Training and Learning Needs for MSc Programs in Sustainable Agriculture

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Abstract

Sustainable agriculture is urgently needed to promote conservation and sustainable resources use in an equitable manner through integrated management of land, water, energy and biodiversity. In this way, education in agriculture emerges as a crucial tool for preparing agricultural technicians, researchers and farmers for productive contributions. Higher education institutions arise with an important mission of education in the context of social transformation and to integrate sustainable development into the educational system as a scientific subject. The aim of this study was to identify the training and learning needs to be included in a MSc program in sustainable agriculture. It was based on a questionnaire prepared and distributed to academics' experts in Agrarian Sciences in Greece, Italy and Portugal. Technologies, legislation, management and business, local community leadership and marketing were the training needs considered very important expertise's in sustainable agriculture. Traditional face-to-face learning, experienced farmers as mentors and knowledge sharing mechanisms were rated as very applicable and important. Due to COVID-19 pandemic, online learning methods, which were not considered suitable for a MSc program in sustainable agriculture, became important by providing online education. Information and communication technology and technological tools showed to be important skills for sustainable agricultural practices to effectively implement online learning and to improve the efficient access, exposure and use of up-to-date information of the agricultural sector and awareness of sustainable agricultural practices.

Keywords: Questionnaires, High education, Sustainable agricultural practices, Agrarian sciences.

1. Introduction

Nowadays, world faces huge challenges such as reducing poverty and ensuring food security. There are approximately one billion people living in hunger today. This is an undoubted worldwide concern because by 2050, there will be 2 billion more people who need to be fed and it is necessary to consider the climate changes that are negatively affecting the availability of fertile soil and water for agriculture production (EU 2012). The sustainable agriculture concept emerges on growth in sustainable productivity to ensure the continued existence of our production base to feed a growing population, also thanks to innovation, while enhancing rural livelihoods (EU 2012). The important role played by sustainable agriculture is in preservation of natural resources, reducing greenhouse gas emissions, halting biodiversity loss and caring for valued landscapes. Sustainable agriculture can help to make farming cleaner, less exposed to volatility in the prices of inputs and more resistant to disasters. Thus, the aims of sustainable agriculture are to increase the productivity without affecting the quality of soil and water, preserve the ecosystems, safeguard animal welfare, generate income for farms and improve quality of life in rural areas, support territorial development and contribute to economy (Cioloş 2012).

Therefore, it is clear that issues related with economic, social and environment aspects are key factors for a sustainable agriculture, as a practice of farming using principles which respect ecology and save natural resources. In the last few decades, the core issue of the sustainable agriculture is focused on the interaction between agriculture and the environment to the detriment of food issues (Lamine 2015). Currently, there is a conscious need to relate agriculture, food and environmental policies and issues from a perspective that takes account of the diversity of sustainable agriculture and the complexity of their interdependencies (Lamine 2015). One of the key features of extensive reforms of the Common Agricultural Policy (CAP) is to support producers rather than products. In a brochure untitled "Sustainable agriculture for the future we want" (EU 2012) some success stories are presented, such as organic farming, on-farm biogas production, extensive grazing practices, renewable energy, precision farming and agro-forestry systems. Moreover, the COVID-19 pandemic showed that it is necessary to have food systems without interruptions in the supply chains, to guarantee agricultural resources and food availability and to mitigate the socioeconomic impacts of crises (UN-FAO 2020).

In order to practice a sustainable agriculture, farmers responsible for the management of farmland must adopt correct and environmentally friendly practices, using appropriate technology and complying with regulations for a sustainable agriculture. Hence, farmers will need know-how and techniques to implement the changes, as well as, a smart governance system, fully set up, linking research, support services, farmers and their organizations and markets. These approaches require increased investments, sharing knowledge, innovation and technologies and courses dedicated to these subjects. Also, the communication gap between academics, researchers and agricultural workers will be promoting. One way to implement the know-how in sustainable agriculture is through MSc programmes since the public is more aware of environmental problems and the offer of educational courses in the universities is increasing in this area (Azeiteiro et al. 2015). For instance, the project - SFARM - Sustainable Farming (www.sfarm-project.eu) of the Erasmus+ program (Capacity Building in the Field of Higher Education) has the goal to provide agricultural workers and agricultural stakeholders with knowledge, skills and competencies in the field of agro-environmental technology for sustainable agriculture in Asian countries (China, Laos, Vietnam and Indonesia). Higher Education Institutions (HEIs) from these countries are partners in SFARM and will develop new curricula and a MSc programme that integrate in a practical way the latest developments in agricultural applied research.

This study aims to identify the training and learning needs to develop a MSc program in sustainable agriculture through a questionnaire prepared and distributed to academics' expert in agrarian sciences in Greece, Italy and Portugal. The questionnaires were developed in order to define the fundamental competences/expertise, to identify the sustainable agricultural practices and the methods of training and learning that should be taken in consideration in a MSc programme in sustainable farming. A long-term impact in securing the sufficient, safe, as well as environmentally, socially and economically sustainable production of agricultural products is expected to be developed.

2. Materials and Methods

In order to identify the training and learning needs for a MSc programme in Sustainable Farming, a questionnaire was prepared by the University of Evora (UEVORA) with the contribution of Agricultural University of Athens (AUA) and University of Basilicata (UNIBAS). This questionnaire was distributed to academics' expert in agrarian sciences in Greece, Italy and Portugal. The main objective was to identify the most important training subjects and the most adequate methods of training and learning: Theoretical, practical classes? Presential, e-learning, b-learning?

The questionnaire results were analysed by country and were presented in percentages to allow the comparison of the results between the countries. The methodology defined for the analysis of the training needs and training methods is shown in Table 1.

Table 1. Methodology defined for the analysis of the best practices of sustainable farming in Greece, Italy and Portugal, based on the percentage of the respondents.

Training and learning needs		Percentage of the respondents (%)
Training needs	Extremely important expertise	Value 5 > 60
	Very important expertise	Sum of values 4 and 5 > 80
	Not important expertise	Sum of values 1 and 2 > 10
Skills with future training needs	Strongly agree	Sum of strongly agree and agree > 80
	Not required	Sum of neither agree nor disagree, disagree and strongly disagree > 20
Forms of learning/training	Very applicable/important	Sum of values 4 and 5 > 75
	Not very applicable/not important	Sum of values 1, 2 and don't know > 10
Training methods efficiency	Extremely efficient	Sum of values 4 and 5 > 75
	Not efficient	Sum of values 1, 2, 3 and don't know > 60

3. Results and Discussion

3.1. Training needs on sustainable farming

The Greek, Italian and Portuguese academics considered very important expertise the majority of the technological, legislative, management and business, local community leadership and marketing (Figure 1). The technological was the most important expertise, while the legislative was the least. However, it must be stated that legislative expertise was considered important only in a relative comparison less important than other competences, such as technology, management or marketing. To train properly the farmers in sustainable agriculture, it is important to provide critical

knowledge and skills to enhance the agricultural productivity and become economically self-reliant through gainful employment (Patil and Kokate 2011). Also, it is necessary to have an appropriate technology which may be economically profitable, ecologically sustainable, technically feasible and culturally compatible (Patil and Kokate 2011). As in other industries, capital investment in intelligent technologies, which supports decision making that optimizes the use agricultural inputs within a sustainable framework and reduce output waste, are the key to high labor productivity (Carson 2018). Additionally, farming training needs to provide new entrants to the industry, whatever their age, with the skills to use performance data for operations and performance management as well as to deliver technical excellence (Carson 2018). Recent developments in science and technology, that could be an added value for farmers' crop and land management, are still unutilized in many situations because farmers have not been introduced to them or have not been trained to use it. Consequently, education in agriculture plays an important role in preparing agricultural workers, researchers and extension staff for the changes and adaptations required in agriculture in the 21st century to contribute more effectively to the improvement of sustainable agricultural production and rural development.

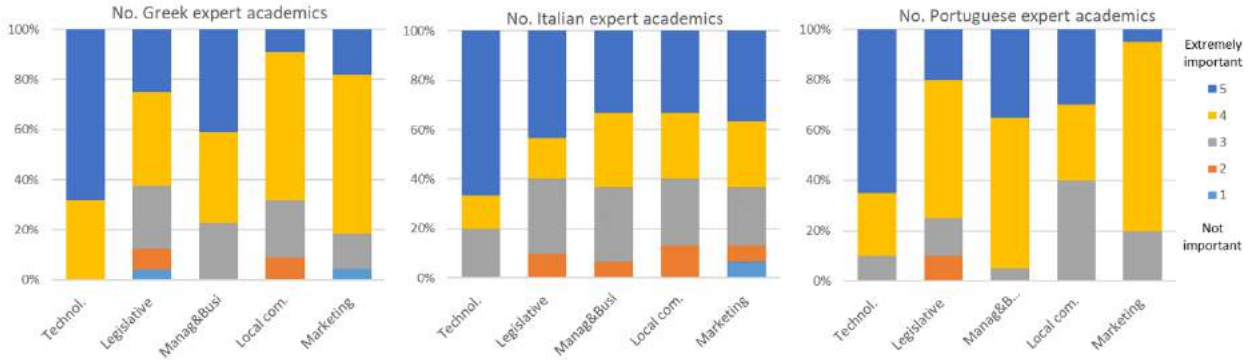

Figure 1. Expertise important rate for the future of sustainable agriculture in Greece, Italy and Portugal: technological, Legislative, Management and business, Local community leadership and Marketing expertises.

3.2. Training methods

The analysis of future training methods allows us to identify that Greek, Italian and Portuguese academics strongly agree with the required learning of new agronomical and environmental issues. Management, and information and communication technology (ICT) skills as future training needs were only considered by Greeks and Portuguese respondents. However, ICT and technological tools showed to play an important role in the online learning during the COVID-19 pandemic (Hodges et al. 2020). Skilled farmers will need to be able to understand and apply new technologies related to primary production for both food and non-food uses, soil science, crop and livestock genetics, agri-chemicals and general-purpose technologies such as remote sensors, satellites and robotics. For instance, communication technology gives farmers greater control over their access and exposure to information. It enables to take initiative as information seekers, rather than adopting a passive role as information recipients (Meera et al. 2004). Text messaging is one of the most widely used mobile data service worldwide, and many services or equipment can use this tool to interact with the farmer providing him with real time information. This can be very useful for farm management. The use of common word processors and spreadsheets are essential for data management and are becoming an important skill in farming practice, allowing workers to process information collected from different sensors and mapping systems (European Commission 2014). Software can also store digital evidence to be presented to national and EU agricultural regulators on the fulfilment of subsidy conditions. Furthermore, we found that traditional face-to-face learning, experienced farmers as mentors and knowledge sharing mechanisms were rated as very applicable/important by the academics. On the other hand, massive open online courses and apps for learning via a smartphone was considered not very applicable/not important forms for learning/training in sustainable farming. However, Shanley et al. (2004) considered that online education provides the trainees/students/farmers with an educational alternative to the traditional face-to-face learning, allowing them to proceed at their own pace. Parr et al. (2007) already considers that students should learn through experiences that link the classroom to field work, engaging a broad range of actors within applied settings. Their study also supports the argument that sustainable agricultural education requires progressive, integrated, experiential, interdisciplinary, systems-based curricula where learning grounds theory to practice in relevant and purposeful social and environmental contexts. Although traditional face-to-face learning is the most suitable training methods for a Master program in Sustainable Agriculture, online training

methods should be seen as complementary tools in agriculture programs for situations like the COVID-19 pandemic. In this way, there is no interruption in the studies and teaching of academic staff, students and agricultural extension staff.

The training methods educational excursions/visits, field demonstrations, short-term seminars, practical courses/exercises and agriculturalist's visits in farms were considered to be extremely efficient by the academics of the three European countries. On the other hand, these academics considered not efficient the training methods broadcasts on radio, information in the form of forms-brochures, television broadcasts and articles in newspaper.

4. Conclusions

Relevant training and learning needs in sustainable agriculture that can be taken into account when developing a MSc programme, were identified based on questionnaires. In summary, the technologies, legislation, management and business, local community leadership and marketing were the training needs considered very important expertise's in sustainable agriculture and the more adequate forms of training/learning considered were: 1) Traditional face-to-face learning; 2) Experience farmers as mentors 3) Knowledge sharing mechanisms. The more efficient training methods considered were: a) Educational study visits; b) Field demonstration; c) Short-term seminars; d) Practical courses/exercises; e) Agriculturalist's visits in farms. COVID-19 pandemic exposed the importance of ICT and technological tools as a basic need for online learning.

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