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Review article

Approach to the Spanish forestry sector

Aproximación al sector Forestal de España

Abordagem ao sector Florestal Espanhol

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ABSTRACT

The Ministry of Agriculture, Fisheries and Food of the Government of Spain pointed out that the forestry industry accentuates its great diversity of species and trees and a multifunctionality of goods and services. The contribution of the wood industry pointed to a wide range of indirect economic activity (extensive livestock farming, nature tourism, fire extinction) of the Spanish forestry sector. In order to protect these activities and the natural environment in general, the Spanish Forestry Strategy was developed, a forestry policy program for the sustainable management of private and neighborhoods forests, as almost 70 % of Spanish forests are private. Spain was among the 130 countries that agreed on National Forest Plans for the development of a comprehensive forest management policy. Therefore, the general objective of this research was to investigate the evolution of the forestry sector in Spain during the last two decades of the 21st century, based on two variables: employment and foreign trade. To this end, an inductive method was used to carry out a quantitative and descriptive analysis, based on secondary sources of information. The result required the identification of the main sectors of the national forest industry (wood, pulp, paper and/or furniture), the positive evolution of the Spanish forest sector and the significant investment in forest policies such as fire extinction

Keywords: Spain; Foreign trade; Employment; Forestry sector; Economic policy.

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RESUMEN

El Ministerio de Agricultura, Pesca y Alimentación del gobierno de España señaló que la industria forestal acentúa su gran diversidad de especies y arboladas y una multifuncionalidad de bienes y servicios. La contribución de la industria de la madera señaló una amplia actividad económica indirecta (la ganadería extensiva, el turismo de naturaleza, la extinción de incendios) del sector forestal español. Para la protección de estas actividades y del medio natural, en general, se desarrolló la Estrategia Forestal Española, un programa de política forestal para la gestión sostenible de los montes privados y vecinales, pues cerca del 70 % de los bosques españoles son privados. España se encontró entre los 130 países que acordaron los Planes Forestales Nacionales para el desarrollo de una política forestal integral de ordenación. Por consiguiente, el objetivo general de esta investigación fue indagar sobre la evolución del sector forestal en España durante las últimas dos décadas del siglo XXI, a partir de dos variables: el empleo y el comercio exterior. Para ello, se siguió un método inductivo en la realización de un análisis cuantitativo y descriptivo, a partir de fuentes de información secundarias. El resultado precisó la identificación de los principales sectores de la industria forestal nacional (la madera, la pasta, el papel y/o el mueble), la evolución positiva del sector forestal español y la significativa inversión en políticas forestales como la extinción de incendios.

Palabras clave: España; Comercio exterior; Empleo; Sector forestal; Política económica.

SÍNTESE

O Ministério da Agricultura, Pescas e Alimentação do Governo de Espanha assinalou que a indústria florestal acentua a sua grande diversidade de espécies e árvores e uma multifuncionalidade de bens e serviços. A contribuição da indústria da madeira apontou para uma vasta gama de actividades económicas indirectas (pecuária extensiva, turismo natural, extinção de incêndios) do sector florestal espanhol. A fim de proteger estas actividades e o ambiente natural em geral, foi desenvolvida a Estratégia Florestal Espanhola, um programa de política florestal para a gestão sustentável das florestas privadas e vizinhas, uma vez que quase 70 % das florestas espanholas são privadas. A Espanha estava entre os 130 países que acordaram Planos Florestais Nacionais para o desenvolvimento de uma política de gestão florestal abrangente. Por conseguinte, o objectivo geral desta investigação era investigar a evolução do sector florestal em Espanha durante as duas últimas décadas do século XXI, com base em duas variáveis: emprego e comércio externo. Para este fim, foi utilizado um método indutivo para realizar uma análise quantitativa e descritiva baseada em fontes secundárias de informação. O resultado exigiu a identificação dos principais sectores da indústria florestal nacional (madeira, pasta, papel e/ou mobiliário), a evolução positiva do sector florestal espanhol e o investimento significativo em políticas florestais, tais como a extinção de incêndios.

Palavras-chave: Comércio externo; Emprego; Espanha; Sector florestal; Política económica.

INTRODUCTION

The Diagnostic Report on the Spanish Forestry Sector (2014) points out that the forestry industry enhances its great diversity of species and tree formations, as well as contributing to the wood, firewood and paper industry. It is a sector characterized by indirect economic activity: hunting, extensive livestock farming, nature tourism and fire extinction, in other words, attention to the environmental variable within

local development policies. In this way, and in favour of rural protection and the natural environment, the Spanish Forestry Strategy is being developed, a program of environmental and forestry policy for the sustainable management of private and communal forests, since almost 70 % of the national forests are private. Spain is one of the 130 countries that have agreed on program or National Forest Plans (NFPs) for the development of a comprehensive forest management policy.

The main sectors of the forestry industry (wood, pulp, cork, paper and/or furniture) stand out for their volume of activity, as well as for their increase in production and their foreign trade performance in recent years, this being a variable to be observed in this research. In addition, the revealing and investing role of the European Union (EU) LIFE+ Program in green technology research and innovation is also important. The European Forestry Strategy and the EAFRD (European Agricultural and Rural Development Fund) are in force, as it is the main EU structural fund responsible for rural development in Spain, with an allocation of approximately 8,000 million euros to be invested during the period 2014-2020. Spanish forestry policy requires two development instruments: legislative instruments such as the Forestry Law and planning instruments, where the Forest Resource Management Plans, among others, are emphasized. This leads to environmental strategies on recycling, waste optimization, environmental certification or energy efficiency. On the other hand, it generates new sources of employment in rural areas such as ecotourism (Zaimes *et al*., 2019), the activity of conservation or monitoring of the natural environment (Ezquerro, Pardos and Diaz-Balteiro, 2019) or professionals to attend to forest fires; in short, the series called "green jobs", the second variable to be observed in this research.

With regard to the review of the literature, the area of study is recognized in the 20th century and advances in the 21st century, so a booming research topic is identified. The origin of Community Forestry Development and the empirical evolution is found in the concept given by the United Nations Food and Agriculture Organization (FAO 1978): "any situation that intimately involves local people in a forestry activity". This concept includes both activities carried out by families or individuals who are farmers and those carried out by the community as a whole. In the mid-1970s, it was confirmed that development strategies based exclusively on industrialization did not work; both the theory and the practice of forest development began to focus on the rural world, devoting greater effort to meeting the basic needs of rural populations. In practice, among the objectives of the first initiatives on community forestry development is to end the shortage of firewood, since reforestation is believed to be an appropriate way of solving it, by initiating different projects such as the creation of forest plots in Korean villages, social forestry programs in India or reforestation actions in Tanzanian villages, among others. FAO concludes from the results obtained that reforestation alone will not end the poverty of rural populations or increase the commercial wood sector.

The notion of reforestation responds to "those techniques necessary to create a stable forest plantation (...) in a land whose current vegetation is ineffective to a greater or lesser degree according to the use assigned to the territory, and that, adopting the desired characteristics, fulfills the purposes demanded of it" (Serrada 1995). On this subject, Ramos-Gorostiza (2006) mentions the definition of Groome (Groome 1990) and his study on the Spanish forest, in particular the appearance of the General Plan for Forest Replanting in 1939, which proposed the repopulation of six million hectares in one hundred years, although it would end up focusing on intensive wood production to compete in the national market. Similarly, Gómez and Mata (1992) refer to the consideration that in forest policy there is a mixture of "protective objectives and the constitution and expansion of the forest heritage, which generate wealth in the long term, and more immediate motives". On the other hand, the concept of Forestry

Industry, from chapter 68 of the Encyclopedia of the International Labour Organization (ILO), cites that "the forestry industry includes all the tasks necessary to establish, repopulate, manage and protect forests and to exploit their products". Forest resources vary in different parts of the world and these differences have direct effects on the technologies used in forestry and on performance. Regarding the evolution of the forestry sector, "at first, the purposes of the exploitation of the forests were almost exclusively for subsistence: food, firewood and construction materials", but there was a sharp reduction in the forest area throughout the world. planet that worsened with the first industrialization, despite deforestation in developing countries; these represent 60 % of the forest area. The countries with the largest forest areas are Russia, Brazil, Canada and the United States (Cuevas, 2001).

In southern Europe, the potential for forest goods and services to contribute to the circular bioeconomy is high (Martínez *et al.,* 2018). According to Martínez and Díaz-Balteiro (2007), Spain's forestry industry is managed in such a way that the services provided by forests take precedence over tangible goods. The three main branches of the wood chain, at national level, are: the wood industry, the paper industry and the furniture industry. The wood industry specifically points out wood construction as the priority (Martínez *et al.,* 2018). This industry is characterized by a cross-sector trade of limited competitiveness and intra-European character. As pointed out by Demaría, Tinoco and Moreno (2014), an intensive type of L-factor employment is being promoted in low-income rural areas, where the forestry sector appears to be the only source of income and economic development. From the Spanish Confederation of Woodworkers (CONFEMADERA), in particular from the headquarters in Galicia, a report of results for the year 2015 is made where again several important ideas are highlighted, such as that in Spain there is a favorable growth of forest trade, both in exports and imports, in four Autonomous Communities: Cataluña, Valencia, Galicia and Andalucía. The case of Galicia is significant, since thanks to the expansion of its forests it has a significant number of timber companies generating jobs, including youth employment. Mention is also made of the growth of forest certification in the same territory, a certification that seeks to ensure sustainable environmental management of forests, while allowing timber companies to market their products with internationally recognized seals[2].According to the different reasons mentioned, and from the Spanish location, the forestry sector has not always been consistent with the exploitation of the mountains of the territory. From the beginning, and once the benefits that Spanish forests provided were discovered, the forestry industry only focused on the production of wood and its derivatives, ignoring the environmental and human effects. Over the years, when observing deforestation, in addition to the depletion of resources and low production, the first forest policies and environmental laws in favour of sustainable exploitation of forests and care of the natural environment began to emerge.

On a scientific level, Iriarte-Goñi (2009) states that Octavio Elorrieta was the first to tackle the concept of Spanish Forest Economics and "he dedicated practically all of his work to designing it". Elorrieta's ideas are oriented towards the economic exploitation of forests from the perspective of monetary policy. According to this, "it can be said that he was the most influential Spanish forest engineer of the first third of the 20th century. As a teacher at the Special School of Forestry Engineers, he transmitted his ideas to several generations of forestry technicians" (Iriarte-Goñi, 2009). In the 1980s, a number of publications on forest economics began to be introduced in Spain, with new ecological and environmental protection trends; the debate on the conflicts that arose around forest use was opened up, considering them to be clashes of interest among the upper classes (Herrera, 1980). At the beginning of the 1990s, and coinciding with the rise of ideas in defence of the environment, works such as those by Aedo *et al.*, (1990) and Groome (1990) appeared, which

analysed the forest with studies carried out by geographers and botanists, to facilitate understanding of the situation of Spanish forests. Over time, this subject came to be considered a scientific discipline, as in 2003 some of the Spanish universities produced a Libro Blanco on Agricultural and Forestry Engineering and, when the 2010-2011 academic year arrived, the degree in Forestry Engineering was introduced. Today, according to Pemán (2019), 44 % of university students come from the field of professional forestry training, which indicates a marked vocation for the forest. Obviously, Aragon (2011) makes an important derivation at world level on the Spanish forest history and its short time frame: "the history of the forest in Spain has a short tradition in comparison with other countries, although it predates the interest in Environmental or Ecological History that, started in the seventies, has been globalized since the nineties of the twentieth century. (...) In spite of everything, Spanish historiography is at the head of the world panorama, next to schools with a greater tradition like the French or the English" (Aragón 2011).

In summary, this bibliographic review of Spanish forest history helps to better understand how research on Spanish forests has proceeded so far, leading to both achievements and shortcomings. It can be said that this is an area of study recognized since the 20th century, with significant potential in the 21st century, although no binding empirical evidence has been found, which points to a scientific limitation that needs to be addressed, as well as prolonged. As Díaz-Balteiro, González-Pachón and Romero (2017) point out, in recent years there has been a great proliferation of works that add sustainability criteria. All this generates scientific curiosity to seek knowledge and observe the current scenario in detail, that is, to investigate the economic activity of the forest and the determinants of the boom in the forestry industry. Therefore, this research aims to understand the evolution of the forestry sector in Spain over the last two decades based on employment and foreign trade.

The present work is composed of three sections, from the relevance and the thematic actuality to reviewing the literature linked to the Forest Economy, in order to set the scientific objective. The consequent method of work is an inductive method, from the descriptive statistics of a series of data extracted from official reports; a section that gives way to the results found. The information collection work was carried out during the 2017-2018 academic year. Subsequently, in order to know the economic activity of the forestry sector, a statistical treatment of the information found was carried out using the Statistical Software IBM SPSS ver. 23, that is, a descriptive statistical analysis was made. The objective of the descriptive analysis was to carry out a quantitative treatment as a pilot study to observe the viability of future investigations. Due to the characteristics of the data collected, the type of descriptive analysis was carried out with the aim of collecting and relating data on various aspects, dimensions or components of the phenomenon to be investigated, in particular data according to two variables: trade and employment.

The descriptive analysis started by identifying as the main source of information the statistics provided by the Ministry of Agriculture, Fisheries and Food housed in http://www.mapama.gob.es/es/desarrollo-rural/estadisticas/

The data processed covered the period from 1995 to 2015. Thus, an inductive method was used based on a series of data taken from official sources: statistics and official reports from the Ministry of Agriculture, Fisheries and Food. The sources of information consulted were secondary, where several official and technical documents predominated, as well as various publications on the Spanish Forest Economy. The main limitations of the research were found in the conditioned number of information sources used. With regard to data collection and analysis, the difficulties encountered were those involved in interpreting the results and integrating

them into broader conceptual frameworks. Likewise, the variables studied were of interest due to their significance, but are subject to being expanded. Finally, the requirement to carry out applied research, directly related to the subjects of study taught in higher education and the quality of the research work of the students who commit their degree closing project, should be considered in order to turn them into editorial goods that find application not only as study materials, but that find practical application within and outside the academic environment.

DEVELOPMENT

Sectorial Scenario

Forests occupied 55 % of Spain's geographical area, so in 2017 "by volume of green area, Spain was at the head of the European Union, and since 1990 has seen its forest cover increase by 33 %". Forests have been an important economic factor as suppliers of forest products, wood and paper. In addition to these industries, Spain's forestry systems must stand out for their multifunctionality, that is, for the amount of goods and services they provide to society and the natural environment. At the same time, we should mention the contribution of non-wood forest products (esparto grass, pineapple, cork, resin, mushroom), where cork accounts for more than 50 % of the production of total non-wood forest products in Spain. According to Martínez and Díaz-Balteiro (2007), as it has already been stated, the main forest industries (wood, paper and furniture industries) presented in 2004 a Gross Value Added (GVA) at national level, higher than 10 700 million euros, that is to say, 11.13 % of the total employed people in the Spanish industry. At a territorial level, according to Díaz-Balteiro (2008), the wood, paper and furniture industry is outstanding in three regions of Andalucía, Extremadura and the Canary Islands.

It is difficult to collect statistical data on non-wood forest products, since the Spanish Forest Science Society (2013) points out that in Spain there are significant advances in the value of non-wood forest products, allowing the formulation of rational management plans and requiring a greater willingness in the economic valuation of these resources (Jiménez-González *et al.,* 2017). It is found that the manufacture of cork "accounts for more than 50 % of the production of non-wood forest products in Spain, and is also the second largest producer in the world". Other non-wood products, according to the Annual and Ministerial Statistics of other forest uses[3], were: chestnuts, pine nuts, resin and truffles or other mushroom that, in general, do not represent a high weight in the national productive activity as wood does, which at a local level represent an important economic injection for the areas where they are extracted and commercialized. In recent years, Spain has reactivated the production of natural resins, as it represents an opportunity for renewable energy (Martínez *et al.,* 2018).

The Annual Indicators Report (2015) shows that, between 1990 and 2014 (Table 1), Spain experienced an increase in forest area, mainly due to the expansion of the wooded area, which went from 13.9 million hectares in 1990 to 18.4 million hectares in 2014.

Table 1. - Evolution and structure of the forest area in Spain

	Years			
Total Forest surface (miles ha)	1990	2006	2014	*Variation Rate*
Forest surface	25 984	27 643	27 738	6,8%
treeless	12 079	9 046	9 346	-22,6%
Wooded/woodland	13 905	18 597	18 392	32,3%
Total Woodland Area (miles ha)	2006		2011	*Variation Rate*
Coniferous surfaces	6 241		6 830	9,4 %
Leafy surfaces	8 479		10 058	18,6 %
Mixed surface	3 369		1 402	-58.4 %

Source: Own elaboration based on the Annual Indicator Report (2015) of the Ministry of Agriculture, Fisheries and Food (Data from AEF 2006, Anuario de Estadística 2014 and Data 1990 IFN2).

In fact, during the last two decades there was an increase in the Spanish forest area of about 7 %, where the main feature is the wooded area, classified as coniferous and hardwood, and with an extension of 32.3 %. This may be due to different factors, such as greater care for the natural environment, public investment, an increase in environmental jobs or the growth of ecological initiatives.

Foreign Trade of the Spanish Forest Economy

Díaz-Balteiro (2008) states that the wood chain constitutes a revealing weight in the national GDP, since during the period between 1995 and 2006, the Spanish Forestry Economy experienced a favourable growth in terms of foreign activity: "in the case of Spain, these exchanges reached 44 % of the Gross Domestic Product in 2006, which meant an increase of nearly 14 billion euros (…)".Following this analysis, on the study of the exports and imports of each Spanish Autonomous Community for the period 2001-2006, the region of Cataluña stands out, since it "absorbed a greater proportion of foreign trade, reaching 27 % of the total forestry industry", followed by the regions of the Comunidad Valenciana and the País Vasco. From a geographical point of view, the Spanish forestry industry is basically intra-European, as nearly 80 % of exports and imports were made in the European Union. The Ministry of Agriculture, Fisheries and Food also stressed the intra-European inclination from the influence of psychological distance in the evolution of destinations, both exports and imports are made to countries that are geographically close. For example, in 2013, almost half of the exports went to France, Portugal and Italy, while imports came mainly from France and Portugal. It was observed that, until 2007, the negative balance remained Table; decreasing between 2007 and 2012. This last observation, on the increase or reduction of foreign forest trade, is indicated in the following tables (Table 2 and Table 3) provided by the Ministry, where the evolutionary process that has concurred to the imports and exports of wood and some of its main derivatives is shown. The growth of firewood exports between 2010 and 2013 was remarkable.

Compared to previous years, where the wood products with the highest nominal value, both in imports and exports, were paper and cardboard, sawn timber, wood panels and pulp. In the case of imports, the increase in housing sales during the housing bubble (1997-2007) may have played a role. Subsequently, in the transition from 2007 to 2008, with the collapse of the real estate sector, there was a significant drop in the level of imports of these wood-based forest products. In future research, it would be interesting to observe the country of origin of the raw materials, as well as to make an extended diagnosis of foreign trade, with the main destination markets

and suppliers, the repercussions of the economic crisis and the recent state of the forests.

Table 2. - Production and foreign trade of wood-based forest products in 2010

Products	Imports		Exports	
	Quantity (1 000 m³)	Value (miles de euros)	Quantity (1 000 m³)	Value (miles de euros)
Firewood	**2**	**202**	**59**	**2.189**
Charcoal	48	13 635	31	9 968
Splinters and particles	900	62 200	20	3 907
Wood waste	455	26 996	283	14 739
Sawn timber	1 324	304 048	151	50 319
Wooden boards	1 018	346 754	2 019	516 361
Paper pulp (wooden)	1 185	507 257	916	596 329
Other types of pasta	4	2 730	17	34 025
Recovered paper	1 277	166 098	665	103 758
Paper and cardboard	4 525	2 158 927	2 952	1 805 933

Source: Data from the Foreign Trade Statistics on Wood and Forest Products (AEAT) of the Spanish Ministry of Agriculture, Fisheries and Food.

The Table 3 considers some of the wood products that appear in both tables. It can be seen that the exports of wood are increasing in 2013 with respect to the exports of 2010. Another relevant fact is the decrease in imports of sawn timber, which will reach 182,036 in 2013. However, paper and cardboard were of regular trend. Attention was drawn to the export and import data, since, for example, sawn timber and wood-based panels differ considerably.

Table 3. - Production and foreign trade of wood-based forest products in 2013

Products	Imports		Exports	
	Quantity (1000 m³)	Value (miles de euros)	Quantity (1 000 m³)	Value (miles de euros)
Firewood	**6**	**204**	**98**	**12 425**
Charcoal	23	8 650	28	12 209
Sawn timber	828	182 036	153	42 488
Paper pulp (wooden)	1 119	563 044	1 184	702 944
Wooden board	919	302 855	1 844	567 409
Paper and cardboard	2 822	2 150 567	2 908	2 036 169

Source: data provided by the Tax Agency, the Industrial Production Survey of the National Institute of Statistics and the industries and professional associations of the first transformation of wood industry (Ministry of Agriculture, Fisheries and Food).

In order to detect the causes of the problems in the Spanish forestry industry, Ortuño-Pérez (2012) begins by recalling the latest economic crisis and the close relationship between the forestry industry and the construction sector. At the same time, he distinguishes the weight between industries of second transformation (they manufacture the final product as furniture, paper or cardboard) and industries of first transformation (intermediate step, as sawmills, plates or boards). Once the worst years of this great economic crisis have passed, and the national forestry sector has

been re-established, many new or surviving companies have improved their competitiveness, so much so that the gap between the forestry industry and foreign trade has narrowed. From the Confederation of Woodworkers (CONFEMADERA), in particular from the Galician headquarters, the woodworking industry is cited as an opportunity for the Spanish economy. According to a publication in 2014, the value of exports amounted to 2 902.3 million euros, 5.5 % more than in 2013. Different solutions to guarantee the future competitiveness of the Spanish forest industry are also presented, such as getting closer to the sectoral model of France or Portugal, as well as promoting the use of wood in all areas of society. From the general secretary of the Association of Spanish Manufacturers of Machinery (AFEMMA), they affirm the rate of continued growth, since from 2015 it closes with a positive aggregate demand, results for the sector of machinery and tools of work of the wood and of the furniture. This underlines the growth that exports have experienced, thanks, among other reasons, to the behaviour of markets such as Eastern Europe, with Poland standing out. The main buyers of wood are, according to AFEMMA's ranking in exports during the last three years, France and Portugal followed by Italy and Germany.

Employment in the Spanish Forestry Industry

According to Díaz-Balteiro (2008), in 2004 there were nearly 292,000 people employed in the forestry industry, that is, 11.13 % of the total number of workers employed in the industry (Industrial Survey of Companies, EIAE). In 2005, more than 30,000 companies were integrated into this business sector, mainly in Catalonia (17.34 %), Andalusia (14.38 %), Valencia (13.57 %) and Madrid (9.38 %). According to Ortuño-Pérez (2012), in 2008 "the number of companies rose to 36,781 and the direct employment generated by them was 312,300 people". It was also noted that in 2011 these figures would be reduced by 30 % and 20% respectively, i.e. about 30,000 fewer forestry jobs. The Diagnosis of the Forestry Sector (2014) of the Ministry of Agriculture, Fisheries and Food shows that in 2012 the industry had 23,200 contracts and by 2013 this figure had risen to 116,000, including the paper industry. The evolution of the employment rate in the forestry industry in recent years is described below.

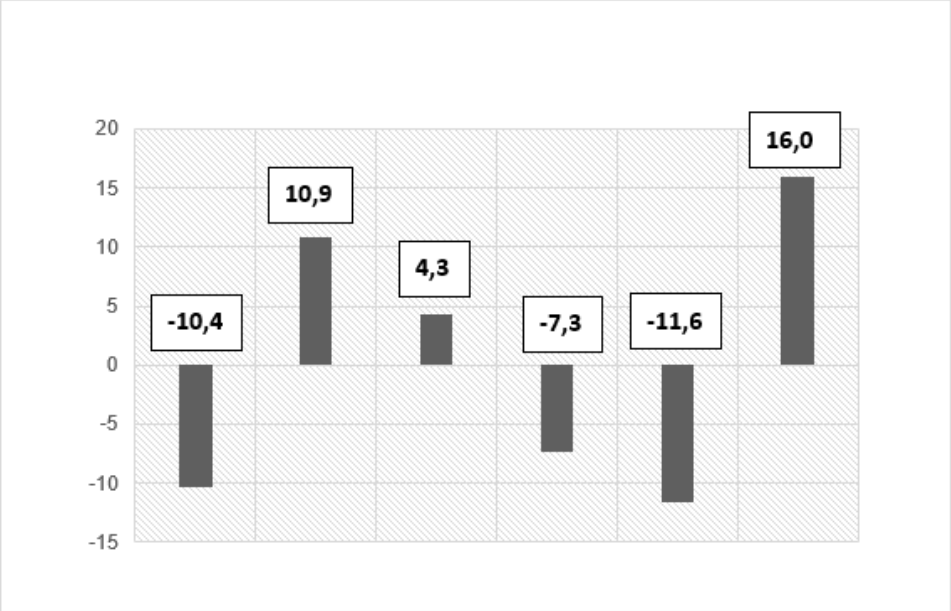

Figure 1. - Inter-annual evolution of the occupation 2010-2015
Source: compiled by the authors on the basis of the Labour Force Survey (LFS), INE. Annual Indicators Report. Ministry of Agriculture, Fisheries and Food.

According to Figure 1, occupation rose in 2015, interrupting a downward trend, occupational irregularity is observed. The forestry sector in Spain, within which silviculture and logging activities are being considered, is of decreasing importance in terms of employment. In fact, the downward trend is clear, although some exceptions should be noted, such as 2006 when there was a significant increase, perhaps due to the effects of the economic cycle. And although the expansionary cycle affected employment in a positive way, this influence was not very pronounced and after the crisis the natural cycle of the sector recovered within the typical evolution of the activities of the primary sector in developed countries. However, the period chosen 2000-2015 (Table 4) marks an analysis of the different stages of the economic cycle: an expansionary phase of the economy from 2000 to 2008, a strong economic recession from 2009 to 2013 and a phase of economic recovery from 2014 to 2015. Three stages of very significant transformations of the forest production system in Spain. Traditionally, forest management has been an example of a bioeconomic model; Spain today faces the challenge of the Circular Economy.

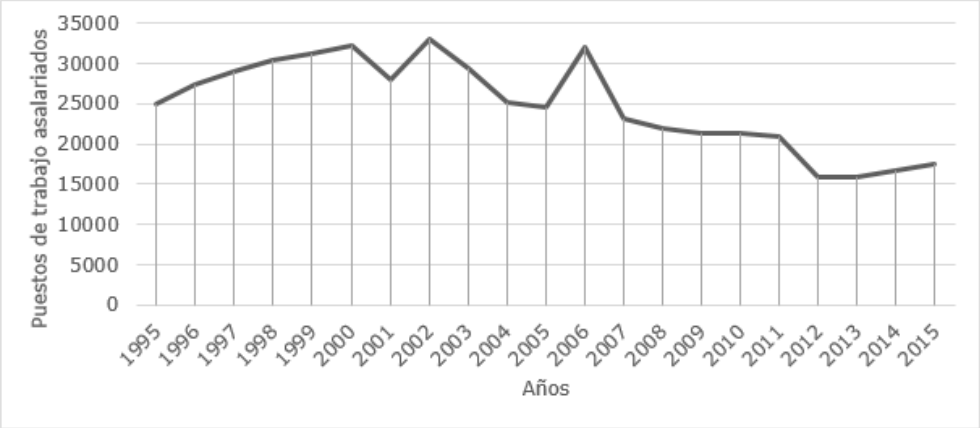

Figure 2. - Salaried Jobs in the Forestry Sector (1995-2015)
Source: Prepared by the authors on the basis of the National Statistics Institute (INE).

Table 4. - The Forestry Sector in Spain 2000-2015

	2000	2007	2011	2012	2013	2014	2015
Salaried jobs	32 200	23 200	20 900	15 900	15 900	16 800	17 500
Percentage of total employees	0.223 %	0.121 %	0.121 %	0.097 %	0.100 %	0.104 %	0.105 %
Volumen porcentual	0.223 %	0.153 %	0.098 %	0.094 %	0.107 %	0.102 %	0.101 %
Evolution	**18 %**	**-2.5 %**	**7.9 %**	**-0.5 %**	**5.5 %**	**1.6 %**	**2.4 %**
VAB real (millones €)	1 017.45	1 086.89	1 104.60	952.00	959.00	975.68	908.65

Source: Own elaboration from the National Institute of Statistics (INE).

On the other hand, the sector's value-added production, in real terms, has also been affected by the economic cycle. From 1995 to 2008, the sector's real GVA grew at a cumulative average rate of 2.42 %, but from this date until 2015 it grew at a rate of -2.48 % (Figure 3).

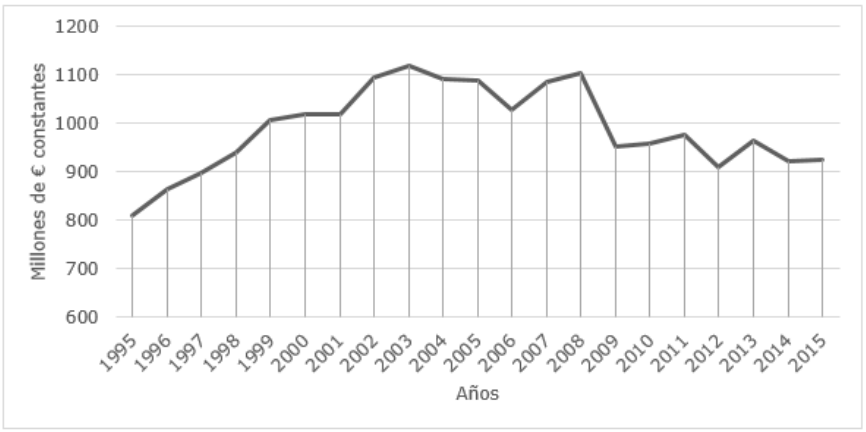

Figure 3. - GVA at constant prices (1995-2015)
Source: Prepared by the authors on the basis of the National Statistics Institute (INE).

The positive data are, however, in the productivity of the L (labour) factor, as they indicate that, even during the expansion in a logic contrary to the rest of the sectors (with the exception of 2006), labour productivity grew (Figure 4).

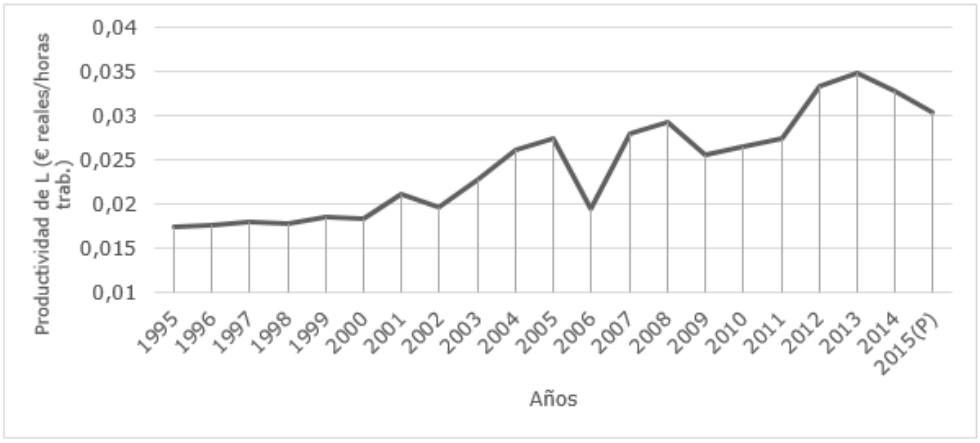

Figure 4. - L-Factor productivity (actual GVA/employment hours) (1995-2015) **Source:** Prepared by the authors on the basis of the National Statistics Institute (INE).

A study published by the Observatory of Sustainability in Spain (OSE) in 2010, the so-called Report on Green Employment in a Sustainable Economy , establishes a distinctive classification of New Employment Sites and adds four new sectors of activity: environmental R&D&I (I+D+i) activities; planning and environmental protection activities of Public Administrations; environmental protection functions in industry and services; third environmental sector (environmental NGOs that carry out various actions related to environmental protection and conservation). These New Forestry Employment Sites also include energy crops, the economy of biodiversity and the low-carbon economy. According to a publication issued by the Institute for Energy Diversification and Saving (IDAE), energy crops have a positive impact on the economy of the Spanish agricultural and forestry environment, leading to an increase in economic activity and, therefore, in the creation and maintenance of jobs. The diversification and exploitation of these energy crops are "an excellent way of making them a sustainable option in energy, economic and environmental terms"[6]. According to the Ministry of Agriculture, Fisheries and Food, biodiversity "used in a sustainable way is a limitless source of resources and very varied services" and is one of the main bases of social and economic development. With regard to the territorial distribution

of Green Jobs, the Ministry (2014) states that more than half of them are concentrated in Spain in four Autonomous Communities, with Catalonia having the highest number of jobs with 18 %, followed by Andalucía (17 %), Madrid (12 %) and Valencia (10 %), In 2014, on the initiative of the Ministry's Directorate-General for Rural Development and Forestry Policy (DGDRPF), the seven-year Socio-Economic Activation Plan for the Forestry Sector was approved. The plan aims to "promote the diversification of economic activity in rural municipalities, thereby improving the living conditions of their inhabitants, particularly those most directly linked to forestry".

The Ministry of Agriculture, Fisheries and Food has made available on its official website a series of guidelines and objectives to be followed by Forest Europe, drawn up at the 7th Ministerial Conference on the Protection of Forests in Europe, held in 2015. In relation to the economy and green jobs, the following objectives stand out: To share information and experiences related to scientific-political integration, to facilitate both policy development and innovation for the long-term competitiveness of the entire forest sector; to develop guidelines for the promotion of green jobs in the forest sector in the region; to stimulate innovation and research, enabling the necessary conditions, such as funding, manpower and training, and encouraging the development of an innovation culture, as well as the exchange of good practices and knowledge; explore ways to use National Forest Programmes or equivalent to improve occupational health and safety standards and practices, to adapt forestry education, labour skills and labour qualifications to current demands, and to promote employment stability as well as social equity and gender equality in the forestry sector; promote a forestry sector and its value chain to provide societies with greater opportunities for green jobs, which implies that these are decent jobs related to the management and use of forests and to environmentally friendly production processes, based on goods and services from sustainably managed forests.

These Green Jobs are also related, in a very direct way, to the current events that are damaging a large amount of Spanish forests: forest fires. According to data from the Ministry of Agriculture, Fisheries and Food, Spain has a total area of 50,599.53 hectares (ha), of which 108,282.39 ha were destroyed by forest fires between 2005 and 2014. There are professionals who make up the Integral Prevention Teams (EPRIF) and the Preventive Work Brigades (BLP). The deployment of aerial means available to the public administration (airplanes, helicopter bombers, transport helicopters, among others) managed by the Forest Fire Defense area is noteworthy. Other preventive means against forest fires, which also provide employment, are the Forest Emergency Plans that in each region distinguish the different agencies that lead these emergencies under their own names: INFOCAT: Cataluña; INFOCA: Andalucía; INFOCAM: Castilla-La Mancha; PROCINFO: Aragon; INFOMUR: Region of Murcia and INFOEX: Extremadura.

CONCLUSIONS

It can be said that it was not until the 1980s that the search for a sustainable balance between forest exploitation and the maintenance of the Spanish mountains began. As far as the Spanish forestry industry is concerned, the weight of wood is recognised, with wood playing an important role in the non-wood products of the last twenty years of the 21st century, along with cork in the region of Andalucía. Although Anaya-Romero *et al.,* (2016) point out the increasing abandonment of cork in favour of cork oak forests. Regarding foreign trade, the forestry sector went through a recession during the current world economic crisis. In spite of it, thanks to the coincident data of different authorships and official reports, the growth experienced in these last years and the intra-European slope by which the forest exports and imports are

inclined emphasizing like outstanding products the paper and the cardboard are verified.

In relation to employment, it can be seen that the productivity of the L factor is growing in the forestry industry in Spain. Finally, future lines of research will extend the temporal scope of the study, with data from 2015-2020; they will also determine the economic and local consequences of the Doñana forest fire in 2017 (quantifying the loss of raw material, tourist attraction or social costs) or verify the sustainability of the exploitation model of Spanish forests in a disaggregated way. As mentioned by Mena-Frau *et al.*, (2006), "in the near future there are signs that applied research into forest fire issues will be further developed" and Agenda 2030 (Bastida *et al.,* 2020).

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