# PROVISION OF AGROECOSYSTEM SERVICES FROM FARMERS EXTERNAL AND INTERNAL FACTORS

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#### Abstract

The purpose of this paper is to present an analysis of the motivating factors for the provision of agroecosystem services by farmers. Farmers are one of the main socio-economic actors on whom the provision or disruption of ecosystem services depends to a large extent. For this reason, a number of studies have focused on the motivating factors for promoting the provision of ecosystem services. In our study, we divided these factors into external and internal. We conducted interviews with 345 farmers in all Bulgarian districts. We observed that internal factors have a greater predominance for all three categories of ecosystem services, especially for the provisioning one. Among these, it appears that own beliefs are a prevailing factor among farmers. On the other hand, among the external factors, legal requirements and public subsidies predominate, while factors such as social pressure have a minor contribution.

*Key words: agro-ecosystem services, motivation factors, adoption behavior* 

## **INTRODUCTION**

Agroecosystems include the traditional understanding of ecosystem services, but with a focus on how agricultural activities modify natural functions. Agroecosystem services can be seen as a subtype of ecosystem services with all the natural functions and the resulting benefits for society, but subjected to the influence of farmers as decision-makers. Ecosystem services have been classified in four main categories by the Millennium Assessment (provisioning, Ecosystem regulating, cultural and supporting services). However, it should be noted that this classification serves mainly for our human understanding of natural processes. In the natural environment, these categories overlap and are completely interrelated. Agricultural ecosystems, by their very existence, provide material, supporting, regulating and cultural services to society. These services are strongly linked to the socio-economic demand of society, providing and satisfying our basic need for food. In most cases, agricultural ecosystems are considered primarily as territories related to the cultivation and production of food resources, with less consideration given to other ecosystem services that should be considered as an integral part of the agricultural ecosystem. The decision-making process in one farm holding has a direct impact on the capacity of the ecosystem to provide services. Thus, agricultural activities can lead to а deterioration in the state of various natural elements such as pollution of water sources, deterioration of soil health (including erosion processes, reduction of biogenic elements, etc.), reduction of biodiversity, among many. On the other hand, the farm is directly and economically dependent on the state of ecosystem functions. This reveals an interconnected system in which the way the farm is managed plays a key role in maintaining the provision of ecosystem services.

The main focus of this paper is what factors influence farmers' decisions to provide agroecosystem services. A number of authors have investigated farmers' motivations and attitudes towards implementing environmental measures. According to some authors [9], these attitudes are influenced by government policy and public pressure to improve the state of natural environment. Other authors examine the relationship between the implementation of environmental measures from the perspective of farmers' perceptions of environmental problems, not only due to

#### Scientific Papers Series Management, Economic Engineering in Agriculture and Rural Development Vol. 25, Issue 1, 2025 PRINT ISSN 2284-7995, E-ISSN 2285-3952

economic incentives [8, 5, 12, 1]. Attachment to the land can be a driving force for the conservation of natural systems [14]. The personal awareness of farmers can also be key in terms of undertaking specific conservation activities [7]. According to some researchers [11], awareness of the presence of soil erosion can have an effect on attitudes towards more environmentally friendly practices. According to other authors [6] social factors may be key to the pro-environmental attitude of farmers, rather than their awareness and information on environmental issues. Other studies address factors such as farm size [4, 15], receiving such as government financial benefits subsidies [3, 15]. By creating increased opportunities state subsidies for and promotion of environmental behavior of farmers in the European Union, there is a steady trend of increasing research interest in these issues. In Europe, research focuses on the participation of farmers in agrienvironmental measures [7, 2, 13]. Similar studies have been conducted in Bulgaria, aiming to reveal the attitudes of farmers to participate in agri-environmental measures in order to provide ecosystem services [10].

In this context, the aim of the research is to analyze the motivating factors for the provision of agro-ecosystem services by farmers.

## MATERIALS AND METHODS

To study the motives and attitudes of farmers towards the provision of agro-ecosystem services, a survey was conducted in 2024 among 345 producers from the six regions of Bulgaria. To reveal the attitudes, the following several motivating factors were identified: (i)Legal requirement, (ii) Social pressure, (iii) Receiving public subsidies, (iv) Requirement of a supplier or buyer, (v) Own conviction, (vi) Provision contract, (vii) Market benefits and (viii) Sustainable behavior.

The selection of factors is based on the author's own observations and literature review of similar studies. In addition to individual factors, the factors are grouped into external and internal (Fig. 1), which reveals a more in-depth view of the farmers' motivation.

The agro-ecosystem services that were selected for the study are divided into three categories. This classification is based on the methodology of CICES – Common International Classification of Ecosystem Services.

The categories and the agro-ecosystem services are as follows:

Provisioning:

- Use of recycled waste, composting
- Renewable energy use
- Preservation of traditional productions, varieties, breeds

Regulation and maintenance:

- Soil health
- Water conservation
- Biodiversity conservation
- Improving air quality and climate

Cultural:

- Preservation of traditional landscape
- Access to the farm territory by other persons
- Conservation and improvement of non-agricultural ecosystems

The division of factors influencing farmers' decisions are presented in Fig.1.



Fig. 1. Division of factors influencing farmers' decisions.

Source: Author's own work.

## **RESULTS AND DISCUSSIONS**

In the next several figures (Fig. 2, 3, 4) we show the overall results regarding the factors that influence farmers' provision of agroecosystem services. The analysis follows the previous division of the services into three

#### Scientific Papers Series Management, Economic Engineering in Agriculture and Rural Development Vol. 25, Issue 1, 2025 PRINT ISSN 2284-7995, E-ISSN 2285-3952

categories. Overall, it appears that the most common motives among the respondents are followed by "own conviction", "legal requirement" "receiving and public subsidies". To the least extent, respondents indicate "market benefits". "provider requirement" and "provision contract".

### Provisioning agroecosystem services

Provisioning ecosystem services are directly related to the production of goods from the agricultural sector, which makes them easily appreciated and valued not only by the producers themselves, but also by consumers. Figure 2 presents the results regarding the factors influencing the provision of these services. For all three types of provisioning services, the factors "provision contract", "supplier/buyer requirement" and "social pressure" are the least important, whereas "own conviction" is the predominant factor.



agro-ecosystem services Source: Author's own work.

### <u>Regulation and maintenance agroecosystem</u> <u>services</u>

These are the services that are most difficult to perceive and evaluate by people, since their benefits to society often remain invisible (unlike provisioning ecosystem services like food and fiber). Similar to the previous category, the main focus is on several factors (Fig. 3).



Fig. 3. Factors affecting the provision of regulation and maintenance agro-ecosystem services Source: Author's own work.

First of all, the factors "legal requirement" and "own conviction" are most strongly represented in the respondents' answers. varving between 19-30% and 30-38% respectively. "Legal requirement" as a factor is strongly reported for water conservation service (30%), which stems from the longstanding state regulatory policy in this area. Again, the factors that have the least influence are "provision contracts", "social pressure" and "market benefits". "Public subsidy" has a steady share for all of the four type of services (ranging between 15-20%). This is a result of a long state support for conserving these natural functions.

### Cultural agroecosystem services

In this category the motive "own conviction" is the most prevalent among respondents in relation to all three types of services included here (Fig.4). "Legal requirement" is significantly considered in the case of "preserving traditional landscape" (26%). For all three types of services the factors "provision contract", "supplier/buyer requirement" and "social pressure" are the least important, whereas "own conviction" is the predominant factor for all services.



Fig. 4. Factors affecting the provision of cultural agroecosystem services

Source: Author's own work.

## Division of factors affecting farmers' decisions to provide agro-ecosystem services – external and internal factors

This subsection presents the results of the survey regarding the factors that influence farmers' decisions to provide agro-ecosystem services from their farms, divided into two categories – external and internal (Fig. 5).



Fig. 5. Division of factors affecting the provision of agro-ecosystem services among the three categories of ecosystem services Source: Author's own work.

Figure 5 shows how the two categories of factors (internal and external) are distributed among the three categories of ecosystem services.

Within the internal factors the predominant one is "own conviction" for all three categories of ecosystem services, followed by "sustainable behavior". "Market benefit" as a motive has the greatest weight in relation to provisioning services (13% of responses), while the "provision contract" represents a negligible percentage of all responses. Regarding the external factors, "legal requirement" and "public subsidies" are the types of factors that are predominant in all three categories of ecosystem services. "Supplier/buyer requirements" and "social pressure" seem to have limited influence.

### CONCLUSIONS

The present study analyzed the factors farmers' influencing provision of agroecosystem services. For this purpose, a survey was conducted among 345 producers from the six regions of the country. The survey questions were aimed at revealing eight factors influencing the provision of eleven types of ecosystem services. The analysis included an assessment of these factors for each of the eleven agroecosystem services, and subsequently they were grouped into three categories. The factors were divided into internal and external in order to assess which of the two categories have greater importance. In general, it is observed that internal factors have a greater weight for all three categories of ecosystem services, especially for the provisioning ones. Of these, it turns out that "own conviction" and attitudes for "sustainable behavior" are predominant in the responses (between 85 -93%) for all three categories of services.

In the case of external factors, "legal requirement" and the "public subsidy" prevail (between 72 - 89% of the responses), while factors such as "social pressure" and the "requirement of a supplier/ buyer" have a minor contribution. To the highest extent, the legal requirement as a factor is reported in relation to the ecosystem service "water conservation". "Social pressure" as a factor is reported to the highest extent in "conservation of biodiversity", and "public subsidies" is

#### Scientific Papers Series Management, Economic Engineering in Agriculture and Rural Development Vol. 25, Issue 1, 2025 PRINT ISSN 2284-7995, E-ISSN 2285-3952

mostly associated with "conservation of soil health".

It can be concluded that internal factors have a higher predominance for almost all of the agro-ecosystem services. The external factors increased their weight for services which are mostly perceived as public goods and where factors such as legal requirements and public subsidy can be driving forces for agroecosystem services provision.

### **ACKNOWLEDGEMENTS**

This study is part of scientific project "Mechanisms and forms of agricultural management in Bulgaria", National Scientific Fund, Contract № KII-06-H56/5/11.11.2021.

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