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Review article

# Can Mexico be competitive in the forest sector from a financial perspective?

# ¿Puede México ser competitivo desde la perspectiva económica en el sector forestal?

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**Abstract**

Throughout its history, Mexico has not been characterized as a competitive country in the forest sector. However, certain conditions and circumstances could promote its significant economic takeoff. The purpose of this paper is to analyze these factors and their feasible application in Mexico. The conditions that define competitiveness and the factors that characterize them are examined from a commercial perspective with a spatial focus, ranging from local to regional, national, and, ultimately, international competitiveness. Mexico's competitiveness in terms of timber products is conditioned by forest land tenure, in two modalities: *ejido* and communal. The factors that determine competitiveness under either of these conditions are considered as follows. The challenges that must be overcome to improve the competitiveness of the sector, as well as a list of the opportunities that Mexican forests offer for this purpose, are examined herein. Finally, recommendations are established to improve the competitive level of the country's forest sector. Emphasis is placed on adopting modern technologies, designing public policies with a short-, medium- and long-term vision, an efficient public administration, an appropriate regulatory framework, the availability of financing and accessible subsidies, and the necessary training and advice at all stages of the production and value chains. The promotion of forest plantations to increase production and productivity of the national forest sector is highlighted.

**Keywords:** Forest competitiveness, *eidos* and community forest lands, federal government, forest legislation, forest plantations, forest policy.

**Resumen**

A lo largo de la historia, México no se ha caracterizado por ser un país competitivo en el sector forestal. Sin embargo, existen condiciones y circunstancias que podrían promover un significativo despegue económico del sector. El propósito del presente trabajo es analizar tales factores y su factible aplicación en México. Se analizan las condiciones que definen la competitividad y factores que las caracterizan desde una perspectiva comercial con visión espacial. Se parte de la condición local, y subsecuentemente regional, nacional y finalmente la competitividad en el plano internacional. La competitividad de México, en términos de productos maderables, está condicionada básicamente por la tenencia de los terrenos forestales, en dos modalidades: ejidal y comunal. Se consideran los factores que, bajo esta condición, determinan la competitividad. Se presenta un análisis de los

retos que se deben superar para mejorar la competitividad del sector, también se hace una enumeración de las oportunidades que los bosques mexicanos ofrecen para dicho propósito. Al final, se establecen recomendaciones orientadas a mejorar el nivel competitivo del sector forestal del país. Se enfatiza en adoptar tecnologías modernas, diseñar políticas públicas con visión de corto, mediano y largo plazo, una eficiente administración pública, un apropiado marco regulatorio, así como la apertura de financiamiento y subsidios accesibles, sin faltar la necesaria capacitación y asesoramiento en todas las etapas de las cadenas productiva y de valor. Se destaca la promoción de plantaciones forestales para aumentar la producción y la productividad del sector forestal nacional.

**Palabras clave:** Competitividad forestal, ejidos y terrenos forestales comunitarios, gobierno federal, legislación forestal, plantaciones forestales, política forestal.

# Introduction

Porter (1990) poses the question, "Why is it that, in international competitions, some countries succeed and others fail?". He goes on to add, "... in all nations competitiveness has become one of the central concerns of government and industry…".

Certain countries that have developed a highly productive forest sector, where the production and export of forest products are a source of significant contribution to the national economy, are often mentioned. Such is the case of the Scandinavian nations, among others; these nations are said to be very competitive. The competitiveness of the forest sector is a prerequisite for accessing the multiple benefits that sustainable forest provides to society (Kovalčík, 2011).

The term competitiveness is linked to many factors; it is commonly related to some of the following concepts: low production costs, use of modern technology, sustainable forest harvesting, trained and efficient human capital, highly integrated and efficient production chain, appropriate policies and legislation, forest and environmental culture in society, etc.

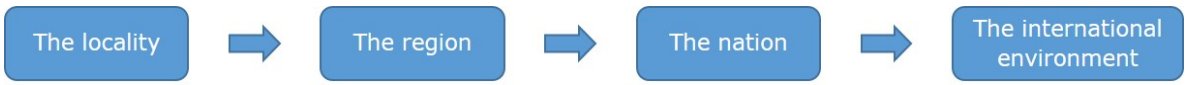
An analysis of Mexico's situation in the national and international context shows that the forest sector has been stagnating indefinitely in a mediocre environment that keeps it far from being competitive. This is corroborated by several important economic indicators such as the Gross Domestic Product (GDP) for forest, the growing deficit in the balance of forest products, the practically stagnant forest production over the last decades, and the limitations of the national forest industry.

The Sectoral Program for the Environment and Natural Resources 2020-2024 (Secretaría de Medio Ambiente y Recursos Naturales [Semarnat], 2020a) highlights four factors that have hindered the development of the forest sector: (A) High opportunity costs of forest activities in the forest industry *versus* other economic activities; (B) Low level of competitiveness of domestic forest products; (C) Low diversification of production, and (D) Low value-added of its products. However, it is considered that there are favorable conditions to reverse these situations. The objective of this contribution is to determine which factors promote competitiveness and how they can be successfully channeled in the country to open new horizons of progress and development in the Mexican forest sector.

# Development and Discussions

## Competitiveness levels in the forest sector

A nation's competitiveness in a specific productive area can be conceived as the result of a gradual spatial process, which is broken down into four stages (Figure 1).




Source: prepared by the authors.

**Figure 1.** Spatial context of competitiveness.

The level of development of a specific sector of the economy and its competitiveness is the result of the evolution and progress through different stages, under a condition of interaction, harmony and complementarity (Figure 1). Table 1 shows the main determinants and factors affecting success at each stage of a nation's competitiveness.

**Table 1.** The four levels of competitiveness of an economic sector and the main determinants of success at each stage of competitiveness development.

| Level of competitiveness | Determinants of success |
|---|---|
| 1. The location<br>The company within the local Environment (Tangible assets) | Survival factors (structure, organization, capitalization, human resources, etc.)<br>Condition of existing local infrastructure<br>Sufficient, consistent and timely supply of supplies |
| 2. The región<br>The company at regional or state level | Integration of development nuclei<br>Cluster formation<br>Competition among existing companies |
| 3. The nation<br>The national industry (from the perspective of the group of companies that make it up). | Support policies<br>Role of the Federal Government<br>Legislation and regulations<br>Role of national institutions<br>Government management and administration |
| 4. The international environment<br>Export capacity of the company | Comparative and competitive advantages |

Source: Author's development based on Peirano (2014).

## Factors affecting each stage of competitiveness

Medeiros et al. (2019) refer to three types of factors that affect a company's competitiveness: (A) Business, (B) Structural, and (C) Systemic. In the case of business factors, the company has substantial control over them, and they are the result of the company's accumulation of knowledge.

On the other hand, the company does not have full control over structural factors. This is the case of supply, demand, and institutions outside the market, which nevertheless define important aspects such as incentives, regulation, marketing systems, and access to international products.

The company has very little or no control over systemic factors. These generate externalities for the company, such as the quality and cost of energy, transportation, telecommunications, basic inputs, and macroeconomic aspects in general.

## The company in the local environment

The point of departure of a solid process to improve the competitiveness of a nation's forest sector, with a special focus on the production chain, is the company in its local environment. Tañski et al. (2007) highlight the fact that, in order to develop an export market, small and medium-sized enterprises (SMEs) need to be competitive. This condition must be achieved initially in the domestic market and then scaled up to the regional and international levels. In the particular case of Mexico, where forest ownership is predominantly collective, improving the competitiveness of *ejidos* and

communities is a priority. For this purpose, Tañski et al. (2007) suggest that companies: (A) Adopt a suitable production scale, (B) Develop product differentiation, and (C) Solve their process issues, which entails quality and continuity of production. In the case of the individual company, it is especially relevant to evaluate the most appropriate location and size of the business unit, as a requirement for competitiveness.

In the initial stage of the production process, the competitiveness of the forest company depends on both intrinsic aspects and endogenous variables specific to the locality where it operates. In the first case, the main issues are often a consequence of the lack of knowledge and inexperience in the structure, organization, operation, commercialization, or the lack of a system for the production process on the part of the managers, owners, or persons in charge of the incipient company. In the second case, these are local factors or circumstances that invariably have a direct impact on the company, including the accessibility and cost of the production factors: land, labor, raw materials, supply of basic inputs for production, as well as the availability of machinery and equipment, transportation, energy, and capital (Peirano, 2014).

A basic condition for the efficient operation of forest companies is to have a sufficient and timely supply of timber inputs for the operation of sawmills, panel mills, or pulp and paper mills. Furthermore, the availability of an adequate infrastructure in the locality is essential for the efficient operation of the company.

Alianza Ecoforce de Mexico A. C. (2010) establishes four stages in the process of developing and improving business competitiveness (Table 2). According to the suggested classification, the period under analysis corresponds to the first level of competitiveness, defined as Stage I: Incipient. In this case, the company is extremely fragile and vulnerable, as it operates under market pressures, lacks competitive principles, and often lacks a specific direction. This is the most unstable period for companies, during which most of them fail. In Mexico, SMEs face a high risk of failure.

According to the National Institute of Statistics and Geography (Instituto Nacional de Estadística y Geografía [Inegi], 2020), approximately 33 % of companies become insolvent in their first year of activity, and 75 % close in less than two years.

**Table 2.** The four stages of of competitiveness.

| Stage | Evolution | Level |
|---|---|---|
| Stage I | Incipient | Very low level of competitiveness |
| Stage II | Acceptable | Fair level of competitiveness |
| Stage III | Superior | Good level of competitiveness |
| Stage III | Outstanding | Very high level of competitivenesst |

Source: Information provided by Alianza Ecoforce de Mexico A. C. (2010).

## The company at a regional or state level

Within the borders of a nation, there are regions or states that, due to their natural conditions, such as the existence of commercial forests or jungles, favor the proliferation *in situ* of organizations that, although with different business lines, are oriented toward the exploitation of natural resources. This circumstance is favorable for forest companies, as it makes more and better infrastructure available to them, reduces the transportation costs, generates more interaction and communication with forest producers, and provides better-qualified labor.

This situation often promotes the formation of what are known as clusters, a concept ascribed to Michael Porter (1990) and defined as geographically concentrated groups of interrelated companies, specialized suppliers, service providers, firms from relevant industries and related organizations in certain areas that compete but are also

conducive to shared work (Oxford Research AS, 2008). Under these conditions, the industrial cluster is an integrated structure, consisting of interconnected, legally independent enterprises, as well as support institutions for the main industry and other related industries that have technological and other interrelationships and are oriented towards a common market of resources or consumers, united by an innovative program (Smolentsev et al., 2018).

Although the cluster concept in Mexico has been discussed and revisited in certain documents on forest issues, it has not yet been applied within the productive context of the forest sector. Some cases have been reported in the literature, such as the sustainable forest industry cluster in the state of *Jalisco*, created in 2014, which is made up of trade organizations, service providers, nurseries, industrial chambers, and furniture manufacturers (Secretaría de Medio Ambiente y Desarrollo Territorial [Semadet], 2021). Another example is the "wood-furniture cluster" in the state of *Oaxaca*, which promotes the fundamental cooperation of community forest companies in the state, as well as other types of companies, with educational institutions and government agencies (Gobierno del Estado de Oaxaca, 2018).

Luján Álvarez et al. (2016) analyzed the sustainable community forest development in the Northern region of Mexico, particularly in the states of *Durango* and *Chihuahua*, as a regional forest cluster system. In this regard, they emphasized that this strategy promoted greater competitiveness and socioeconomic development, which favored sustainable forest management and other potential benefits. The authors point out that community forest enterprises (CFEs) are subject to high domestic demand, although they sell at higher prices than those of international markets; they recognize that this forest region in Northern Mexico is characterized by inefficient production, productivity, and marketing processes, resulting in high timber production costs and lower competitiveness than imported products.

## The group of companies that make up the national industry

Exogenous factors, *i. e.,* those that transcend the local environment, creating or establishing business operating conditions and standards in the national and global context, must be considered. In this regard, the macroeconomic, fiscal, financial, legal, social, and institutional conditions of the country have an impact (Peirano, 2014). Prominent among these are the demand, interest rates, growth rates, energy situation, technological changes, information technologies, etc., including the impact of climate change.

The degree of development that a country's forest industry can achieve depends largely on the political, productive, ecological, economic, technological, institutional, legal, and social structure that characterizes it. In Mexico, forest policy and legislation have been mostly federal; however, the notably diverse conditions that characterize the states have a significant impact on the conditions under which the state forest sector develops. It also depends on the degree of priority given to the forest sector by the authorities in office, particularly the federal executive. Therefore, it is important to consider the investment climate and policy, the macroeconomic and political stability, the tax market, the labor market context, and intellectual property rules, among others (Suñol, 2006).

## The company in the global context

There are several factors that favor forest competitiveness at the international level. Among them, the existence of comparative and competitive advantages stands out.

Samuelson and Nordhaus (2006) state that comparative advantage establishes that each country benefits by specializing in the production and export of goods that it can produce at a relatively low cost, and by importing the goods it produces at a relatively high cost. Porter (1990) structured a diamond model, which describes a nation's competitive advantage through four attributes: (1) Factor conditions, (2) Demand conditions, (3) Related and supporting industries, and (4) Firm strategy, structure and rivalry.

From the point of view of the forest sector, a favorable condition for a nation to take off in terms of competitiveness is to have a significant endowment of forests or commercial natural resources as the basis for a thriving forest industry. This has been the case in Canada, the United States of America, and several European countries. However, certain countries that have not had this capacity have been inclined to create an important forest resource from plantations of commercial species with high international demand, as Brazil and Chile have done. Another alternative has been to resort to timber imports to develop an important industrialization and commercialization process, as evidenced, among others, by Japan and Germany.

## The case of *ejidos* and forest communities

Regarding land tenure, Mexico stands out globally, particularly in terms of forest ownership. There are 32 210 agrarian nuclei in Mexico, of which 29 798 are *ejidos* and 2 412 are communities; 49 % of the forest area is occupied by *ejidos* and communities (Comisión Nacional Forestal [Conafor], 2023). Over time, some situations inherent to their community status have slowed down the development of

these agricultural centers. One aspect that has had an important impact on the productive performance of these communities has been their enormous ethnic, cultural and social diversity. Regarding forest production levels, there are *ejidos* that sell only standing timber, while others sell round wood and some have managed to integrate an industry, producing boards, panels, and other products, even furniture (López González et al., 2024). However, it is noted that, in general, *ejidos* and forest communities are not competitive. This is due to various circumstances, among them: high production costs, poor training, poor organization, lack of planning and follow-up in the medium and long term, and limited associativity (Cubbage et al., 2013; Luján Álvarez et al., 2016). Within this context, it has been stated "...that the new macroeconomic scenarios and globalization trends urgently demand that community enterprises be more competitive, sustainable, and able to respond objectively to the realities and preferences of future markets..." (Alianza Ecoforce de México A. C., 2010). In this regard, for years it has been suggested to design a framework of incentives to support producers, in order to promote an integrated and diversified management of their forests (Segura et al., 2003). Some recommendations for improving the productivity and competitiveness of community enterprises are listed below:

(A) Intensive training program with a focus on business strengthening

(B) Facilitating access to markets and the supply chain

(C) Investment in technology and machinery

(D) Diversification of products and services

(E) Financial support and access to preferential credit at low interest rates

(F) Promoting sustainable forest management

(G) Promoting progress in value chains

# The competitiveness of the Mexican forest sector: opportunities and challenges

## Opportunities

Mexico offers conditions that provide important opportunities to improve its forest productivity and competitiveness. In this regard, the following stand out:

**High potential for commercial plantations.** Through recent decades, the establishment and development of commercial forest plantations have been promoted with the purpose of increasing timber production and reducing the supply of wood from natural forests, encouraging the development alternatives in the rural areas of the country. In the 2000-2018 period, 350 000 hectares of commercial plantations were established in the country. Of this total, 226 000 were oriented to timber production (Conafor, 2025; Organización de las Naciones Unidas para la Agricultura y la Alimentación [ONUAA], 2010; Semarnat, 2021). In this regard, the following tested favorably: eucalyptus (*Eucalyptus* spp.), red cedar (*Cedrela odorata* L.), pine (*Pinus* spp.), teak (*Tectona grandis* L. f.), and beechwood (*Gmelina arborea* Roxb. *ex* Sm.). The plantation areas were located mainly in tropical conditions in the states of *Tabasco*, *Veracruz*, *Campeche* and *Chiapas* (Fierros, 2015).

The experience gained during the 27 years following the implementation of the Commercial Forest Plantation Development Program (*Prodeplan*) has evidenced the availability of favorable conditions for channeling large tracts of land to this profitable

activity. For the Gulf-Southeast region, increases in the order of 35 $m^3$ $ha^{-1}$ $year^{-1}$ have been recorded, with 8-15 year shifts (Musálem, 2006).

The greatest limitations in this respect are the lack of credit, the pulverization of the land, and the lack of an adequate organization for production within the communities (Galicia Sarmiento et al., 2023). The substitution of timber production, which today comes from natural forests, for the harvest obtained from commercial forest plantations represents the best alternative to promote the country's forest competitiveness. It may also provide an opportunity to reverse the balance of international trade in forest products and turn Mexico into a major exporter of products derived from forests and jungles.

**Diversity of forest species with commercial potential.** The jungles, located in the Southeastern region of the country, are characterized by a remarkable plant diversity, including many tree species. Most have been little studied, but several are estimated to have a potential for diverse uses and offer options for development into commercial plantations (Musálem, 2006). Orantes-García et al. (2013) cite the multipurpose timber harvesting of six native tree taxa by local inhabitants in the *Selva El Ocote* Biosphere Reserve, *Chiapas*. In this regard, the following stand out: *Cedrela odorata* (cedar), *Cordia alliodora* (Ruiz & Pav.) Oken (Spanish elm), *Terminalia obovata* Cambess. (river cluster-leaf), *Swietenia macrophylla* King (mahogany), *Heliocarpus donnellsmithii* Rose (*majagua*), and *Croton guatemalensis* Lotsy (*copalchi*).

**The Free Trade Agreement between Mexico, the United States of America and Canada (USMCA) and free trade agreements.** The existence of this treaty opens up important prospects for the export of forest products, particularly to Canada and the United States of America within the framework of the treaty in force as of 2020. Mexico is currently the leading exporter to the United States of America. It also participates in 12 free trade agreements with 46 countries. Within this context, an appropriate international trade policy can have a substantive impact on promoting

the competitiveness of Mexican timber products. At the same time, it would make it possible to progressively reduce the deficit of forest products, which in 2023 was US $7 483.87 million (Conafor, 2025). For years, Mexico has exported to North America various products such as cellulose, paper, and wood derivatives, including laths and moldings, windows, doors, cellular boards, boxes, and pallets, among others (Semarnat, 2021). USMCA provides preferential access to one of the most powerful markets in the world, encouraging foreign investment and foreign trade. This translates into a higher employment rate, in addition to promoting the country's economic development (Fernández Hernández & Bravo Benítez, 2023).

**Abundance of labor.** This important comparative advantage has been decisive for the installation and operation of international industries in Mexico. It also offers an attractive potential to promote the nearshoring of international forest industries on Mexican soil. However, some companies consider that there are obstacles to setting up in Mexico, such as electric power issues, water scarcity, insecurity, and lack of a regulatory framework (Fernández Hernández & Bravo Benítez, 2023).

**Unbeatable geographical location.** Mexico's strategic location in North America has opened the doors to a relevant potential market for forest exports to the United States, Canada, and, in general, to the rest of the continent. Among other advantages, this situation has promoted increased foreign investment, greater access to Mexican products, logistical advantages such as reduced costs and improved transportation structure, and greater economic diversification (Chávez et al., 2019).

## Challenges

Specific challenges implying the effective involvement of both the Federal and State governments, as well as society at large, particularly those closely linked to the forest sector, must be overcome.

**Improving the sector's production chain.** The conditions under which many forest SMEs operate in Mexico have revealed limited coordination, interconnection, and communication between the links in the production chain, which have, over the years, highlighted several deficiencies, including, in general, obsolete infrastructure that operates primarily with inefficient technologies. In some cases, there are strong limitations to community organization and commercialization. Additionally, some forests are subjected to overexploitation, illegal logging, and significant deforestation. In another geographical context, in the case of *Merco Sur*, the following are considered as systemic determinants of competitiveness: (i) Natural resources and climate, (II) Transportation and port infrastructure, (III) Macroeconomics and socio-political stability, and (IV) Social infrastructure (Osimani & Paolino, 2004).

**Effective fight against the illegal production chain.** For a long time, Mexico's forests have been subject to significant illegal exploitation, industrialization, and commercialization of their products. Efforts by the Federal Environmental Protection Agency (*Profepa*) and state governments to curb this scourge have been ineffective. Unfortunately, this serious problem has so far no solution on the horizon, as it is largely the result of the significant growth of criminal organizations, as well as the poverty conditions prevailing in rural Mexico.

**Modernization of productive infrastructure.** Except in a few companies, most industrial facilities are obsolete and inefficient. There is a predominance of low-value-added industries such as sawmills, in contrast to chipboard and paper mills. The

sawmill industry has been characterized by low capital intensity, low productivity facilities, deficient technological equipment, and low raw material conversion efficiency (Sawmilling ratio of 50 %) (Flores-Velázquez et al., 2007). The scarce liquidity of most companies has limited their ability to renew their infrastructure. Federal and state government support for the community forest industry has generally been scarce and discontinuous.

**Promoting Sustainable Forest Management.** At a national level, the forest area under harvesting in 2020 was 5.5 million hectares (Semarnat, 2021), equivalent to 25 % of the potential commercial forest area. This situation is partly due to the enormous heterogeneity in the forest production and value chain that prevails in the universe of community forest enterprises in the country. The existence of conflicts and limitations in the forest *ejidos*, such as a deficient or lacking infrastructure (equipment, machinery, forest roads and trails, the absence of a management plan), should also be considered; the same applies to various types of internal conflicts, including resistance to change, as well as to a variety of problems specific to the *ejido* assemblies (Madrid et al., 2009).

**Land tenure conflicts.** In Mexico, there is an important forest area that remains idle, *i. e.*, that is not subject to harvesting. This is largely due to conflicts over land tenure. A frequent cause responds to claims and demands regarding the boundaries and location of properties by local communities. Another important aspect is the lack of precise and clear rules that guarantee the integrity of common lands and contribute to reducing land tenure security. In many cases, this point is related to the lack of legal certainty (Zarazúa & Gómez-Carreto, 2013).

**Strengthening the domestic market.** Promoting the consumption of forest products produced in the country to replace the increasing imports of such products. For years in the past, the Federal Government promoted an import substitution policy that proved successful. It is considered that this policy can be promoted again

under the conditions of the current economic environment. It may include the provision of subsidies, especially to the *ejido* forest industry, the effective fight against the commercialization of illegitimate forest products, the application of tariffs on imported products, and the promotion of educational campaigns to raise awareness in society.

**Promotion of forest product exports.** Article 20, paragraph XVI of the General Law on Sustainable Forest Development (Semarnat, 2018) establishes among the powers conferred on Conafor, to promote and favor the forest production chain and its associated resources, promoting diversified and integrated forest activities, as well as the export of processed forest products and their derivatives. However, the country has not, in general, carried out campaigns for the export of timber products, 14) even though there is a significant potential in this regard.

In the Statistical Yearbook of Forest Production in Mexico (Semarnat, 2021), the main timber products exported in 2018 were as follows: laths and moldings, windows, doors, cellular boards, boxes and pallets, as well as charcoal and firewood, for an estimated sum of 2 715 million USD. This suggests a potential for exporting manufactured and other value-added products based on the recognized creativity of various groups and organizations that work with wood in Mexico. It is considered advisable for the Federal and State governments to develop public policies to promote this activity.

**Promoting research, technological development, and innovation (production chain).** There is an urgent need to overcome the obsolescence of the forest production sector resulting from a significant technological backwardness. This situation calls for greater support for research, innovation, and technological development. Although funding for these tasks has improved in recent decades, most financial resources are channeled toward theoretical research, with limited emphasis on applied research, *i. e.*, research oriented toward problem-solving. Given the major issues affecting the forest sector, this should receive greater support.

It has been pointed out that it is not only enough to generate knowledge, but the most important thing is to apply it (Segura-Bonilla, 2002). In several countries, such as Mexico, research and higher education institutions work every day to generate innovation and new technological developments. However, much of the new knowledge they provide does not land in the productive and operational areas of the company. Under these conditions, it is advisable to create and operate mechanisms for the dissemination and transfer of technology. National extension services are an example of this.

Scandinavian countries developed the concept of a National Innovation System to achieve sustainable development based on: (A) Formal organizations, (b) A production structure, (c) An institutional base, (d) Economy-ecology relations, and (e) Sector policies (Segura-Bonilla, 2002).

# Conclusions

Mexico exhibits favorable potential conditions for significantly improving its level of competitiveness; the most prominent of which are:

(I) Given the tenure status of forest lands, the starting point for improving the level of forest competitiveness is the empowerment of farmers' organizations. These must be advised, trained, and accompanied permanently regarding both forest matters and economic, administrative, business, industrial, and commercial disciplines. Within this context, it is essential to maximize the value added to the timber input obtained from the forest.

(II) Although policies and strategies to promote forest development have been supported and encouraged in the past, instability within government bodies, lack of continuity in government programs, limited financial availability, and lack of direction in forest sector planning have disrupted the continuity of forest development. Today, more than ever, a realistic long-term forest plan needs to be developed and effectively implemented.

(III) In recent decades, the production potential of commercial forest plantations in Mexico has become evident. The existence of appropriate land and ecological conditions, among others, opens a wide range of possibilities to achieve self-sufficiency in forest products in the coming years and, subsequently, to promote their exportation. For this purpose, the three levels of government need to support a new, aggressive plantation program.

At the beginning of a new stage of government, the conditions are favorable for developing and implementing a new long-term forest policy, aiming to channel the country towards sustainable forest development and render Mexico a competitive country in the forest and natural resources sector.

# Recommendations

As a result of the present analysis, the following recommendations are suggested:

**Adopting modern technologies.** In order to attain competitive levels, it is necessary to renew and modernize the production plant using modern, high-performance equipment and machinery. Such is the case with the machinery used in sawmills, wood-cutting tools, biomass-processing equipment, and the acquisition of

monitoring and control equipment, as well as the incorporation of automation systems (Instituto Nacional de Investigaciones Forestales, Agrícolas y Pecuarias [INIFAP], 2022; Tamarit-Urías et al., 2021).

**Promotion of commercial forest plantations (CFP).** The 1992 forest law was amended in 1997. A major insertion in this new legislative version was Article 33 (Secretaría de Gobernación, 1997). This formalized the creation of measures, programs, and financial instruments to promote investment, among others, for the sustainable harvesting and multiple use of forest resources. Thus, the subsidy programs for the forest sector were born, during the administration of President E. Zedillo. One of the most relevant was the Commercial Forest Plantation Development Program (*Programa de Desarrollo de Plantaciones Forestales Comerciales*, *Prodeplan*). Semarnat (2020b) has described this program as "a strategy to increase the country's forest production, improve the productivity and competitiveness of forest raw materials, contribute to reducing the national deficit in the supply of forest raw materials, and generate sustainable development alternatives in the rural regions of the country". The same source points out that, in Mexico, 9 % of forest production already comes from CFP. Undoubtedly, this production alternative is the best option for Mexico's future forest development.

**Training and consulting.** For decades, community organizations have been working with limited support or guidance from public sector institutions in the harvesting of their forest resources. On the other hand, educational and technological institutions, which have traditionally been devoted to formal education, have done little to promote and implement training with a productive approach. In order to improve the level of competitiveness of *ejidos* and forest communities, it is imperative to establish intensive forest training systems along the forest production and value chain, covering these four basic aspects: (A) Forest Management, (B) Sourcing, (C) Industrialization, and (D) Marketing. Likewise, it is necessary to train the farming communities, among

others, in the development of entrepreneurial skills, business management, and international trade and market. There is a need to counsel the *ejidos* with a multidimensional approach that will cover the technical, organizational, administrative, financial, technological, market, and environmental angles (Luján Álvarez et al., 2016).

**Long-term vision for the sector.** Policies to promote effective success in the forest sector must be designed with a short-, medium-, and long-term vision. Unlike agricultural policy, which is typically based on short-term systems and crops, forest ecosystems and plantations must be considered in planning schemes that will span multiple years' production cycles. This is of enormous importance in the case of Mexico, where the federal executive is replaced every six years and a new National Development Plan is adopted, necessitating the periodic generation of new policies and strategies for the next six years. Based on these considerations, the General Law of Sustainable Forest Development in force (Semarnat, 2018) in the framework of Article 35 of Section One, establishes that Forest Development Planning shall include a long-term projection (for twenty-five years or more). In this regard, it should be noted that the only long-term forest program that the country has had (Strategic Forest Program) concludes in 2025 (Conafor, 2001).

**Transparent, agile, and expeditious public administration.** In all nations, there is a national government entity responsible for the design, implementation, and evaluation of each sectoral public policy. In the case of Mexico, public policy for the forest sector is primarily the responsibility of the Ministry of the Environment and Natural Resources, with substantive support from the National Forest Commission. Together, these two institutions perform a role equivalent to that of the National Forest Services in other countries. However, throughout contemporary Mexico, public administration has been characterized by over-regulation and a high burden of bureaucratic procedures, which has led to increased production costs and negatively affected the sector's competitiveness (Semarnat, 2020b).

In contemporary Mexico, public forest administration has also been a source of significant instability and frequent changes in terms of both structure and functions, as well as levels of financing and sources of dependence (Caballero, 2000). For decades, public forest administration in Mexico has suffered from a high level of bureaucracy, which has been tortuous, slow, and, in many cases, discretionary. Such circumstances have been significant factors limiting the success of many past policies.

**Regulatory framework.** Every public policy requires a realistic and practical regulatory basis for its proper implementation. Today, more than ever, a regulatory framework is needed that, far from inhibiting, promotes sustainable forest resource management.

**Financing, subsidies, and effective support policies.** Substantial and consistent financial support is needed to support, in particular, forest harvesting, sourcing, and the *ejido* and communal forest industry. Access to capitalization, investment, and financing mechanisms should be promoted (Dávalos Sotelo & Morosini Cordero, 2000; Merino et al., 2008).

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## Conflict of interest

The author confirms that there was no conflict of interest at any time during the preparation of this document.

**Contributions by author**

The article was prepared solely and entirely by the author.

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