

# The Adoption of Information and Communication Technologies in Farmers and the Emerging Need for an Integrated System of Agricultural Advisory and Training

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## Abstract

The present study investigates the adoption of Information and Communication Technologies in farmers of the Regional Unit of Serres, as well as their need for information – advisory regarding the importance of the adoption of ICT. The research area is characterized by a variety of soil and climatic conditions, which resulted in the formation of large differences in the practice of agriculture in the specific area. Among the results of the research, the existence of the increased need and desire of the target group for training on ICT is of particular interest, as well as their strong will to be informed on a daily basis about the weather conditions as well as the cultivation -irrigation needs of their agricultural crops

## Keywords

Agricultural consultants, agricultural advisory, ICT, precision agriculture, agricultural extensions, agricultural education

## 1. Introduction

The use of Information and Communication Technologies in agriculture is extremely important. Globalization has created a new dynamic in the competitive situation which has led the agricultural sector to reduced incomes resulting in the intensification of agricultural production, [1]. Until recently, farmers, in order to cope with this problem, turned to intensive use of fertilizers, which, however, had no visible effects on increasing production. In contrast, farmers nowadays have the opportunity to be trained in new technologies based on precision agricultural applications, aiming at achieving better results in agricultural production and at the same time ensuring the protection of natural resources. The paper aims to investigate the adoption of Information and Communication Technologies, as well as the need for information – advisory regarding the importance of the adoption of highly recognizable ICTs (mainly computers, internet and cellphone), in farmers of the Regional Unit of Serres.

## 2. Literature Review

The development of ICTs is vital to competitiveness in today's ever – growing digital global economy. Investing in ICT is an integral part of agricultural – and vocational – education and contributes to the effective implementation of lifelong learning and training, [2]. In order to be able to integrate ICT in the curricula, it is necessary a general review of the role of education, as well as the educational material provided. New technologies in agricultural education, which are mainly used as literature support tools in various forms, can upgrade the educational process, [3].

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The use of ICTs in European Union countries already has a significant impact on the agricultural sector. Their dissemination is marked by the number of actions and organizations that systematically deal with the penetration process of ICTs in the agricultural sector. EFITA [4] is a federation that has been systematically involved in this effort, for a decade since its establishment.

There are several studies, which have analyzed farmers' information needs, based on which possible applications of information and communication technologies can be identified. The majority of the specific studies evidence that the primary function of such an organized public service in agriculture is to enable easier transfer of knowledge, [5].

The adoption of ICT follows the pattern of the adoption of other innovative actions. Thus, their degree of diffusion is related to the degree to which individuals can learn to use technology, [6, 7, 8, 9, 10]. Among ICT, the use of internet in Greece occurred to be advantageous, due to its low cost, [11].

It is essential for the lucrative function of agricultural holdings, agricultural consultants to motivate farmers, as well as to upskill them and expand their capabilities with substantial and innovative techniques [12]. Furthermore, agricultural consultants could inform farmers about certain specific mobile applications [13] along with intelligent monitoring and automated control tools [14, 15].

According to a recent study, farmers are more likely to adopt a mobile technology as a part of their smart-way of farming, when they really understand the importance of ICTs in agriculture. [16].

The introduction of ICT in the training process and in counseling programs in general is not a simple application. Policies that have not considered every parameter that need to be taken into account, failed.

### **3. Methodology**

A fully structured questionnaire of 40 questions was used for the research needs. The main thematic sections of the questionnaire refer to the demographic characteristics of the farm managers / respondents, the use or not of ICT and their emerging needs for counseling - training on issues related to them. Given the pandemic (COVID-19) restrictions, the preferred method used to complete the questionnaires was by telephone, in a sample of 100 farmers - heads of agricultural holdings in the wider area of Serres. Part of the results is presented in the next chapter.

### **4. Results**

The sample of the survey (100 farmers in Serres) consisted mostly by male farm holders (82%). Their mean age is 58 years old, while only a small percentage (10%) is under 35 years old. The interviewees are mostly married (80%). Regarding the educational level of the respondents, the largest percentage (48%) has only graduated from elementary school, a percentage of 37% has completed high school and a smaller percentage of 9% are graduates of higher education. Furthermore, in a large majority of cases (80%), farmers are exclusively engaged in agriculture.

Regarding the possession and use of ICT, about 7 out of 10 farmers own a personal computer, which is mostly installed in their house and not in their exploitation. Although the PC is used daily, however, it is used by less than half of the farmers themselves, since the rest of the daily users are their children. The internet usage rate is slightly lower, as almost 6 out of 10 respondents use it. Regarding the use of e-mail, it is observed that it is much more limited, compared to the use of the PC and the Internet. In particular, only 23 out of 71 farmers who have a PC use an e-mail account. On the contrary, it is observed that the mobile phone is an exception and is widely used by farm holders. Nine out of ten farmers own and use a mobile phone, of which about 60% have a mobile phone with internet access.

Farmers being interviewed consider as the most important reason for using a computer, the professional use and in particular the management and the accounting monitoring of their farm. This group of farmers mainly concerns either those who have automated some tasks on their unit, or those who mainly use the computer for Internet access and use of e-mail.

Farmers consider the use of internet important, mainly because it enables them to search for information and use social media, as well as because it provides them with amusement. It has therefore been observed that internet use is not necessarily linked to searches related to their exploitation activity. Farmers, who use Internet, evaluate as the most important factor for its use, purely professional use, as well as their children's communication. However, the reason why some farmers do not possess an

internet access is because they do not assume it is necessary and at the same time they consider it to be a somewhat expensive service.

Almost every farmer in the sample considers mobile phone as an integral part of their daily lives. Respondents who possess a new generation mobile would like to be informed through it, both for impending dangerous weather phenomena, as well as about cultivation care of their crops (e.g. need for irrigation using sensors in their plots).

As far as it concerns farmers who do not have a computer, the most important reason for not owning one is the fact that they consider the pc to be a useless / unnecessary tool, as well as both lack of time for its use and lack of computer skills. Regarding reasons for not using Internet, respondents state that it is notable the non-possession of a computer and the lack of internet usage knowledge. Furthermore, e-mail is considered as a non-essential service by the majority of farmers, who insist on not obtaining one, although some Services (e.g. OPEKEPE) henceforth inform producers principally via e-mail. Additionally, those who do not yet own a mobile phone, declare reluctant to acquire one.

Analyzing social variables, it is concluded that age and level of education are the main determinants of possession or not a computer, its professional use and the desire to acquire one, as well as whether or not farmers use internet or desire to obtain an internet connection. Furthermore, mainly educational level and secondarily age and marital status are key determinants of whether or not farmers respondents use e-mail or desire to obtain one.

## 5. Conclusions

Regarding the importance of the ICT adoption in farmers' daily life, it is observed that the need to inform and advise producers is extremely important, in order to improve the financial results of their farms and consequently to improve their standard of living. The application of ICT in agriculture requires skills which, however, cannot be acquired in a short time and without proper training. Moreover, it should be emphasized that agricultural advisory needs to be done on a rather practical than theoretical level, aiming at clear objectives and results - as observed in some cases in recent years. The state should therefore ensure the proper training of agricultural advisors by promoting a more effective system of agricultural advice and at the same time provide specific incentives for the acceptance and use of Information and Communication Technologies by farmers and livestock farmers.

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