

Contribution for Rural Development through Training in Organic Farming

Raquel P. F. Guiné, Daniela V. T. A. Costa, Paula M. R. Correia, Moisés Castro, Luis T. Guerra, Cristina A. Costa

Abstract—The aim of this work was to characterize a potential target group of people interested in participating into a training program in organic farming in the context of mobile-learning. The information sought addressed in particular, but not exclusively, possible contents, formats and forms of evaluation that will contribute to define the course objectives and curriculum, as well as to ensure that the course meets the needs of the learners and their preferences. The sample was selected among different European countries. The questionnaires were delivered electronically for answering on-line and in the end 135 consented valid questionnaires were obtained. The results allowed characterizing the target group and identifying their training needs and preferences towards m-learning formats, giving valuable tools to design the training offer.

Keywords—Mobile-learning, organic farming, rural development, survey.

I. INTRODUCTION

THE European Commission's rural development policy is one of the two pillars of the Common Agricultural Policy (CAP). It helps meeting the challenges faced by rural areas and contributes for their sustainable development [1].

Rural areas in the European Union are of extreme importance because they represent a home for 113 million people. Furthermore, they also provide food products or raw materials for transformation industries. Finally, they offer a wide variety of jobs and a diversified ecosystem services, such as cultural landscapes, biodiversity, carbon storage, water and soils [1].

The sustainable development of rural areas was established as a key objective of the European Common Agricultural Policy in 2000, and ever since it has been object of increasingly important financial support. The proposed new regulation for rural development policy after 2013 is the latest step in a series of policy developments aimed at creating a coherent and sustainable framework for the future of Europe's rural areas. The reinforcement of support for rural development is evidenced through rural development

programs from 2014 onwards and up to 2020 [1].

The demand for safe food products, in parallel to increased environmental awareness, has resulted in an increasing demand for organic products [2], [3]. Organic farming is frequently promoted on the basis of the multiple benefits it is argued to provide, among which stand healthier foods, improved farming environment and, increasingly, a contribution to the rural economy [4].

In nutritional terms, there is some growing evidence that a predominantly organic diet reduces the amount of toxic chemical ingested, totally avoids GMOs and reduces the amount of food additives and colorings. On the other hand, it increases the amount of bioactive compounds with important functions for human health, such as vitamins, antioxidants and beneficial fatty acids [5], [6].

Besides the nutritional value of the organic foods, organic agriculture has also been found to enhance soil fertility and increase biodiversity [2], [3]. In fact, organic farming is an approach to agriculture that emphasizes environmental protection, animal welfare, food quality and health, based on a sustainable resource use. Furthermore, it's philosophy advocates social justice, and hence it utilizes the market to help support these objectives [7], [8].

Organic farming is based on a perspective for farming which has a positive impact on the environment while addressing many economic and social aspects, contributing to the sustainable development of the rural areas as well as to the protection of all components of the environment [9].

The agro-ecology perspective of European agriculture is implemented by incentives to environmentally friendly farming practices, such as organic farming, because it offers an effective means of satisfying consumer demand for healthy and safe foods while reducing the environmental pressure of agricultural production, and simultaneously addressing important animal welfare issues. Organic farming is believed to significantly strengthening rural economies [4], [10]. This argument, that organic farming and rural development are linked in a positive way, is supported by a considerable number of published works and studies, which address, among others, organic production statistics, production incentives, farm economic results and organic retailing statistics [4]. Furthermore, it has been suggested that organic farming can provide rural development benefits through enhanced employment and through closer connections with the local economy, reconnecting consumers with producers and stimulating positive economic multipliers, in view of a just commerce with advantages for all intervenients [6].

Several policy instruments have been developed to

R. P. F. Guiné is with the Research Centre CI&DET, Polytechnic Institute of Viseu, Campus Politécnico, Repeses, 3504-510 Viseu, Portugal (Corresponding author, Phone: +351-232-480700; Fax: +351-232-480750; e-mail: raquelguine@esav.ipv.pt).

D. V. T. A. Costa is with the Ecology and Sustainable Agriculture Department, Agrarian School of Viseu, Quinta da Alagoa, Ranhados, Viseu, Portugal (e-mail: daniela@esav.ipv.pt).

P. M. R. Correia is with the Research Centre CI&DET, Polytechnic Institute of Viseu, Campus Politécnico, Repeses, Viseu, Portugal (e-mail: paulacorreia@esav.ipv.pt).

M. Castro, L. T. Guerra and C. A. Costa are with the EOSA, Rua Doutor Cadaval 5, Vigo, Pontevedra, España (e-mail: mcastro@eosa.com, ltourino@eosa.com, amarocosta@esav.ipv.pt).

encourage growth in organic production and consumption. These include direct approaches, like promoting conversion to organic and marketing arrangements. On the other hand, also indirect approaches are used, such as promoting extension services and research [11]. Organic farming has become an inherent part of agriculture in the European Union [12]. Since the mid-1980s, organic farming has become the focus of significant attention from policy-makers, consumers, environmentalists and farmers in Europe and state institutions have become increasingly involved in regulating and supporting the organic sector. Reflecting the multiple goals for organic farming and for agricultural policy, a varied and complex range of policy measures have been developed and implemented to support the organic sector [7].

In the European Union rural regions represent 52% of the territory and 23% of the population. In 2010, they generated 16% of the total Gross Value Added and 21% of the employment [1]. Rural regions represent more than 80% of the territory in Portugal against 45.2% in Italy or 29.2% in Spain [13].

The knowledge and technical training are essential motivators for the adoption of organic farming, either by converting conventional farms to organic production or by creating new organic farms. The project "ECONewFARMERS - Building the future with new farmers in organic production through vocational training" was approved by Program Leonardo da Vinci – Transfer of Innovation (ref 2013-1-PT1-LEO05-15535). It aims to contribute for the technical training and provide tools to improve the capacity of intervention and innovation of farmers wishing to convert or start a farm in organic farming, in contexts of mobile-learning (m-learning), and who already have at least secondary education but no formal knowledge in agriculture in general or organic farming in particular [13]. This project includes partners from different European Countries, namely: Portugal, Spain, Slovakia, Hungary, United Kingdom, Italy and Turkey.

The aim of this work was to make a survey by means of a questionnaire in order to gather information that could be used to define a set of guidelines for the preparation of new contexts for training in organic farming, in particular in the form of m-learning. The information sought addressed in particular, but not exclusively, possible contents, formats and forms of evaluation that will contribute to define the course objectives and contents, as well as to ensure that the course meets the needs of the learners as well as their preferences.

II. MATERIALS AND METHODS

A. Instrument for Data Collection

This survey was undertaken by means of a questionnaire, which constitutes one of the privileged ways of collecting data refereeing to social behaviors.

The questionnaire was firstly prepared in English and Portuguese and then it was translated into the languages of the participating countries and applied to potential interested people in each of the countries of the ECONewFARMERS

partners (Portugal, Spain, Slovakia, Hungary, United Kingdom, Italy and Turkey). The questionnaire was produced using the tools provided by Google Drive, as it provides an easy way of sharing and altering the language among all partners participating in the project.

The Questionnaire was structured in five sessions that aimed to assess respondents' characterization, past experience in actions for agricultural training, use technologies and m-learning tools, preferences towards the type of training to offer and gaps in training in ecological (organic) farming.

B. Sampling Procedure

The sample was selected among all the potential interested people in the different countries included in the study. The questionnaires were delivered electronically for answering online. The participation of the respondents was voluntary and in the end 135 consented valid questionnaires were obtained.

C. Data Analysis

In the data analysis basic descriptive statistics was used, for an exploratory evaluation of the data. For all data analysis software SPSS, from IBM Inc. (version 22) was used.

III. RESULTS AND DISCUSSION

A. Sample Characterization

Table I shows how the enquired were distributed among the countries that were included in this preliminary study. Hungary, Spain, Portugal, Slovakia and Turkey had the higher percentages, with participations between 14 to 19 %, followed by United Kingdom and Italy, with 9% and 8%, respectively.

TABLE I
DISTRIBUTION OF THE ENQUIRED BY COUNTRY

Country	Percentage
Hungary	19%
Italy	8%
Portugal	16%
Slovakia	16%
Spain	18%
Turkey	14%
United Kingdom	9%

The sample consisted of people aged between 18 and 70 years old, with an average of around 35 (± 11) years (Table II). The majority, 23%, was aged between 25 and 30 years, and people under 45 represented 80% of the total enquired. This shows that the people potentially interested in the training in organic farming are young farmers or young people who want to start a farm in organic farming.

Table III shows that most of the sample individuals have a university degree, 68%, and only 7% have a very low level of education (basic education). This is a good indicator that the potential interested in the training offered already have some education, although in many cases it is in an area quite different from agriculture (73%), thus indicating that those people intend to change their present or past activities into agriculture. Some of those included areas so diverse as Economy, Management and Business Administration, Human

Resources, Geography, Urban Policies and Territory, Political Sciences, Social Sciences, History, Law, Foreign trade, Engineering, Communication and information technology, Nursing, Painting, Chemistry or Sports.

TABLE II
DISTRIBUTION OF THE ENQUIRED BY AGE

Age class (years)	Percentage
18 – 25	15%
25 – 30	23%
30 – 35	15%
35 – 40	18%
40 – 45	10%
45 – 50	7%
50 – 55	5%
55 – 60	3%
60 – 65	2%
65 – 70	2%
Mean	35,36
Standard deviation	11,27

TABLE III
DISTRIBUTION OF THE ENQUIRED BY SCHOOL LEVEL OF EDUCATION

School level	Percentage
Basic	7%
Secondary	18%
Post-secondary training	7%
Higher Education	68%

B. Agricultural Practices

Another aspect addressed in the questionnaire connected to past experience and/or future plans related to agriculture activities. 28% do not have any kind of experience in agriculture against 41% who have experience in agriculture (Table IV), regardless of the cultural practices (organic or conventional farming) or the type of crops produced. Still, 24% have just some experience, which was obtained working in farms owned by the family.

TABLE IV
PREVIOUS EXPERIENCE IN AGRICULTURE

Experience	Percentage
No experience and comes from the city	16%
No experience but comes from a rural area	12%
Some experience coming from relatives that are farmers	24%
Yes, has experience	41%
Missing	7%

More than half (56%) of the enquired affirmed that they presently have some agricultural activity, while 30% are thinking about starting one the future, and only 14% do not have and also do not intend to start one.

Regarding the number of years of past experience in agriculture, 50% have less than 10 years, 28% between 10 and 20 years, and a very small percentage has more than 30 years of experience (4%) (Table V). This is also related to the age of the enquired, since most of them were quite young and hence it would be expected that the number of years of experience would be low.

From those who already have a farm, 58% have very small farms, with less than 5 ha, 15 % have farms between 5 and 10 ha, and only 19% have farms bigger than 20 ha (Table VI). The largest farms were situated in United Kingdom and Turkey (70 and 64 ha on average, respectively), followed by Slovakia (average 27 ha), while the smallest (lower than 10 ha on average) were in Portugal, Italy, Hungary and Spain (9, 7, 6 and 1 ha on average, respectively). The low average area found for Spanish farms may be related to the fact that the target group was situated in the North, in the province of Galicia, with a reality different from the south of Spain, where farms are typically bigger.

TABLE V
YEARS OF EXPERIENCE IN AGRICULTURE

Age (years)	Percentage
0	4%
0 – 10	50%
10 – 20	28%
20 – 30	14%
30 – 40	2%
40 – 50	2%

TABLE VI
FARM DIMENSION

Farm dimension (ha)	Percentage
0 – 5	58%
5 – 10	15%
10 – 20	9%
20 – 30	3%
30 – 50	5%
50 – 100	5%
100 – 200	2%
200 – 300	4%

The variety of adopted crops, or intended to, is wide, but fruits represent almost half (48%), followed by vegetables (37%). Other crops include field crops (21%), medicinal herbs and olives (13% each), pastures (9%), animal production (5%) and ornamentals (3%) (Table VII).

TABLE VII
CROP PRODUCTION

Crops	Nº of farms
Vegetable crops	37
Field crops	21
Vineyards	11
Fruits	48
Medicinal herbs	13
Ornamentals	3
Pastures	9
Olives	13
Animal Production	5
Others	4

Regarding the production system adopted, 71% want to start operating as organic farmers, 17% intend to adopt integrated pest management and a minority still prefer conventional farming (11%). For those farmers who are

already practicing organic farming, integrated pest management or integrated production, 19% are already certified, 28% are in the process of conversion, but a considerable part (52%) admit that they do not want certification.

Table VIII shows that the most preferred commercialization methods include local markets, specialized shops, retail markets, door to door basket and internet. Still an important part of the production is aimed at self-consumption, as it was indicated by 11 farmers.

TABLE VIII PRODUCT COMMERCIALIZATION	
Selling possibilities	N° of farmers
Local market	44
Retail market	31
Door to door basket	27
Specialized shops	35
Undifferentiated shops	8
Internet	25
Export	4
Self-consumption	11
Cooperatives	4
Farm	1
Others	9

Among the motivations for practicing agriculture (Table IX) stand the satisfaction (in almost 60 cases), the family farming traditions or the education received in agricultural related topics. Although not very representative, still in 16 cases the farmers came to practice agriculture as an alternative to unemployment, hence referring to people who were used to do something else.

TABLE IX MOTIVATIONS FOR AGRICULTURAL ACTIVITIES	
Reasons	N° of responses
I come from a family of farmers	38
I like agriculture	59
I've studied with that purpose	35
As an alternative to unemployment	16
Discontent in the previous job	14
Another income resource	3
Hobby	4
Others	5

The most cited previous activities included education and research as well as activities related to management, consultancy, administration and logistics (Table X).

Those who were previously employed in agriculture represent only 10% because the majority is employed in another sector (75%) and only 15% are unemployed. Among those who have or are thinking about getting a farm, in 57 cases it was obtained or will be obtained from family and in 34 cases it was or will be bought (Table XI).

40% admit that they hold some kind of experience in organic farming against 60% that do not.

Table XII shows that 31 of the respondents had experience in organic farming by being farmers, while 15 were from

academic media, and hence teach topics related to organic farming.

TABLE X
PREVIOUS PROFESSIONAL ACTIVITIES

Activities	N° of responses
Education and research	20
Management, consultancy, administration and logistics	19
Agriculture	10
Environment	6
Construction and industry	5
Health	5
Driver	2
Food	2
Sales	2
Other	15
Unemployed	15

TABLE XI
OBTAINING OF THE FARM

Possibilities	N° of responses
It was on the family	57
Buying	34
Renting	14
By cession	8
Other	5

TABLE XII
TYPE OF EXPERIENCE IN ORGANIC FARMING

Experience	N° of responses
Farmer	31
Trainer/Teacher/ Researcher	15
Technical support (farmer associations/official agencies)	10
Company of production factors	6
Project	2
Student	2
Other	4

C. Experience in Agricultural Training

Regarding the participation in training activities in agriculture or other related areas, 58% said they participated in such actions while 42% did not. For those who participated, in 28 times they participated as trainers, 57 times as trainees and 9 times as coordinators. Most frequently the training consisted of classroom lessons (68 times) and the expression of long distance learning formats (e-learning, b-learning or m-learning) is still low (24 times, representing less than 20%) (Table XIII).

TABLE XIII
TYPE OF TRAINING IN AGRICULTURE

Type	N° of responses
Classroom	68
e-learning	12
b-learning	8
m-learning	4
Practical	3
Other	9

Those who participated in any training programs in e-

learning, b-learning or m-learning, referred that it was organized in classroom environment (24 answers), also using platforms (6 times), including practical and field activities (13 times), together with field visits (once) and a practical workshop (also once).

D. Using Technology and m-Learning Tools

To evaluate the use of mobile technologies among the respondents, who represent potential interested people in frequenting training courses in organic farming in the context of m-learning, a set of questions was presented with the objective of characterizing their usage and preferences for technology. The data in Table XIV shows that almost all (106) use frequently a mobile phone (representing 79%), or a laptop (74%). The less used include I-phone and I-pod (13% and 2%, respectively).

TABLE XIV
TECHNOLOGY USED REGULARLY

Equipment	N° of responses
Mobile phone	106
Laptop	100
Tablet/I-pad	46
I-phone	18
I-pod	3
Others	5
None	1

In most of the cases these devices are used also in their professional activity (88% of the cases). Mostly, the frequency of use is daily (in 86% of the cases) and with a lower frequency stand options like 1 to 2 times a week (7%), 1 to 2 times a month (1%) or rarely (6%).

The type of information sought for in the internet is variable but includes many subjects that are related to the farming activities. Among the most cited, weather comes first, followed by crop protection, marketing/commercialization production factors or crop production (Table XV).

E. Training Preferences

Because the main goal of the work included in the ECONewFARMERS project was to develop contents and prepare a training course in organic farming to operate in m-learning contexts, it was important to identify the target group preferences about this type of training. When asked about what type of learning systems they believe should be available in organic farming, still many say that traditional classes are important (67 responses), but e-learning, b-learning and m-learning gather the preferences of a considerable number of persons (between 47 and 53 responses). Also practical activities were mentioned, although less expressively (mentioned only by 8 people) (Table XVI).

Even though the training is organized in the context of m-learning, some people consider necessary the organization of classroom sessions (66%), against only 34% who consider those dispensable. Regarding the duration and frequency of presence sessions Table XVII shows that in 26 cases the respondents said classroom sessions should be organized when

asked by the trainees or periodically once a month (21 responses).

TABLE XV
INFORMATION SEARCHED FOR IN THE INTERNET

Information	N° of responses
Weather	48
Crop protection	38
Market	25
Production factors	17
Crop production	12
Crops/ Species	7
Technical and scientific information	7
Organic farming	7
Financial support	4
Soil	3
Machinery	3
Training	3
Land sales	3
Food/Food safety	2
Other	26

TABLE XVI
SUGGESTED TYPE OF TRAINING

Training mode	N° of responses
Classroom	67
e-Learning	53
b-Learning	55
m-Learning	47
Practical	8
Other	1

TABLE XVII
DURATION AND FREQUENCY OF PRESENCE SESSIONS

Frequency	N° of responses
When asked by trainees	26
Periodically once a month	21
Once in the beginning for preparation of the training and once at the end to assess the achieved outcomes of learning	19
Sporadically in 1/2 day modules	19
Sporadically in 1-day modules	13
Once in the beginning for preparation of the training	3
Once at the end to assess the achieved outcomes of learning	3
Other	2

The presence sessions could be of different types, as shown in Table XVIII, with a strong emphasis on farm activities (suggested by 102 participants) and particularly supervised by a pilot or model farmer. Also the study visits were considered very useful, as well as discussion groups and activities in the laboratory.

The potential respondents interested in frequenting the training in organic farming still considered that manuals and handbooks constitute a preferred support for learning (as indicated in 70 responses), but e-books, software and interactive platforms came right after with a close number of responses (between 60 and 67) (Table XIX).

TABLE XVIII
TYPE OF CONTACT SESSIONS

Type of sessions	Nº of responses
Farm	102
Pilot farmer	70
Study visits	62
Discussion groups	46
Laboratory	38
Videoconference	25
Other	3

TABLE XIX
SUPPORT MATERIALS

Type of materials	Nº of responses
Manuals/Handbooks	70
e-Books	67
Specific software	65
Interactive platforms	60
Technical leaflets	51
Other	5

A very important aspect is related to the evaluation of the assimilated contents and acquired competences. In this regard, the tests for response on-line seem to be preferred (68 preferences), due to the convenience they represent. Also practical activities and the accomplishment of tasks and reports represent important ways of evaluation, as indicated by the high number of responses (almost 50 responses in each case).

TABLE XX
TYPE OF EVALUATION

Evaluation methods	Nº of responses
Test for response on-line	68
Tests for response in classroom	39
Test for response to send by mail	9
Tasks/reports	44
Practical activity in classroom	48
Other	2

Some suggestions for training topics or modules were also obtained from the questionnaires. In this way, the participants indicated some topics that, in their opinion, constitute gaps in training in organic farming and that could be interesting to have in the context of m-learning. These include: organic farming principles, organic fertilization, conversion from conventional to organic production, certification, crop protection, conservation, food safety, marketing and commercialization, management, tourism, husbandry, bee keeping or multifunctionality.

IV. CONCLUSION

This work allowed characterizing a specific target group for training in organic farming in m-learning context in seven European countries. Most of the respondents had a higher level degree and from those, about two thirds were in areas that are not related with agriculture, which shows their need for training in agriculture. However, an expressive number of farmers with no training, education and experience in

agriculture, are already involved and aiming for training in this area.

From the respondents, 86% currently have, or are thinking of starting, some agricultural activity, but the majority of the farms are small, with less than 5 ha. Regarding the farming system, 70% have already adopted organic farming or wish to adopt it in the future, revealing the interest for this farming system. However, when it comes to certification, it seems as not being an option for the majority of farmers.

From the respondents, 58% had already participated in training activities related to agriculture. The teaching, training and learning experience was generally in classroom, with only a few presenting experience in e-learning, b-learning and m-learning.

All respondents use IT technologies regularly, including to search for information related to their professional activity.

A large number of respondents indicated their preference for training in classroom and m-learning. The presentational sessions would allow to clarify doubts, exchange thoughts and discuss topics as well as to facilitate the assimilation of knowledge. Also training sessions on a farm were identified as a useful tool for complementing the training. The preferred training materials were manuals and electronic books, but other supports were also recognized appropriate (specific software, manuals, interactive platforms, technical leaflets). Regarding the assessment of the learning performance, the tests for response on-line were preferred, followed by practical activities in the classroom.

ACKNOWLEDGMENT

R. P. F. Guiné thanks CI&DETS Research Centre and Polytechnic Institute of Viseu.

All authors thank Project Leonardo da Vinci – Transfer of Innovation ECONewFARMERS: Building a future for new farmers in ecological farming through vocational training (2013-1-PT1-LEO05-15535).

All authors thank the contribution of Catherine Seeds, Collette Coll, Helena Esteves Correia, László Radics, Mehmet Arslan, Monika Tóthóva, Peter Toth, Salvatore Basile, Soner Soyulu.

REFERENCES

- [1] European Commission, "Rural Development in the EU: Statistical and Economic Information," European Union, Report 2013, 2013.
- [2] C. Argyropoulos, M. A. Tsiafouli, S. P. Sgardelis, and J. D. Pantis, "Organic farming without organic products," *Land Use Policy*, vol. 32, pp. 324–328, May 2013.
- [3] P. Mäder, A. Fließbach, D. Dubois, L. Gunst, P. Fried, and U. Niggli, "Soil fertility and biodiversity in organic farming," *Science*, vol. 296, no. 5573, pp. 1694–1697, May 2002.
- [4] E. Smith and T. Marsden, "Exploring the 'limits to growth' in UK organics: beyond the statistical image," *Journal of Rural Studies*, vol. 20, no. 3, pp. 345–357, Jul. 2004.
- [5] M. Lobley, A. Butler, and M. Reed, "The contribution of organic farming to rural development: An exploration of the socio-economic linkages of organic and non-organic farms in England," *Land Use Policy*, vol. 26, no. 3, pp. 723–735, Jul. 2009.
- [6] A. D. Dangour, K. Lock, A. Hayter, A. Aikenhead, E. Allen, and R. Uauy, "Nutrition-related health effects of organic foods: a systematic review," *Am. J. Clin. Nutr.*, vol. 92, no. 1, pp. 203–210, Jul. 2010.

- [7] M. Stolze and N. Lampkin, "Policy for organic farming: Rationale and concepts," *Food Policy*, vol. 34, no. 3, pp. 237–244, Jun. 2009.
- [8] N. Lampkin, "From conversion payments to integrated action plans in the European Union.," 2003, pp. 313–328.
- [9] L. Paľšová, L. Schwarczová, P. Schwarcz, and A. Bandlerová, "The Support of Implementation of Organic Farming in the Slovak Republic in the Context of Sustainable Development," *Procedia - Social and Behavioral Sciences*, vol. 110, pp. 520–529, Jan. 2014.
- [10] T. Marsden, J. Banks, and G. Bristow, "The social management of rural nature: understanding agrarian-based rural development," *Environment and Planning A*, vol. 34, no. 5, pp. 809 – 825, 2002.
- [11] H. Bjørkhaug and A. Blekesaune, "Development of organic farming in Norway: A statistical analysis of neighbourhood effects," *Geoforum*, vol. 45, pp. 201–210, Mar. 2013.
- [12] A. M. Häring, D. Vairo, S. Dabbert, and R. Zanoli, "Organic farming policy development in the EU: What can multi-stakeholder processes contribute?," *Food Policy*, vol. 34, no. 3, pp. 265–272, Jun. 2009.
- [13] C. A. Costa, P. Correia, H. E. Correia, R. Guiné, P. Rodrigues, D. Teixeira, L. T. Guerra, and S. Basile, "Family and Organic Farming. New Apprenticeship technologies Through M-Learning," Oct-2014.