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SOCIOECONOMIC INDICATORS FOR A MULTIDIMENSIONAL FARM SYSTEM TYPOLOGY IN A FOREST MANAGEMENT MODEL – METHODOLOGY AND SOME RESULTS

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Abstract

In the Mediterranean forests there is a diversity of agro-forest farms, with different management objectives and socioeconomic characteristics, which need to be accounted in forest management models. Therefore, the following paper presents a proposal of indicators to characterize socioeconomically the farms located within these forests in order to define typologies. Different information sources were analysed and social and economical key indicators defined. The typology created is based on four key indicators which result in 54 typologies. The indicators were applied to the Forest Intervention Zone (FIZ) Arade-Alte/S. B.Messines, using the official statistics complemented with a survey. Results show that the dominant farm type is the Small Scale-Singular producer- Forest- Family labour farm. The resulting simulations of different profit scenarios using a forest management model for the FIZ revealed the applicability of the methodology proposed to the objective.

Keywords: socioeconomic indicators, farms' typologies, Algarve, forest management model.

JEL codes: *Q10, Q15, Q19. Q01.*

1 - Introduction

Forests are present in a huge variety of climatic, geographic, ecological and socioeconomic conditions. Ecologically, EU forests belong to numerous vegetation zones, ranging from the coastal plains to the Alpine zone, while socioeconomic management conditions vary from small family holdings to large estates belonging to vertically integrated companies (EUROSTAT, W.D.).

The recent economic and political developments suggest a more comprehensive analysis of the socioeconomic situation of farm forestry and farms located in forest areas, and that the analysis of the economic performance of farm forests and other small scale forests using different indicators is important for various areas of Europe (MOSEFA, 2001). Also, the PROTECT (An Integrated European Model to Protect MEDiterranean Forests from Fire) project aims to develop and transfer, through common approach at transnational level, an integrated model for the prevention of forest fires, where there is a need of considering the main territory's agents.

So, in the Working Group 2 of the PROTECT project, an economic and eco-compatible sustainable model for forest maintenance including the valorisation of biomass (PROTECT, 2008) is being developed, which needs one simplified socioeconomic typology of farms, resulting from the definition of several socioeconomic indicators.

The resulting farm types consist of a group of farms with similar characteristics (e.g. size, specialization, land use), which may be defined through synthesis indicators or descriptors. In order to simulate the behaviour of a certain farm type with a farm model it is important to select/construct a farm that represents adequately the whole group of farms that are classified in the same farm type (SEAMLESS, 2006, Andersen *et al.* 2006).

To define a socioeconomic farms' typology, it is necessary to define key socioeconomic indicators, using as a basis a process of selection, which valorises all the existing information. So the objective of this work is to develop a typology of forest farms, based on key socioeconomic indicators applicable to all the Mediterranean area, to use on the model to be developed within the Protect project. It is also intended to test this typology in some selected areas and exemplify its use in a forest management model.

The remainder of the paper is organized as follows: in section 2 a summary of previous studies considered relevant for this subject, as well some relevant methodological issues, are presented; section 3 presents the information sources; in section 4 the indicators are presented; in section 5 the use of socioeconomic indicators on the definition of a farm type

typology is made; in section 6 the applicability of the typologies in a forest management model is shown. Finally, section 7 stresses the main conclusions of this study.

2 - Methodological issues

There are references of socioeconomic indicators in many types of sources, directly or indirectly connected to the agrarian economy issues. Some of them include the Direcção Geral do Ambiente (2000), the Sustainable Development Division-UN (2007), INE (2009), European Environment Agency (2005), EXTENSITY (2004), Dalsgaard *et al.* (1995), Agriculture & Environment Research Unit (2002), GPPAA-Gabinete de Planeamento e Política Agro-Alimentar (2004), Sheppard *et al.* (2005), Adamowicz (2003). Although these may be considered as a background for indicators selection, the review of previous studies focus more precisely in key bibliographic references which directly approach these issues.

The MOSEFA (Guidelines for Establishing Farm Forestry Accountancy Networks) project presented some guidelines for establishing forestry accountancies networks, but also some reflections about farm typologies. It is referred that, since there is no agreed definition for farm forestry, it is useful to consider what it is meant by this definition, considering that the definition is "a description of an entity by properties". A descriptor is a distinguish property and typology is the study of the distinguish descriptors of a group (MOSEFA, 2001).

MOSEFA (2001) states that, considering the definition in a broad sense, modern farm-forestry might be perceived as: "The purposive integration of forest trees including shrubs and agricultural activities within the farm holding in order to contribute to satisfy one or more of the following management objectives of the farm business: environmental enhancement, economic viability and amenity improvement". So depending on the focus of the inquiry, the farms might be distinguished on the basis of property descriptors, such as: size; ownership; economic output; type of crop area; and management objective. Therefore, due to the absence of a common definition of farm forestry a definition by descriptors is useful and its results allow the establishment of farms' typologies, based on common features. Several indicators of the different farms' properties were proposed (table 1), which might be appropriate to forest farms and the forest activities within them. The resultant types of farm forestry can then be used for the comparison of social and economic trends within and between countries.

Table 1- Indicative propriety indicators for forest farms and farm forestry activities

Category	Descriptor	Examples
1. Physical	Size of forestry	Area, width
	Type	broadleaf/coniferous/mixed (certain percentage or more of the species)
	Tree height	
	Stand density	Height at maturity
	Output	Tree crown cover
		Timber: volume, use
		Non timber forest products: type quantity
2. Economic	Income	Net income proportion of total farm income
3. Social/Legal	Ownership	Private
		Jointly owned
4. Environmental/ Amenity	Conservation/ habitat creation or protection soil/water	

(source: MOSEFA, 2001, p. 15)

The choice of property descriptors and limits placed on them to describe farm forest typologies could be based on prescriptive criteria agreed by member countries, some of which could be unique to a particular country or region, or they may be selected to describe what is most typical or of greatest strategic interest to the various actors in the country concerned. This also allows less obvious forms of farm forestry — such as planting for conservation, production hedgerows, types of agro-forestry and amenity forestry — to be identified and included in the analysis.

The SEAMLESS (System for Environmental and Agricultural Modelling; Linking European Science and Society) project presented a proposal of indicators for the definition of a typology of farms according to data in the FADN (Farm Accountancy Data Network of the European Union) database. They considered three main dimensions: size, intensity and combined specialization.

The size was measured as the economic size of farms (Andersen, 2010, Andersen, *et al.*, 2006). It was based on the calculated standard gross margin (SGM), measured in European Size Units (ESU), which can be used to determine the economic size of farms and is defined as the value of output from one hectare or from one animal less the cost of variable inputs required to produce that output. The farms were classified in three size scale farms

according to the limits in the agricultural statistics. However, this selected measure may not to reflect the diversity in output of the farms by using standard values in the calculations (Andersen *et al.*, 2006, Andersen, 2010).

The intensity was measured as the total output in Euro per ha to be able to compare across different agricultural sectors, using a dimension based on outputs instead of inputs. The total output is defined as the total output of crops and crop products, livestock and livestock products and other output in monetary terms, which is related to the agricultural area and expressed as output per ha (Andersen *et al.*, 2006).

The combined specialization was the combination of the standard gross margins and land use (Andersen, 2010, Andersen *et al.*, 2006). The use of this indicator was the result of a simplification procedure to enable the reduction of farm types for operational reasons, since the first typology proposed, with four dimensions, resulted in three size types, three intensity types, 10 specialization types and 9 land use types with combinations resulting in 810 potential types (Andersen *et al.*, 2006, p. 17).

3 - Sources of information

In order to define the key socioeconomic indicators it was necessary to analyse the existing sources of information, since it is not viable to propose indicators that are not available in any source or that are very difficult to obtain in reality, even when additional sources of information are used.

All possible sources of information considered relevant to the population under investigation should be analysed. The main categories (MOSEFA, 2001), its corresponding availability and level of disaggregation are presented in table 2. It is important also to realise that different sources of information on the population of farm forests are likely to vary with the underlying concept of farm forestry, and therefore they may not be compatible between them. Due to such conceptua1 differences, the data available may be inconsistent, describing in fact not all the same population, but different ones (MOSEFA, 2001). In these cases adaptations are recommended.

The main indicators existing in the national statistical systems are in the EUROSTAT system (Farm Accountancy Data Networks, Agricultural Statistics, Farm Structure Survey, etc.). So, the information sources presented in the EUROSTAT system, and available in the national statistical systems, are analysed next.

Table 2-Summary analysis of the available sources of information

SOURCES OF INFORMATIONS	Level of disaggregation	Availability to the public	Applicable to the problem
Agricultural census and FSS data;	Region, county, parish	Yes	Yes
Cadastral register	Parish, field level	Yes (but not in a GIS platform)	Yes
Statistics of persons or entities, who or which have previously applied for a forestry grant	Local	Yes	Yes
COS 90 and COS 2007 cartography	Field level- minimum mapping unit of 1 ha	Yes	Yes
Investigations and scientific studies	Only in some areas and have different disaggregation levels	Yes	Yes
National or regional farm register	Statistical regions, county parish	Yes	Yes (with field data)
Lists of members, especially when land owners are obliged to be a member	Field level	No	Yes (as a basis for future surveys)
Forestry statistics	Country, Region	Yes for country level	No
Farm Accountancy Data Networks (FADN)	Region, country	Partial (county and region)	No
Surveys carried on by other entities	Unknown	Unknown	Unknown

(source: own results)

The Farm structure survey (FSS), also known as Survey on the structure of agricultural holdings is carried out by all European Union Member States every 10 years with intermediate sample surveys being carried out three times between the basic surveys (EUROSTAT, 2010). The Member States collect information from individual agricultural holdings and data is forwarded to EUROSTAT. The information collected in the FSS covers land use, livestock numbers, rural development, management and farm labour inputs (including the age, gender and relationship to the holder of the agricultural holding). The survey data can then be aggregated by different geographic levels (Member States, regions, and for basic surveys also district level). The data can also be arranged by size class, area status, legal status of the holding, objective zone and farm type.

The basic unit underlying the FSS is the agricultural holding: a technical-economic unit, under single management, engaged in agricultural production. The FSS covers all agricultural holdings with a utilized agricultural area of at least one hectare (ha) and also those

holdings with less than 1 ha if their market production exceeds certain natural thresholds (INE, 2001d). Therefore, a considerable universe of farms is studied in these statistics. However, the farms that only have forestry occupation and do not have the typical structure of a farm may be excluded, since they are managed by forestry producers or cellulosic industries.

Other sources not available in EUROSTAT may also present useful data. In Portugal there are available results from the last National Forest Inventory, which was conducted from 2005 until 2008. Previous studies, from the National Forest Inventory of 1995-1998, are also available to the public, and allow us to withdraw some conclusions. These results are available to the public in the NFA (Portuguese National Forest Authority) webpage and present the area occupied by the different forest species in all Portuguese regions. However, a lower level of disaggregation is not available and it is difficult to study a very small area.

The property register allows obtaining data, at the field level, for the type of properties and their dimension. However, there are several areas without a cadastre in a Geographic Information System (GIS) platform. Geo-referenced data is critical for analysing data and to interpolate it with other up-to-dated information, namely land use cartography.

The lists of members, especially when land owners are members of an association, are available and may be acquired if asked to the forest producers associations, allowing an easier connection with the producers.

The land use cartography of European countries is available and, in some cases, it allows a detailed analysis of the existing forest. For instance, the COS 90 or the COS 2007 (a land use digital cartography), used by the National Forest Authority, has a minimum unit of 1 ha and a detailed degree of precision regarding the forest, since its mains objectives were a detailed study of the forest. However, this kind of information is not up-to-date, since the most recent land use version of this cartography, is still not available. Other European information GIS cartography, such as the Corine Land Cover 2006 (CLC 2006), allows us to have an idea of the area occupied by the forest. However it is not precise at local level, since its minimum mapping unit is 25 ha.

There is also the possibility of combining different types of information or using the existing ones for conducting surveys. For instance, it is possible to use the property register combined with the land use cartography to obtain additional information, or using the land owners lists to conduct field surveys.

The Farm Accountancy Data Network (FADN) is an important source regarding economic indicators of farms. However, it doesn’t have data regarding the forest farms. The

FADN was created to provide monitoring information for the Common Agricultural Policy (CAP) implementation and often farms with forestry activities are excluded from the FADN farm samples, or revenues and outputs from forestry activities are excluded in these accounts. Also, it happens that the information from the existing survey does not permit the separation between non-agricultural inputs (Brookes, 1998, cited by MOSEFA, 2001).

Other important information source from EUROSTAT are the EU Forestry Statistics, which have a low level of disaggregation, namely at Country or Regional level. They have detailed data regarding forest resources and ownership (principal area categories, basic forest resources, volume of the growing stock, ownership of forest and other wooded land), forest economy, employment (for instance, the employment in agriculture) forestry and forest industries; energy, forest conditions, forest fires, production and trade of wood and wood products (removals, production and trade of wood products, etc).

Although these two sources may not be directly applied to the problem, it is important to consider them as they are quite specific and can be used to validate more disaggregated data or data collected by surveys.

The analysed sources considered are the most important ones. However, other sources of information should be screened, not only in terms of content and accessibility, but also in regard to the information qualitative aspects. The data should be comprehensive, reliable, valid as well as reasonably accurate (see Hyttinen, 1995, cited by MOSEFA, 2001). A key issue of data quality, however, is timeliness, since outdated information may not only be useless, but even misleading (MOSEFA, 2001) and should be avoided.

4 - The proposed socio-economic indicators

The proposal of the key socioeconomic indicators must respect several aspects considered essential to solve the investigation problem. Therefore, it was defined that the indicators must: 1) Be applicable in all the Mediterranean area (if we have indicators that are not applicable in other areas we cannot solve the investigation problem); 2) Be adaptable to small territorial units; 3) Represent the most important types of farms; 4) Allow the development and functionally of the forest management model; 5) Do not exclude farms that only have forest as land use.

The first problem was to select the indicators. Based on the referred pre-requirements and on the available information as well as on the possibility of complementing this information with surveys, the following socioeconomic indicators were selected (table 3).

Table 3-The synthesis socioeconomic indicators proposed

Type of indicator	Dimension of analysis	Indicator
Economical	Dimension	Economic size (output)
	Forest specialization	% of shrubs and forest area regarding the total
	Type of producer	Legal nature of the producer
Social	Labour	% of farms' labour (familiar or non familiar)

(source: own results)

Why have these indicators been chosen? Dimension is always a relevant question when related to social and economic aspects of agriculture. Small scale farms, with or without additional income from of-farm sources, react differently to policy measures and/or market changes than large-scale farm and can contribute to the viability of rural areas. It is then important to be aware of farm dimension.

The specialization on some agricultural activities is an important characteristic of farms. Their economic results, as well as their future management decisions are closely linked to specialization. It can even be said that the environmental impact of farms is linked to specialization (for instance, different biodiversity levels are linked to forestry farms or horticulture farms), although inside the same specialization intensive or extensive farms can be found, resulting in different environmental pressure. In this case, the key point was to know if farms were mainly agricultural farms, forestry farms or a mix, since management decisions would surely different on the different situations.

In what concerns the third indicator – producer type – it is relevant to underline that forestry protection against fire is closely linked to very different questions, one of which is, undoubtedly the management of agri-forestry areas. And these areas management, even inside a FIZ, are surely conditioned by each of the producers' individual objectives, so it was important to know what kinds of producers compose the FIZ.

Finally, the work. The work is not considered in the ESU calculus and we want to understand the family work importance (with an economic dimension several times under evaluated by farmers) on the farms composition of the FIZ. Rural communities' viability, and

so the viability of the production units that compose them, is not strictly linked to these units non-family work demand. According to the Organization for Economic Co-operation and Development (OECD), work can be imported or exported from rural economy, being not obvious that the direction of the work flow is a critical determinant of rural communities' sustainability.

The second problem was to select the thresholds for these indicators. In what concerns the dimension size, we considered several ways of measuring it, such as the economic output, the total inputs used or the farm's area. In the case presented here, although our problem was only concerned with agro-forestry farms, there was an enormous variety of farms since the Mediterranean areas concerned are very different and this great heterogeneity would difficult to give a meaning to physical dimension. So, as other authors (eg. Andersen *et al.*, 2006), we thought that the economic dimension would allow an easier comparison between farms although even this has to be made carefully. OECD recommends that the classification should be based on economic dimension and considering relative dimension classes instead of absolute dimension classes.

We chose the economic dimension based on the European Size Unite (ESU) but, since there are no Standard Gross Margins calculated for forest activities the farms were surveyed to have an idea of its dimension in terms of ESU.

Three size types of farms were considered: small scale, medium scale and large scale. The following table (Table 4) presents the corresponding thresholds for each size type in ESU, which are an adaptation of the limits of the official statistics.

Table 4-Types of economical sizes definitions

Size type Definition	ESU
Small scale	< 16 (ESU)
Medium scale	16 ESU – 40 ESU
Large scale	=> 40 ESU

As regards to the forest specialization dimension we considered, as an indicator, the percentage area occupied by shrubs and forests, including those who are used as pastures or for crops. There are included here all the areas that are covered by forest bushes or forest species, with only one specie or a mixture of species.

Several different thresholds were considered raging from a type of farms that are not forest specialized until those that are forest specialized and for which the forest area represents the larger part of the farm's land use. The thresholds for each type are presented in the following table (table 5), and result from two main aspects: 1) a necessity of simplification; 2) the initial situation's analysis. Precision, in what concerns this indicator, would be greatly increased if these classes were sub-divided, but that would contradict simplification need and would difficult the subsequent analysis.

Table 5-Types of farms according to the indicator forest specialization

Farms	Forest area percentage
Agricultural/ other	< 25%
Mixed	25-50 %
Forest specialized	>50%

The third dimension is the type of producer and the selected indicator for this dimension is the legal nature of the producer. According to the Agricultural Census and the legislation, the producer may have different juridical forms, which are presented next.

A "singular producer" is a physical singular person that owns a farm (or farms). It may be classified as autonomous, when it uses only his family as labour, or as entrepreneurial, when there is a use of non-family labour.

The "agriculture group societies" are societies managed by a group of persons (producers) that are business partners and run together one or several farms. They may eventually elect one of the partners for managing the farms. In order to include the farms in this group it is necessary to be civil societies under the classification of "quotas societies", in which the responsibility is of all the associates.

Other types of legalized societies include all the other societies such as anonymous societies, of limited responsibility, etc.

There are also other societies classified as non legalized societies, which are societies without a legal formal feature. The Baldios are public holdings owned and explored by a community without the possibility of being sold. The farm subordinated to central or local administration, directly, or by a special organization form are state and public entities. All the others entities that cannot be put in this classification are finally inserted in the last one called other entities.

In order to simplify this classification only three types of producers were considered, according to their legal nature. The “singular producer” (autonomous and Entrepreneurial) includes all the situations of individual owners that may use only family labour or have workers that do not belong to their families. The “associative regime” corresponds to the “agriculture group societies” mentioned before although this so called “associative regime” is not a true association of producer in legal terms, but rather a quotas society. Finally it was considered a third type called “Other forms and enterprises”, which contains all the other juridical forms of producers mentioned before.

The following table presents the proposed types of producers and correspondent statistical/ juridical elements for this indicator.

Table 6- The types of producers division

Type of producer	Statistical/ juridical concepts
Singular producer	Autonomous singular producer
	Entrepreneurial singular producer
Associative	agriculture group societies
Other forms and enterprises	All the other legal societies
	Baldios,
	State and public entities
	All the other non formal entities

For the social indicators, it was considered that the dimension proposed reflects the farm’s main characteristics.

Farms were classified according to the origin of its predominant labour - family and non-family labour. Family labour means the family members that participate in the activity of the farm and non-family labour means the permanent and temporary workers.

The size unit was the Annual Work Unit (AWU). A family farm has 50 percent or more of labour from the producer and its family members and a non-family farm has less than 50 percent of non-family labour (Table 7).

Table 7-Types of economical sizes and definitions

Farms	AWU percentage
Family Farm	>=50 %
Non family (enterprise)	>50 %

5 - The use of socioeconomic indicators on the definition of a farm type typology

The proposed methodology was applied to the production unit chosen to develop a forest bio-economic management model in the framework of PROTECT project: the FIZ Arade/Alte-S. B. Messines. To characterize the farm types present in the production unit the proposed methodology was applied, combining statistical and cartographic information with a survey. The survey's formulary was divided in the following thematic areas: 1- Farm location; 2- Identification; 3- Farm activities; 4- General soil occupation; 6- Type of producer; 7- Labour force; 8-Forest area characteristics; 9- Fires. A sample of 30% of the farms, selected from a population of the landowners integrated in the FIZ Arade-Alte/ S. B. Messines was considered. The consideration of a larger number of individuals was not possible due to operational reasons (Xavier and Martins, 2010).

The summary results for each indicator show that there is a strong domain of small scale farms (94% of the farms and 87% of the total area). There are no large farms, and only 6% percent of them are medium scale farms. Most of the farmers have other occupations/ jobs, which are their main income source, outside the farm. The average economic size is very low: 4533 euros per farm (Xavier and Martins, 2010).

Regarding the criteria "forest specialization", more than 88% of the farms are forest specialized and have more than 87% of the total farms' area. Also, all the producers interviewed are singular producers mainly autonomous (which mean that the main labour source is the family) and only 11% are entrepreneurial, using mostly labour outside the farm. Finally, the "labour" criteria show that 88% of them are family farms. However, these enterprises only represent about 62% of the total area (Xavier and Martins, 2010).

The following table shows the complete classification of the existing farms. These data reveal that the dominant farm type is the Forest- Family labour farm (code type: S1-F3-T1-L1). These farms represent 70% of the farms but only 36% of the area. The farm type which represents the most considerable share of the area is the Small scale-Forest specialized-Singular producer-Non Family labour farm (code type: S1-F1-T1-L2), which has more than 38% of the total land share in spite of including only 12% of the farms (Xavier and Martins, 2010). Finally, a third type is the Medium scale-Forest specialized-Singular producer-Family Farm (S2-F3-T1-L2), which represents only 6% of the farms.

Table 8- The dominant farms' typologies

Farms'types				Share of farms	Share of area
Small scale	Forest specialized	singular producer	Family Farm		
S1	F3	T1	L1	70	36
Small scale	Forest specialized	singular producer	Non Family (enterprise)	12	38
S1	F3	T1	L2		
Medium scale	Forest specialized	singular producer	Family Farm		
S2	F3	T1	L2	6	13
Others				12	13

(source: Xavier and Martins, 2010)

6 - An application to a sustainable forest management model

These farm types were inserted in a forest bio-economic model developed by the authors in the framework of PROTECT project. The objective of the proposed model is to maximize the economic result of the FIZ, considering all the agricultural, forest and animal production activities, the biophysical conditions (considering soil types and slopes) that are present in the production unit and computing a biodiversity indicator and a fire risk index. Therefore, it has a structure that allows the integration of all the activities existent in a territory (fig. 5), which is divided among different modules that correspond to the different activities, calculating a very large number of variables. The insertion of farm types allows the modeling of the main farm types' characteristics and, on one side, to consider the farmers' management decisions' importance for the production unit results and, on the other side, what are the consequences, to farmers, of being inserted in a larger production unit, which takes management decisions on the use of some of its resources.

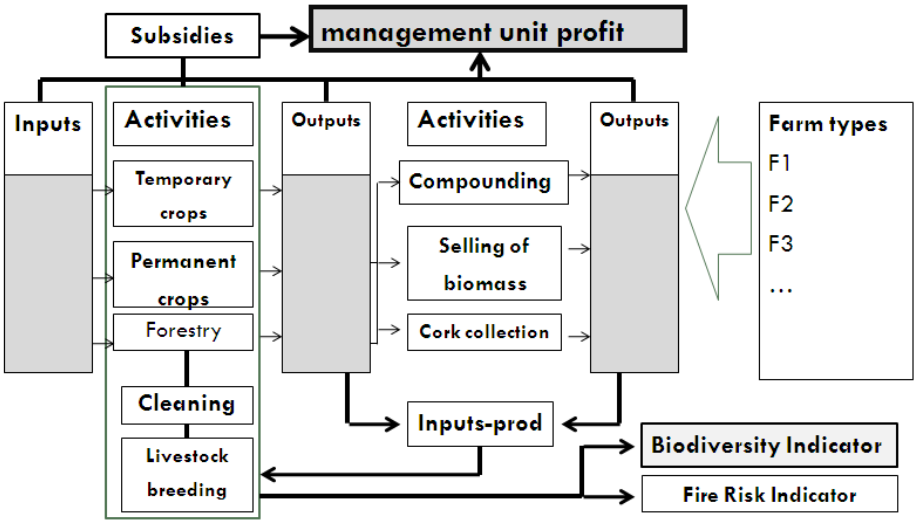


Fig. 1- The general model framework

(source: the authors, unpublished)

The next table (table 9) presents the results maximizing the economic result for the FIZ or for the different farm types inside the FIZ. Each scenario corresponds to the maximization of a single farm type economic result. The results show that an economic result of 1.124.577 € is the maximum that can be obtained for the FIZ, showing that, when the different farm types maximize their own objectives the FIZ results can reach 832.718 €, the worst scenario.

Table 9- Profit maximization scenarios by farm type

Farm types		Profit maximization scenarios			
		FIZ	**FT1**	**FT2**	**FT3**
Profit (euros)	**FIZ**	1.124.577	985.980	832.718	874.537
	FT1	430.678	628.302	308.456	286.343
	FT2	290.312	166.787	328.947	138.007
	FT3	223.665	114.017	119.797	365.532
	OFT	179.922	76.875	75.518	84.654

(source: model results)

7 – Conclusions

The paper proposed a synthesis of farms' socioeconomic characterization indicators aiming to establish a typology of farms applicable to the Mediterranean basin. The typology used allowed us to define different types of farms with different socioeconomic characteristics

to better understand the farmer's behaviour and to insert these characteristics in a forest management model.

The model application to a production unit composed of different farms, in Portugal, produced valid results, showing that it is relevant to be able to have farms divided by types to achieve the main goals proposed. It has been shown that, when managing the FIZ, the situation regarding the interests of the different owners has to be carefully analyzed. Otherwise, it is possible that a situation where they put their own interests ahead from the FIZ arises, with consequences on the forest management, the biodiversity and the fire risk.

This model could be further improved in the future, on one side considering the improvement to a dynamic model, because the forest is a permanent activity and it should then be studied based on a model which considers management decisions on consecutive years and on the other side up-grading it to a multiobjective model since there are here several objectives to consider – the economic result, the biodiversity level and the fire risk index. These are important questions to consider, for which it is relevant to have a characterization of farm types existing in the considered Production Unit.

Finally, it is an important development the application of this prototype to other PROTECT partners' management units.

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