

# The Implementation of Innovation and the Attitudes of Farmers towards Advisory Services: The Case of Western Macedonia, Greece <sup>†</sup>

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**Abstract:** This paper investigates the implementation of innovation and the advisory needs of farmers in agricultural holdings in Western Macedonia. The research carried out was divided into two parts. Initially, we investigated how the programs under analysis related to innovation in the agricultural sector, specifically with respect to the improvement plans that were implemented in the region. Specifically, parameters such as age, gender, place of residence, and the types and number of investments were examined. The analysis revealed farmers' characteristics and the types of their investments, in addition to their degrees of adoption of innovation and their attitudes towards innovation. We also tried to clarify the reasons leading farmers toward innovation and the importance of consulting services in their orientation towards innovative ideas.

**Keywords:** agricultural knowledge and innovation systems; productive investments for the modernization of agricultural holdings; Western Macedonia; advisory services; sustainability



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## 1. Introduction

Innovation is considered the heart of value creation for small businesses [1] and a key strategy for improving productivity and promoting the sustainable use of resources, and it is also a resilient tool for rural development (OECD, 2006–2013). Ref. [2] developed agricultural innovation indicators to measure levels of innovation in the agricultural sector. The overall research findings showed that the effort to innovate varies among agricultural systems. Factors such as farm size and intensity as well as access to credit and agricultural training appear to promote innovation. Profitable agricultural businesses are generally more innovative [3]. Conversely, increasing age and working outside the agricultural sector seem to hinder innovation [4]. Internal variables such as flexibility and adaptation have the greatest influence on an agricultural enterprise's propensity to innovate. Training levels, the exchange of knowledge with research centers, and firm location have an impact on the propensity to innovate [5], while technological progress and resource sufficiency improve the quality of life of producers [6].

On the other hand, the agricultural sector faces challenges posed by climate change, soil erosion, and biodiversity loss, as well as changing consumer preferences for food and concerns about how it is produced [7]. Sustainability in agriculture has a positive impact on opening markets and ensures that farmers can set affordable prices for the products they sell and receive fair profits [8,9]. Productive investments for the modernization of agricultural holdings are an important tool for supporting the agricultural sector with investments that contribute to increasing competitiveness, the use of renewable energy

sources (RES), and environmental protection. Western Macedonia constitutes an important strength of Greece in terms of the production of agricultural products, even under difficult conditions, due to its soil and climatic characteristics.

## 2. Methods

After reviewing the Greek and foreign literature, a questionnaire was created and used as a tool to collect primary data on producers' views on the investment plans concerning their joining of the Regional Unit of Grevena. The investments that they proceeded to make were funded by the AGRICULTURAL DEVELOPMENT PROGRAM (2014–2022) and more specific for Sub-Measure 4.1.1 (concerning the implementation of investments that contribute to the competitiveness of a farm) and Sub-measure 4.1.3 (concerning the implementation of investments that contribute to the use of Renewable Energy Sources (RES) and environmental protection).

Some of the sections that the questionnaire included concerned demographic characteristics such as gender, age, marital status, and education level and factors that lead to innovation related to consulting services. Additionally, there was a section regarding farmers' attitudes toward innovation as well as a specific section regarding the degree of adoption of innovative technologies. Special reference was made to the barriers and reasons preventing a farmer from adopting technological innovation. At the end of the interview, the interviewees were asked about the main factor that prevented them from participating in funding programs.

The starting point of factor analysis is to explore and identify the underlying dimensions that lie behind the original variables in a set. In the case of our research, we studied 29 variables. Specifically, the innovation attitude, learning orientation, and market orientation factors consist of 6 subfactors, while the consulting services factor consists of 11.

The factor analysis was performed using the IBM SPSS statistics data editor program.

The variables were grouped into 5 factors, and they concern 67.7% (cumulative %) of the sample. According to the data quality indicators of SPSS, we noted that the sample can be considered adequate, as the value of the KMO index was equal to  $0.826 > 0.50$ , and the evaluation of the correlations between the variables allowed for factorial analysis, as Bartlett's Test of Sphericity had a value of  $p = 0.00 < 0.05$ .

The extraction of the factors was conducted using principal component analysis, with the aim of studying all existing variation in order to extract the largest percentage of variation from the fewest possible factors. To extract the factors, the corresponding research was based on the Guttman–Kaiser criterion, according to which selectable factors are those with an eigenvalue greater than 1. The rotation of the factors is necessary as it allows for the easier interpretation of the factors that emerge from the analysis.

The first factor, 'Consulting services', explains 36.45% of the total variance. It is characterized by high correlation coefficients: (a) when a technical product does not perform well, I analyze the reasons for the failure; (b) I receive technical advice from my suppliers; and (c) I consult private geotechnical offices in the area so that I can implement the best practices.

The second factor, 'Innovation Attitude', which explains 13.9% of the total variance, shows a high correlation with the following parameters: (a) innovations improve the results of my farm, (b) innovation is worthwhile, (c) adopting innovation is a useful decision, (d) I am motivated to innovate, and (e) I am informed by private geotechnical offices about research and innovation programs.

The third factor is called market orientation and explains 6.57% of the total variance. The parameters that are highly correlated are as follows: (1) my pursuit of producing cheaper products gives me advantages over other farms; (2) I look for new customers every year; (3) customer satisfaction is the main goal of my farm; (4) I am interested in my customers' preferences for product quality and follow them during the production process; (5) customers direct me with respect to which varieties to grow; and (6) my pursuit of producing high-quality products gives me advantages over other holdings.

The fourth factor, 'Learning Orientation', explains 6% of the total variance, and the parameters for which it shows a high correlation are as follows: (1) I usually consult universities and research centers, (2) I like to read magazines or other media from reputable bodies about new crops or methods that I could introduce in my business, and (3) I take part in research and innovation projects supported by public or private bodies.

Finally, the fifth factor, 'Consulting services from the public', explains 4.78% of the total variance and shows a high correlation with the following parameters: (a) I am informed by public geotechnical services about research and innovation programs and (b) I consult public geotechnical services in this region to apply best practices.

### 3. Results and Discussion

The farmers that participated in a funding program (sub-measure 4.1.1 monopolized the interest of farmers, as only 5% participated in sub-measure 4.1.3) were mainly people between the ages of 35 and 60 (68%) and mostly men (67%).

Regarding the types of investments that were supported, the farmers were oriented toward the acquisition of mechanical equipment (74.5%), meaning that they had either not yet reached the level required to be able to use modern innovative technologies or practices such as precision agriculture, the use of GPS, drones, weather stations, etc., or that they might not have trusted such innovations or even known of their existence.

Regarding the attitudes of the farmers towards innovation, the results showed that most of them considered innovation useful, finding that it improves the economic outcome of a farm and simultaneously admiring people who proceed to adopt an innovation.

The research also showed that most of the sample was accustomed to being informed by magazines and other media (websites and social media) of reputable organizations while enjoying participating in exhibitions and seminars to discover new ideas and share experiences with colleagues.

The processing of the farmers' answers regarding consulting services showed that most of them had a positive opinion of public extension services and the Common Agricultural Policy (CAP). These factors allow agricultural holdings to innovate. In the contrary, farmers do not consult universities and research centers, nor do they participate in research and innovation projects. It also seems that the farmers in the sample were informed about research and innovation programs as well as agricultural practices that they could adopt mainly from the private sector and not from public geotechnical services.

Finally, it is worth mentioning that, according to the sample, the main barriers to innovation adoption are purchase costs, lack of financing, lack of credit, and lack of equity.

In closing this section, it is worth mentioning that in the factor analysis, we studied 29 variables, which were finally grouped into five factors that concern 67% of the sample. The factors resulting from the processing of the data are shown below:

1. Consulting services;
2. Innovation attitude;
3. Market orientation;
4. Orientation toward learning;
5. Consulting services from the state;

### 4. Conclusions

There is no doubt that innovation is considered the heart of value creation for small businesses and a key strategy for improving productivity and promoting the sustainable use of resources. Farmers need valid access to knowledge and information as well as training and education. This is included in the framework of the European Union strategies and should be facilitated by policies wherever advisory services play a very important role.

Investments in agricultural holdings are important tools for supporting the agricultural sector, contributing to increasing competitiveness, the use of RES, and environmental protection.

Western Macedonia is an important strength of Greece in terms of the production of agricultural products, even under difficult conditions, due to its soil and climatic characteristics. Innovation is perhaps the answer to these difficulties, and for this reason, it was chosen as an area of research.

In conclusion, farmers of Western Macedonia turned to traditional investments and showed no specific interest in new innovative technologies. Nevertheless, the majority had a very positive opinion and were in favor of innovation.

Perhaps this means that they have not yet reached the level required to be able to use modern innovative technologies or practices such as precision agriculture, GPS, drones, weather stations, etc. On the other hand, it may mean that they do not trust such innovations or even know of their existence. The only thing that is certain is that their attitude towards innovation should be investigated further.

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