IOSUD – UNIVERSITATEA „DUNĂREA DE JOS” DIN GALAȚI

Școala doctorală de Științe fundamentale și inginerești

DOCTORAL THESIS

RESEARCH ON THE IMPACT OF TRAINING ACTIVITIES ON THE PERFORMANCE OF AGRICULTURAL ACTIVITIES

Phd student,

Simescu Laura Maria

Scientific coordinator,

Turek-Rahoveanu Maria-Magdalena

Seria I9 Nr.11

GALAȚI

2021

Anexa 2 –*Copertă interioară/față*

IOSUD – UNIVERSITATEA „DUNĂREA DE JOS” DIN GALAȚI

Școala doctorală deȘtiințe fundamentale și inginerești

UNIVERSITAS
GALATIENSIS

ABSTRACT

DOCTORAL THESIS

RESEARCH ON THE IMPACT OF TRAINING ACTIVITIES ON THE PERFORMANCE OF AGRICULTURAL ACTIVITIES

Phd. Student,

Ec.Simescu Laura Maria

Scientific coordinator,

Turek-Rahoveanu Maria-Magdalena

Președinte	Prof univ.dr.ing.ec. Silvius Stanciu
Conducător științific,	Prof univ.dr.ec. Turek Rahoveanu Maria Magdalena
Referenți stiințifici	Prof univ.dr.ing.Valenatina Constanța Tudor
	Prof univ.dr.ec. Dorina Nicoleta Mocuța
	Prof.dr.habil, Zugravu Gh. Adrian

Series I9 Nr.11

GALAȚI

2021

Anexa 2 *–Copertă interioară/verso*

Seriile tezelor de doctorat susținute public în UDJG începând cu 1 octombrie 2013 sunt:

Domeniul fundamental ȘTIINȚE INGINEREȘTI

Seria I 1**: Biotehnologii**
Seria I 2**:Calculatoare și tehnologia informației**
Seria I 3:**Inginerie electrică**
Seria I 4**:Inginerie industrială**
Seria I 5:**Ingineria materialelor**
Seria I 6**:Inginerie mecanică**
Seria I 7**:Ingineria produselor alimentare**
Seria I 8:**Ingineria sistemelor**
Seria I 9**:Inginerie și management în agicultură și dezvoltare rurală**

Domeniul fundamental ȘTIINȚE SOCIALE

Seria E 1:**Economie**
Seria E 2:**Management**
Seria SSEF:**Știința sportului și educației fizice**

Domeniul fundamental ȘTIINȚE UMANISTE ȘI ARTE

Seria U 1: **Filologie- Engleză**
Seria U 2: **Filologie- Română**
Seria U 3**:** **Istorie**
Seria U 4:**Filologie - Franceză**

Domeniul fundamental MATEMATICĂ ȘI ȘTIINȚE ALE NATURII

Seria C:**Chimie**

Domeniul fundamentalȘTIINȚE BIOLOGICE ȘI BIOMEDICALE

Seria M: **Medicină**

ABSTRACT

The doctoral thesis entitled **"Research on the impact of training activities on the performance of agricultural activities"** addresses one of the most important and current issues, in the context in which self-identity refers to the perspective of farmers on enriching knowledge to improve business management in their farms.

In the first chapter "The role of young farmers in ensuring the sustainability of farms at European level" we make a foray into the literature on the evolution of the concept of young farmers and policy-based economic processes aimed at improving farm performance and sustainability.

The chapter is structured as follows:

- A background section describing the role of the farmer in promoting a transition to sustainable agriculture in relation to learning and motivation tools.
- The second section emphasizes the need to manage farm activities based on the farmer's knowledge with the presentation of the German model;
- The third section presents a selection of factors that influence the farmer's behavior to manage an activity in sustainable agriculture;
- The fourth section follows approaches to the literature on different manifestations of farmers and their attitude in different processes in practice and introduces the theoretical framework of distributed knowledge.

The chapter concludes with the need for advisory services for farmers in order to increase farm sustainability by defining standards on the environment, food safety, plant (and animal) health and animal welfare, as well as the requirement to maintain land in good agricultural and environmental condition.

Therefore, in this chapter we aim to come up with a description of what “young farmers” mean based on the literature, to understand their role and importance in the society in which we live as well as the main political tools to support young farmers.

Agricultural audit similar to quality assurance certification schemes emerged as a first idea in the mid-term review of the CAP. This idea was later replaced by the concept of a mandatory "agricultural advisory system" for Member States and combined with increased public control of agricultural land use by establishing the "Integrated Management and Control System" (IACS) ([61].

The implementation of the agricultural advisory system in the EU Member States was initiated by the rural development authorities and took place within the existing institutional framework at national or regional level.

For the most part, it resulted in two distinct organizational forms:

(i) in several countries, the agricultural advisory system has been re-established in parallel with existing agricultural advisory systems (eg Bulgaria or Hungary, Romania-2002, 2008), while

(ii) in other countries the existing agricultural advisory systems have been updated and supplemented with the agricultural advisory system component (eg Germany, the Netherlands, Denmark).

An evaluation of the implementation of the policy at Member State level was carried out shortly after their implementation at Member State (MS) level.

Despite limited evidence, this assessment concluded that the agricultural advisory system contributes to raising farmers' awareness of material flows and on-farm processes related to environmental, food safety or animal health issues and that they support in implementation of environmental requirements. In addition, the basic one-to-one farm-based advice on checklists (in 18 Member States implemented by 2008) was assessed as particularly effective compared to off-farm or individual approaches.

Apart from this initial assessment, little is known so far about the results and impact of the agricultural advisory system on good environmental practice, as there has been no second assessment since 2009.

A recent overall study on European agricultural advisory services as a key factor for farmers' access to relevant information and viable knowledge concluded that the data available to assess the impact of advisory services [63] are insufficient for a meaningful assessment.

Together with the United Kingdom, Italy and Belgium, Germany is one of the few European countries where the implementation of agricultural advisory systems is mandatory at national level, which has led to considerable institutional diversity [25]. In addition to this diversity and unlike all other EU Member States, the German implementation of the agricultural advisory system has been combined with the dissemination of farm management systems (FMS).

In this context, an FMS is defined as "a tool for the systematic documentation and analysis of production processes, designed to continuously improve the overall performance of the farm".

Strengthening self-control and optimizing the process at farm level through the FMS has become a political priority, as manifested in a national subsidy system called the "Framework Plan for the common task of improving agricultural structure and coastal protection" [44].

FMS was presumed to be a facilitator of farmers' compliance with public support for CC-related agricultural councils related to the introduction and implementation of this tool.

(BMELV, 2017) recommended the implementation of FMS to federal states. Depending on the state-level advisory system, FMSs were developed by public institutions, agricultural chambers or independent private consulting companies. Between 2007 and 2013, national policy provided financial support for consultancy services combined with FMS (BMELV, 2017).

Thus, we frame the introduction of farm management systems in Germany as a process of policy-based innovation in the agricultural sector aimed at increasing farm sustainability. As the adoption of environmental tools and practices by farmers is a complex process, usually influenced by a wide range of socio-structural and situational determinants, we consider it a unique opportunity to study such policy-based innovation.

FMS costs ranged from 0 to 1000 Euro per unit, in states with private counseling systems many times higher than in public or mixed systems.

Grants for advice on the introduction of FMS were only available in 5 of the 16 states. The main consultative approach was one-on-one advice. Only in Bavaria has the state-level farmers' union implemented a group approach.

In addition, some states provided a free official CC checklist or provided free advice on individual aspects of CC without FMS.

In the second chapter entitled "Research on the diversity and performance of farms in the period 2014 - 2020 at European level" of the doctoral thesis "Research on the impact of training activities on the performance of agricultural activities" we set out to present an analysis of the stage current implementation of the CAP with reference to young farmers, beneficiaries of

financing their farms in the period 2014-2020. Several of their own views are expressed, related to improving the existing support scheme and assisting young farmers to remove barriers to entry into agricultural activities.

This chapter presents a section on the relationship between farmers' participation in M60.1 and the number of younger agricultural managers, as well as the preferences or orientations of those over 65 years of age. An attempt is also made to explore whether the share of Priority 2B in promoting the entry of young farmers and the size of the flat-rate support are determined by the socio-economic situation in a Member State at a given time. The chapter ends with the presentation of the effects produced by the application of measure 06.1 for the installation of young farmers in Romania.

If we refer to the effects produced by the application of measure 06.1 for the installation of young farmers in Romania, at the end of 2018, 2749 projects were submitted for evaluation and at the same time 1038 completed projects. Experiences have shown that out of the number of projects submitted, only 70% have been contracted. The vocational training projects for the beneficiaries of SM 6.1 proved to be insufficient because only 1 project was contracted with the objective of providing counseling services for them.

Regarding the level of education, only 10% of the beneficiaries of the completed projects respect the mandatory minimum level based on the selection criteria, while 13% have a good knowledge of the agricultural field. Also, 7% of the completed projects are applications of young people with a higher education degree in agriculture, and 6% of beneficiaries who have completed post-secondary or secondary education in agriculture. On the other hand, the majority of beneficiaries with completed projects (77%) took a specific course to obtain level 1 professional qualification.

The analysis of the beneficiaries allows the examination of the correlation between the distribution according to gender, sector of activity, regions and the qualification of farmers. Gender analysis shows that there are no differences in the level of qualification of women and men. Regarding the territorial differences, it is observed that 18% of the well-qualified beneficiaries come from the Bucharest-Ilfov region (15 out of 84), 17% from the Western region (59 out of 350), 16% from the South-East region (75 out of 452). At the same time, it was highlighted that 9% of the less qualified beneficiaries come from the South Muntenia region (53 out of 561).

These regional differences can be explained by the lack of access to university-level agricultural education in marginal areas. This is confirmed by the fact that low-skilled farmers come from mountain areas (10%) and "normal" rural areas (13%). The correlation between the level of qualification and the activity sector also highlights interesting findings.

Less qualified young people (4%) work in the cattle breeding sector, while the most qualified young farmers (22%) tend to work in the permanent vine and orchard crops sector, followed by the field crops sector (18%). Measure 6.1 also generates other positive effects on beneficiaries, such as the acquisition of new skills, cooperation with other farms, new opportunities in the local market and job creation. The measure offers young farmers the opportunity to take advantage of lifelong learning strategies, improve market conditions and develop the rural economy.

Chapter 3 - "Study on the benefits and barriers to the use of information technology at the level of farmers in the South East Region" aims to involve farmers in the use and application of smart technology.

The current study examines the factors influencing the involvement of farmers in the South East Region in the use of smart technology as well as new smartphone applications, explored the support needed for farmers to successfully interact in agricultural activities. Seven discussion groups were organized with a total of 41 farmers from the South East region, Romania. The results showed that factors such as the low availability of broadband internet, together with the lack of comfort with emerging technologies, problems of trust in technology and the perceived lack of sufficient benefits discouraged farmers' commitment to smartphones and agricultural applications.

The perceived benefits of smartphone involvement have also emerged, including an increased sense of empowerment, advanced information, a more flexible lifestyle, reduced stress, improved time efficiency, an improved level of communication between farmers and their respective governing bodies and an ability to make clear and firm decisions on the farm. Perceived support to help farmers use agricultural applications came from agricultural consultants, family members and colleagues. The findings highlight the importance of understanding the barriers and facilities offered by farmers' availability of advanced information through agricultural applications in the South East Region. The findings are of interest to researchers in the field of intelligent agricultural technologies, as well as to developers and suppliers of agricultural applications for smartphones.

The current study reports the findings of empathy: the stage of an approach used in developing a farm management application to reduce the administrative burden and simplify the communication process between farmers and government bodies responsible for monitoring and inspecting agricultural activity under the common agricultural policy.

Initial discussions with the target end users - farmers - were beneficial in understanding the problem and the technology investigated from the end user's perspective. Giving up previous hypotheses and engaging with the end user in such a way allows the technological process to progress in a trajectory that will be more aware and receptive to the needs, desires and concerns of end users.

In the current study we considered that the use of a user-centered approach is crucial for openly and actively obtaining critical contributions from farmers in the application development process and encouraging mutually transformative learning between farmers, researchers and application developers. Instead of being treated only as recipients and beneficiaries of the new technology, the farmers in this study were considered important actors who would ultimately influence and provide key inputs to the application development process.

In conclusion, this study provides a better understanding of the adoption and use of smartphones and smartphone applications by farmers in Galati and Braila counties. The results showed that the use of smartphones varies according to different agricultural sectors and ages; and applications that are simple and easy to use, accessible and understood by all and without technical errors are considered the most attractive by farmers. As such, application developers and vendors should focus on these functions for the future development of agricultural applications.

As not all farmers in this study used smartphone applications, there is the potential to increase the adoption and use of the device through effective training and marketing; for which the results of this study can be used. Accordingly, the provision of information and training on the use of applications should be kept as simple as possible to make them as attractive as possible to farmers, regardless of educational experience, IT skills and prior knowledge of application use.

Finally, it is essential to use a user-centered design to increase the capacity of all farmers to participate, contribute and benefit from the development of Agricultural Innovation.

The approach we used not only encouraged us to think about what agricultural applications are used, but also who they serve and who leads the process. We believe that, after the first step in the process of evaluating the current stage, we can now move on to the second stage presented in the next chapter.

Annex A.

The set of questions for the discussion group

1. Can you explain how aware you are of the emergence of new information technologies in agriculture?
2. What do you think about the use of new agricultural technologies through applications?
3. What special experiences have you had in using them?
4. For what types of agricultural activities would it be most comfortable to use information technology?
5. What is your opinion about smartphones?
➢ Do you use a smartphone for agricultural activities at work? ➢ If yes, what type of Smartphone do you use and what do you use your smartphone for? ➢ If not, why not use a smartphone for work purposes? ➢ What influences your decision to use / not use a smartphone for agricultural activities?
6. How comfortable do you feel using smartphone apps?
7. What agriculture-related smartphone apps do you know, if any?
➢ How did you become familiar with these applications?
➢ What do you like / dislike about this application / applications?
8. What would you think of a smartphone application used to reduce farm management documents?
9. What factors would encourage you to use this type of application?
10. What would stop you from using this type of application?
11. What daily workout do you think you would need to use this type of application?

Chapter 4 "Assessing the impact of vocational training acquired by Romanian farmers on the intelligent management of their farms" proposes an assessment of the impact of vocational training on farm performance that can be explained by measuring economic impact, measuring the impact on community members, sales and compliance with good agricultural and environmental practices with a focus on sustainability.

In this chapter we propose a measurement of farm performance in the pre-adoption and post-adoption phase of an intelligent farm management (GIF) application to have useful information and the formulation of new needs that may be part of the new agricultural policy for agricultural development. The chapter offers conclusions and perspectives for the development of GIF systems, absolutely necessary for the business when we discuss the functionality of the farm. Our conclusions show that the routine of technical and economic activity has a special role in the impact on farm performance. We believe that it is necessary to extend these approaches to other areas, where other factors may influence the benefits of training on farm management.

Participation and collaboration between producers will be very important for these GIF methods to work.

Our model did not validate the hypothesis that routine in technical and economic activity had a positive impact on farm performance. We expected the routine to moderate the relationship between the impact on costs, the impact on sales and the impact on natural resources with an impact on farm performance.

However, the routine is not only moderated by the relationship between the impact on community members (BMI) and the impact on farm performance (IPF). The higher the routine (R), the greater the impact on farm performance, as shown in Figure 4.2. This may indicate a prejudice on the part of the farmer about other resources that may be firm and valuable in determining competitive advantages.

The conclusion is that it is necessary to analyze the main activities in which knowledge management intervenes, respectively in each of the stages of all production processes. Routine can also occur in terms of knowledge gained, but also in the exchange of knowledge, the emergence of new knowledge and the application of new tools. [146] consider GIF system measurements based on the combination of four attributes of the business management process, which are integration, standardization, routine and centralization of the business process.

We believe that consulting firms could analyze the behavior of farms by: the resources attracted in production processes and the adoption of a GIF on costs, sales and natural resources for investment planning and access to credit or European funding, have an impact on farm performance.

The farmer's management knowledge in the field of sales and management of natural resources is significant and has an impact on farm performance, but may not be considered sufficiently valuable, both strategically and operationally.

The results of some studies show that the interactions between farmers and the continuous assistance provided by specialists, help to mobilize the companies, the respective farms in the sense of faster adoption of technology. In order to assess the absorption and assimilation capacity of GIF as a system in the pre-implementation and post-implementation phases, [147] considers that failed risks can be considered multiple challenges:

(a) the wide scope of the project;

(b) by changes in business processes;

(c) through strategy, technology, culture and management systems;

(d) human resources and organizational structure;

(e) the levels of commitment of the entire organization.

When we analyze the loads of variables for building the impact on costs (CI), we notice that those that contribute the most to its explanation are: improving the decision-making process in periods of higher business risks; improving staff efficiency.

Chapter 5 "Effects on the profitability of tomato farms through vocational training in the South East region" aims to present an assessment of the impact of vocational training of tomato farmers with best management and marketing practices for products obtained on their farms located nearby the cities of Brăila and Galați (tomatoes in the field and solariums, greenhouses). The results of the study showed that the training had a positive impact on farm profitability, but not on productivity. This is important in a country where 76% of tomato production

comes from field cultivation and profit margins have fallen. These approaches can be applied in other regions with vegetable potential to accelerate the development of vegetable growing through appropriate training for farmers.

The chapter is structured as follows: a first section refers to the general framework of manifestation of producers on the Romanian tomato market, followed by the presentation of the methodology of data collection from farmers, the design of the questionnaire and its application in the field and finally partial conclusions.

The results show that their training of trainers for farmers has had a positive impact on profitability, but not on the productivity of tomato farms in the South East Region. Through more efficient supply and market management, trained tomato farmers were able to cover total costs and obtain better seed conversion ratios than their untrained counterparts. This led to average net profits of 6665 euro / ha in instrument farms, compared to only 3527 euro / ha for untrained farms. At an average farm size of 7.5 ha, this requires that trained tomato farmers would have obtained on average over 45,000 euros in additional profits compared to untrained farmers.

For many farmers, this was the first time they had received technical assistance or training.

Training programs, through their structure, we believe need to be reviewed and streamlined to take into account the adoption rate and the impact of individual training modules. More emphasis needs to be placed on critical aspects of training to further protect profitability, while ensuring the sustainability of the sector through more efficient use of resources and encouraging improved post-harvest handling practices to ensure product safety for consumers.

Although over 35 farmers and administrators of vegetable farms (tomatoes) have completed marketing training, they are not a representative sample for the total market.

The impact assessment study also included randomly surveyed farms that have adopted the proposed technology and marketing for their products, and we cannot be sure about the profits made.

However, the training claims to have resulted in the fact that for many tomato farms, 2019 was their first year of applying new marketing, association and cooperation practices. As they become more confident in new practices, they should be able to generate higher incremental profits.

In the meantime, after becoming aware of their basic technical and economic skills, students believe that they will be encouraged to continue meeting together and experiment in local groups of "tomato growers" to share their knowledge and benefit. additional support from their colleagues and other trainers. Other enlargement approaches should be considered, including the use of media, social media and the private sector to convey key messages to tomato farmers. It seems that the main factor that contributed to improving the profitability of trained farms was the efficient management of inputs. This will also have a positive impact on the environmental performance of trained farms compared to those not trained through management and marketing practices.

Tomatoes from Romania, especially in the Brăila Galați area, are appreciated for their taste qualities. It is a common opinion of both domestic producers and importers in the region. Market operators point out that tomatoes are of a lower quality than those of EU competitors in terms of appearance. Romanian vegetables have quality problems caused by factors such as: the competitiveness of the product is the lack of local packaging in the region and raw materials to produce it. Manufacturers are required to pay customs duties on the packaging or the raw

material intended for the production of the packaging, even if the given packaging is subsequently exported together with the production. The relatively high cost of packaging Romanian products also has a negative impact on the competitiveness of vegetables.

Vegetable production in Romania is very fragmented and oriented towards the local market. The export in relatively large quantities is done only with tomatoes, which is due to the popularity of the given product and some examples of high geographical concentration of tomato producers in greenhouses. Only a few economic agents in Romania export their own obtained productions.

In conclusion, Romania simply does not produce sufficient quantities of vegetables for export, due to an inefficient distribution system, but also the lack of desire to build business processes based on marketing principles.

The Romanian producer often does not want to deal with association and cooperation for an advanced promotion of their production, but neither for export.

Usually, the marketing of the production is carried out individually by participating in the market or through traders who take the goods directly from the field or greenhouse. It is incorrect to underestimate the importance of intermediary traders because they play an important role in the value chain of fresh vegetables and, at present, without the involvement of traders most exports could not have been made.

However, such high reliance on traders leads to the following problems and risks:

• Dependence on a single market - intermediaries are primarily interested in maximum profits in a short period of time and do not think about the prospects for the development of the sector.

For a domestic producer that is linked to its business through long-term investments, high dependence on a single market is risky, and minimizing risk requires diversifying markets. Of course, entering the EU market requires increased efforts and significant investment in promotion, which is of no interest to intermediaries. This must be the prerogative of the manufacturer.

• The fact that manufacturers are not related to the market often leads to a lack of responsibility for product quality. The most common approach is for the intermediary to buy the products and it is still his job to sell them, and if he is no longer interested, he will be another intermediary. At the operational level, such an approach leads to the need to carry out a strict quality control at each product delivery. At a strategic level, this led to Romania's positioning as a weak supplier.

• The lack of direct connection with the market always keeps the Romanian producers behind the competitors. The manufacturer does not "feel" the market, respectively, can not anticipate trends and act proactively. The only method that leads to some changes and improvements is the "money penalty", when middlemen no longer offer the same high price for lower quality production as they did a few years ago.

• The manufacturer, who is not directly involved in the export, is often unaware of the export procedures and the relevant legislation. Therefore, even if the producer has a "virtual" desire to initiate exports to some countries in the region (eg Ukraine or Romania), the lack of information or the complexity of export procedures is an important barrier in carrying out this initiative. It is obvious that many producers want to focus on what they know best, ie production, and not to deal with the realization of the goods, but the lack of direct connection with the market

slows down the development of the sector. In developed EU countries such a market connection is made through marketing cooperatives.

But in the EU the respective cooperatives are heavily subsidized by the state, which is not the case in Romania. In addition, the lack of mutual trust between producers stops most development initiatives in this direction. As a conclusion to the approached subject, we can say that the distribution system of Romanian vegetable products, in the state in which it operates now, slows down the development of trade in the region, namely, the development of vegetable exports to the EU.

The essence of the export problems is that the domestic producers consider that carrying out all the procedures related to the export is costly and time consuming. For some acts, producers in the regions have to travel long distances to obtain all the necessary certificates for export, while the common opinion of producers is that it should take a maximum of 2-3 hours, according to international practices. Romania is facing increased imports of vegetables and fruits, the main effect of which has been felt in terms of price and implicitly in terms of producers' incomes. The solution could come through a concentration of supply, especially of producer organizations in the Galati area, which will allow the practice of increasing production and distributing it. Among the factors generating the elimination of the crisis on the tomato market can be mentioned: • the planned production according to the market requirements; • application of good organic farming practices to combat the effects of extreme climate change and various diseases and pests; • limiting imports from the EU and third countries that mainly affect the vegetable and fruit market; • a good promotion of local tomatoes among consumers as well as the role and importance of fruit and vegetable consumption for the health of the population. • various media articles that transmit incomplete and incorrect information about the fruit and vegetable sector.

Acknowledgment

This research was supported by the Galați Chamber of Commerce and Industry through my participation as a guest on behalf of Prof. coordinator Turek Magdalena for this study. I am especially grateful to the farmers participating in the training session who responded to the questionnaires I applied and voluntarily provided information and facilitated these results.

CONCLUSIONS AND PROPOSALS

In a changing economic context, in which new technologies are becoming predominant and in which society’s expectations are becoming more and more insistent, the training of farmers, their employees and their advisers is the cornerstone of adaptation and resilience. farm performance.

We believe that adapting and then strengthening the training offer to innovate training tools and themes is a solution to increase farmers ’decision-making autonomy and to optimize their skills.

Our discoveries

Agricultural activity is constantly being renewed. It is interested in new technologies, adapting to new consumption habits, the challenges of the agri-environmental transition and societal and environmental expectations in an increasingly demanding regulatory framework. Training, whether for farmers or their advisers, either individually or collectively, face-to-face or at a distance, is an important asset for adapting to this new context.

New less restrictive ways of learning in terms of travel and availability are being developed: webinars, distance learning. Increasingly technical, agriculture requires increasing expertise throughout the farmer's career. Its great diversity confers a series of more specific, specialized and varied needs.

Our proposal is to adapt the current action plans and includes:

1. An adaptation of training to new challenges in agriculture and to all categories of farmers.

Through their skills, proximity to the agricultural sector and agricultural associations, universities could continuously adapt the training offer to the challenges of agriculture and the diversity of farmers' expectations. A continuous development of training standards according to the needs of active farmers and future young farmers, through their in-house training organizations, could optimize the skills of their managers and advisers. A training course adapted to the key phases of agriculture, installation, development, adaptation of agricultural systems, diversification of production, processing, distribution could develop specific partnerships to expand its training offer.

1. Dissemination of research and innovation results promotes the acquisition of knowledge and its application on farms.

Innovation, research and development contribute to improving the economic, environmental and societal performance of farms. Training plays a key role in disseminating and mastering the results of research and development.

Dunărea de Jos University of Galați occupies a central place both in carrying out research (experiments, research and development projects, farm monitoring, support for groups of innovative farmers, etc.), and in the training of farmers and advisers. This original positioning and the quality of the numerous partnerships with the technical and economic institutes allow our university to offer training at the top of agronomic and technological developments at regional level.

Dunărea de Jos University of Galați could be the main training network for agricultural producers in the South East Region. Currently, almost all training courses followed by farmers and agricultural workers are offered by training centers by accessing PNDR funding measures.

Digital technology could serve to renew training methods for farmers.

• A “distance learning” format, regardless of specialization, we believe that it will allow the creation of new areas of potential through farmers trained through continuous training (training sessions over 2-3 years).

The key to this success?

It would be the combination of digital technology and the flexibility of training programs and work applied on your own farm, with the support of a team of teachers and specialists to monitor economic results over time, applying theory in practice in the form of workshops and exchange of experience.

Providing specialized answers to the needs of farmers, but also of the production and processing sectors can build a Passport for Performance (eg environmental protection in vine and wine production, including training support for certification.

Over time, we will be able to discuss a concept of training farmers, which will enable farmers to have "Success guaranteed through specialized training".

For example, for farmers who want to switch to organic products or those who want to obtain certificates to access new markets, a farmer training group can be set up at the request of several agricultural / animal husbandry producers. The training courses created for this group will then be offered to the entire sector.

Teachers will need to be trained to implement such courses that acquire skills related to achieving the objectives through a series of priority training courses in accordance with all professional activities in each field of business.

These training courses will need financial support from pooled vocational training funds.

Trainers will be able to follow these trainings and thus consolidate their knowledge to meet the needs of farmers.

Proposal for attracting young people to a rural area

Do you want to become a farmer in the area? Do you want to set up a farm or take over an agricultural business in this locality?

To achieve this project, you need two main steps:

1. Preparing for installation

2. Make the plan for your installation project and then make it. What is the financial need to install yourself?

First step: Preparing for installation

1. Farm management can be learned and prepared. It is also important to participate in training and anticipate the creation or takeover of a business in agriculture: both during initial training and during preparation for installation, but also throughout the career.

Preparing to settle in the countryside means being helped by specialist teachers to support you in your efforts to become a farmer.

An installation preparation can give you human support and the opportunity to train you according to your needs by creating a personalized professional business plan.

This installation preparation phase will allow you to increase your skills and approach your future profession with confidence.

The custom professionalization plan is open to everyone, whether or not you want installation support and your age.

Each year, almost 5,000 project leaders set up shop after accessing the support system and developing a personalized professionalization plan.

Preparation for the installation of the single "gateway" for all farmers who want to settle in agriculture. A specialist trainer will coordinate support for all those who want to settle in agriculture.

The missions of a continuous professional training will guide the steps that must be taken either to access a support, or for employment, for on-farm management or even to validate the experience gained.

BIBLIOGRAPHY

[1] S. Koutsou, M. Partalidou, and A. Ragkos, "Young farmers' social capital in Greece: Trust levels and collective actions," *J. Rural Stud.*, 2014, doi: 10.1016/j.jrurstud.2014.02.002.

[2] V. Borsellino, E. Schimmenti, and H. El Bilali, "Agri-food markets towards sustainable patterns," *Sustainability (Switzerland)*. 2020, doi: 10.3390/su12062193.

[3] B. Manos, T. Bournaris, P. Chatzinikolaou, J. Berbel, and D. Nikolov, "Effects of CAP policy on farm household behaviour and social sustainability," *Land use policy*, 2013, doi: 10.1016/j.landusepol.2011.12.012.

[4] C. May, "Towards a general theory of implementation," *Implement. Sci.*, 2013, doi: 10.1186/1748-5908-8-18.

[5] I. Coldwell, "New farming masculinities: 'More than just shit-kickers', we're 'switched-on' farmers wanting to 'balance lifestyle, sustainability and coin,'" *J. Sociol.*, 2007, doi: 10.1177/1440783307073936.

[6] M. Sponte, "The role of young farmers in the sustainable development of the agricutural sector," *Qual. - Access to Success*, 2014.

[7] C. Emmerling and R. Pude, "Introducing Miscanthus to the greening measures of the EU Common Agricultural Policy," *GCB Bioenergy*. 2017, doi: 10.1111/gcbb.12409.

[8] S. Andersson, "International entrepreneurship, born globals and the theory of effectuation," *J. Small Bus. Enterp. Dev.*, 2011, doi: 10.1108/14626001111155745.

[9] M. Kahanec and K. F. Zimmermann, *Labor migration, EU enlargement, and the great recession*. 2016.

[10] P. Rovný, "The Analysis of Farm Population with Respect to Young Farmers in the European Union," *Procedia - Soc. Behav. Sci.*, 2016, doi: 10.1016/j.sbspro.2016.05.513.

[11] A. Kontogeorgos, D. Tselempis, and S. Aggelopoulos, "Measuring service quality of the greek ministry of agriculture," *Meas. Bus. Excell.*, 2014, doi: 10.1108/MBE-05-2013-0030.

[12] P. Burny and F. Terrones Gavira, "Implementation of the green payment within the scheme of the new common agricultural policy (2015-2020): First results for 2015 in wallonia (south of belgium)," *Qual. - Access to Success*, 2016.

[13] S. Iammarino, A. Rodriguez-Pose, and M. Storper, "Regional inequality in Europe: Evidence, theory and policy implications," *J. Econ. Geogr.*, 2019, doi: 10.1093/jeg/lby021.

[14] C. Europeana, "Strategia UE privind biodiversitatea pentru 2030," *Journal of Chemical Information and Modeling*. 2013.

[15] C. Hamilton, "The anthropocene," in *Encyclopedia of Ecology*, 2018.

[16] E. Defrancesco, P. Gatto, F. Runge, and S. Trestini, "Factors affecting farmers'participation in agri-environmental measures: A northern Italian perspective," *J. Agric. Econ.*, 2008, doi: 10.1111/j.1477-9552.2007.00134.x.

[17] M. Pérez Urdiales, A. O. Lansink, and A. Wall, “Eco-efficiency Among Dairy Farmers: The Importance of Socio-economic Characteristics and Farmer Attitudes,” *Environ. Resour. Econ.*, 2016, doi: 10.1007/s10640-015-9885-1.

[18] A. Carbone and G. Subioli, “The generation turnover in agriculture: The ageing dynamics and the EU support policies to young farmers,” in *The Common Agricultural Policy After the Fischler Reform: National Implementations, Impact Assessment and the Agenda for Future Reforms*, 2012.

[19] A. Coynel *et al.*, “Spatial distribution of trace elements in the surface sediments of a major European estuary (Loire Estuary, France): Source identification and evaluation of anthropogenic contribution,” *J. Sea Res.*, 2016, doi: 10.1016/j.seares.2016.08.005.

[20] M. Š. Pechrová, O. Šimpach, T. Medonos, D. Spěšná, and M. Delín, “What are the motivation and barriers of young farmers to enter the sector?,” *Agris On-line Pap. Econ. Informatics*, 2018, doi: 10.7160/aol.2018.100409.

[21] Á. Szerletics, “Degressivity, capping and European farm structure: New evidence from Hungary,” *Stud. Agric. Econ.*, 2018, doi: 10.7896/j.1811.

[22] M. Schreiner, “Aspects of outreach: A framework for discussion of the social benefits of microfinance,” *J. Int. Dev.*, 2002, doi: 10.1002/jid.908.

[23] G. Papadavid, G. Kountios, A. Ragkos, and D. Hadjimitsis, “Measuring the environmental awareness of young farmers,” 2017, doi: 10.1117/12.2279984.

[24] L. Rumanovska, J. Lazikova, and I. Takac, “Small Farmers, Their Position and Support Within the Cap - Case of Slovakia,” *Sci. Pap. Manag. Econ. Eng. Agric. Rural Dev.*, 2018.

[25] C. S. L. Dias, “A Status Quo Review of Climate Change and the Agriculture Sector of the Western Cape Province. Ecosyst. Serv,” 2016.

[26] J. M. L. Laforge and S. M. McLachlan, “Learning communities and new farmer knowledge in Canada,” *Geoforum*, 2018, doi: 10.1016/j.geoforum.2018.07.022.

[27] A. L. Katchova and M. C. Ahearn, “Dynamics of farmland ownership and leasing: Implications for young and beginning farmers,” *Appl. Econ. Perspect. Policy*, 2016, doi: 10.1093/aepp/ppv024.

[28] M. M. Zondag and B. Ferrin, “Finding the true voice of the customer in CPG supply chains: Shopper-centric supply chain management,” *J. Bus. Logist.*, 2014, doi: 10.1111/jbl.12055.

[29] M. Pelling and D. Manuel-Navarrete, “From resilience to transformation: The adaptive cycle in two Mexican urban centers,” *Ecol. Soc.*, 2011, doi: 10.5751/ES-04038-160211.

[30] A. Scharlach, C. Graham, and A. Lehning, “The ‘Village’ model: A consumer-driven approach for aging in place,” *Gerontologist*, 2012, doi: 10.1093/geront/gnr083.

[31] B. A. Aubert, A. Schroeder, and J. Grimaudo, “IT as enabler of sustainable farming: An empirical analysis of farmers’ adoption decision of precision agriculture technology,” *Decis. Support Syst.*, 2012, doi: 10.1016/j.dss.2012.07.002.

[32] S. Kajalo and A. Lindblom, “Market orientation, entrepreneurial orientation and business performance among small retailers,” *Int. J. Retail Distrib. Manag.*, 2015, doi: 10.1108/IJRDM-04-2014-0044.

[33] H. Sundmaeker, C. Verdouw, S. Wolfert, and L. P. Freire, “Internet of food and farm 2020,” in *Digitising the Industry Internet of Things Connecting the Physical, Digital and Virtual Worlds*, 2016.

[34] C. Leeuwis, “Reconceptualizing participation for sustainable rural Development: Towards a negotiation approach,” *Dev. Change*, 2000, doi: 10.1111/1467-7660.00184.

[35] E. Jakku and P. J. Thorburn, “A conceptual framework for guiding the participatory development of agricultural decision support systems,” *Agric. Syst.*, 2010, doi: 10.1016/j.agsy.2010.08.007.

[36] A. Lindblom and T. Lindblom, “De-ownership orientation and collaborative consumption during turbulent economic times,” *Int. J. Consum. Stud.*, 2017, doi: 10.1111/ijcs.12336.

[37] N. Roling, “Extension science: information systems in agricultural development,” *Ext. Sci. Inf. Syst. Agric. Dev.*, 1988, doi: 10.1016/0308-521x(89)90049-8.

[38] Z. Hochman and P. S. Carberry, “Emerging consensus on desirable characteristics of tools to support farmers’ management of climate risk in Australia,” *Agric. Syst.*, 2011, doi: 10.1016/j.agsy.2011.03.001.

[39] A. Krzywoszynska, “‘Waste? You mean by-products!’ From bio-waste management to agro-ecology in Italian winemaking and beyond,” *Sociol. Rev.*, 2012, doi: 10.1111/1467-954X.12037.

[40] R. L. McCown, “A cognitive systems framework to inform delivery of analytic support for farmers’ intuitive management under seasonal climatic variability,” *Agric. Syst.*, 2012, doi: 10.1016/j.agsy.2011.08.005.

[41] C. Lundström and J. Lindblom, “Considering farmers’ situated knowledge of using agricultural decision support systems (AgriDSS) to Foster farming practices: The case of CropSAT,” *Agric. Syst.*, vol. 159, pp. 9–20, Jan. 2018, doi: 10.1016/j.agsy.2017.10.004.

[42] M. Bloch and E. Hutchins, “Cognition in the Wild.,” *J. R. Anthropol. Inst.*, 1998, doi: 10.2307/3034455.

[43] T. ROGERS, E. MARSHALL, and C. A. TYSON, “Dialogic narratives of literacy, teaching, and schooling: Preparing literacy teachers for diverse settings,” *Read. Res. Q.*, 2006, doi: 10.1598/rrq.41.2.3.

[44] BMELV, “Eiweißpflanzenstrategie des BMELV,” 2012.

[45] “Zapf: Bewertung der Nachhaltigkeit landwirtschaftlicher... - Google Academic.” https://scholar.google.com/scholar?q=related:MT_LpwDbdesJ:scholar.google.com/&scioq=&hl=ro&as_sdt=0,5 (accessed May 19, 2021).

[46] M. Mathai, “Working with communities, governments and academic institutions to make pregnancy safer,” *Best Practice and Research: Clinical Obstetrics and Gynaecology*. 2008, doi: 10.1016/j.bpobgyn.2008.02.002.

[47] J. Van Meensel, L. Lauwers, G. Van Huylenbroeck, and S. Van Passel, “Comparing frontier methods for economic-environmental trade-off analysis,” *Eur. J. Oper. Res.*, 2010, doi: 10.1016/j.ejor.2010.05.026.

[48] T. Baars, “Experiential Science; Towards an Integration of Implicit and Reflected Practitioner-Expert Knowledge in the Scientific Development of Organic Farming,” *J. Agric. Environ. Ethics*,

2011, doi: 10.1007/s10806-010-9281-3.

[49] A. A. Hoffmann and C. M. Sgró, “Climate change and evolutionary adaptation,” *Nature*. 2011, doi: 10.1038/nature09670.

[50] J. S. Brown, A. Collins, and P. Duguid, “Situated Cognition and the Culture of Learning,” *Educ. Res.*, 1989, doi: 10.3102/0013189X018001032.

[51] H. L. Dreyfus, S. E. Drey-fus, and L. A. Zadeh, “Mind over Machine: The Power of Human Intuition and Expertise in the Era of the Computer,” *IEEE Expert*, 2008, doi: 10.1109/mex.1987.4307079.

[52] M. J. Mol and J. Birkinshaw, “The sources of management innovation: When firms introduce new management practices,” *J. Bus. Res.*, 2009, doi: 10.1016/j.jbusres.2009.01.001.

[53] B. Alenljung and A. Persson, “Portraying the practice of decision-making in requirements engineering: A case of large scale bespoke development,” *Requir. Eng.*, 2008, doi: 10.1007/s00766-008-0068-2.

[54] J. Orasanu and T. Connolly, “The Reinvention of Decision Making,” in *Decision making in action: Models and Methods*, 1993.

[55] J. Hollan, E. Hutchins, and D. Kirsh, “Distributed Cognition: Toward a New Foundation for Human-Computer Interaction Research,” *ACM Trans. Comput. Interact.*, 2000, doi: 10.1145/353485.353487.

[56] D. Lapple and T. Donnellan, “Farmer attitudes towards converting to organic farming,” *Teagasc Org. Proaduction Res. Conf. Proc.*, 2008.

[57] J. Ahnström, J. Bengtsson, A. Berg, L. Hallgren, W. J. Boonstra, and J. Björklund, “Farmers’ interest in nature and its relation to biodiversity in arable fields,” *Int. J. Ecol.*, 2013, doi: 10.1155/2013/617352.

[58] R. Greiner and D. Gregg, “Farmers’ intrinsic motivations, barriers to the adoption of conservation practices and effectiveness of policy instruments: Empirical evidence from northern Australia,” *Land use policy*, 2011, doi: 10.1016/j.landusepol.2010.06.006.

[59] IPCC, *Climate Change 2014: Synthesis Report. Contribution of Working Groups I, II and III to the Fifth Assessment Report of the Intergovernmental Panel on Climate Change*. 2014.

[60] O. for O. publications of the E. C. European Commision, “Eu Rural Development Policy 2007-2013,” *Eur. Comm. Dir. Agric. Rural Dev.*, 2008.

[61] M. Schramm and A. Spiller, “Farm-Audit- und Farm-Advisory-System - Ein beitrag zur ökonomie von qualitätssicherungssystemen,” *Berichte uber Landwirtschaft*. 2003.

[62] M. Kannegiesser, M. L. Entrup, and A. Martin, “Performance management in the value chain,” in *Strategies and Tactics in Supply Chain Event Management*, 2008.

[63] R. Siebert, M. Toogood, and A. Knierim, “Factors affecting european farmers’ participation in biodiversity policies,” *Sociol. Ruralis*, 2006, doi: 10.1111/j.1467-9523.2006.00420.x.

[64] S. Scrieciu, “Economic Impacts of Adopting the Common Agricultural Policy of the European Union: A CGE Approach to the Case of Romania,” *J. Econ. Integr.*, 2007, doi: 10.11130/jei.2007.22.2.407.

[65] Eurostat, “Eurostat - Tables, Graphs and Maps Interface (TGM) table,” *Eurostat*. 2019.

[66] C. Alexandri and L. Luca, “Implications of Agrarian Structures upon the Agricultural Supply in Romania,” *Procedia Econ. Financ.*, 2014, doi: 10.1016/s2212-5671(14)00057-4.

[67] F. Mikulcak, J. Newig, A. I. Milcu, T. Hartel, and J. Fischer, “Integrating rural development and biodiversity conservation in Central Romania,” *Environ. Conserv.*, 2013, doi: 10.1017/S0376892912000392.

[68] A. Dachin, D. L. Constantin, and Z. Goschin, “The influence of the urban-rural gap on the R&D and innovation potential in Romania,” in *Towns in a Rural World*, 2013.

[69] P. Hubbard, “Geographies of studentification and purpose-built student accommodation: Leading separate lives?,” *Environ. Plan. A*, 2009, doi: 10.1068/a4149.

[70] M. Iorio and A. Corsale, “Rural tourism and livelihood strategies in Romania,” *J. Rural Stud.*, 2010, doi: 10.1016/j.jrurstud.2009.10.006.

[71] “No Title,” *Haan, H. (1994), Shad. tree kinship, Prop. Inherit. among farm Fam. Thesis - Landbouwuniversiteit, Wageningen, Wageningen*.

[72] D. . (1990) Symes, “Bridging the generations: Succession and inheritance in a changing World,” *Sociol. Rural. 30, 280-291*.

[73] L. Zagata and L. A. Sutherland, “Deconstructing the ‘young farmer problem in Europe’: Towards a research agenda,” *J. Rural Stud.*, 2015, doi: 10.1016/j.jrurstud.2015.01.003.

[74] A. Errington and R. Gasson, “The increasing flexibility of the farm and horticultural workforce in England and Wales,” *J. Rural Stud.*, 1996, doi: 10.1016/0743-0167(96)00008-3.

[75] H. M. Chiswell, “From Generation to Generation: Changing Dimensions of Intergenerational Farm Transfer,” *Sociol. Ruralis*, 2018, doi: 10.1111/soru.12138.

[76] A. Matthews, “Greening agricultural payments in the EU’s common agricultural policy,” *Bio-based Appl. Econ.*, 2013, doi: 10.13128/BAE-12179.

[77] C. Eastwood, L. Klerkx, M. Ayre, and B. Dela Rue, “Managing Socio-Ethical Challenges in the Development of Smart Farming: From a Fragmented to a Comprehensive Approach for Responsible Research and Innovation,” *J. Agric. Environ. Ethics*, vol. 32, no. 5–6, pp. 741–768, Dec. 2019, doi: 10.1007/s10806-017-9704-5.

[78] M. Carolan, “Automated agrifood futures: robotics, labor and the distributive politics of digital agriculture,” *J. Peasant Stud.*, vol. 47, no. 1, pp. 184–207, Jan. 2020, doi: 10.1080/03066150.2019.1584189.

[79] K. Bronson, “Looking through a responsible innovation lens at uneven engagements with digital farming,” *NJAS - Wageningen J. Life Sci.*, vol. 90–91, Dec. 2019, doi: 10.1016/j.njas.2019.03.001.

[80] M. Michels, W. Fecke, J. H. Feil, O. Musshoff, J. Pigisch, and S. Krone, “Smartphone adoption and use in agriculture: empirical evidence from Germany,” *Precis. Agric.*, vol. 21, no. 2, pp. 403–425, Apr. 2020, doi: 10.1007/s11119-019-09675-5.

[81] P. W. Michels and O. Distl, “Genetic variability in polish lowland sheepdogs assessed by pedigree and genomic data,” *Animals*, vol. 10, no. 9, pp. 1–17, Sep. 2020, doi: 10.3390/ani10091520.

[82] M. Paustian and L. Theuvsen, “Adoption of precision agriculture technologies by German crop farmers,” *Precis. Agric.*, 2017, doi: 10.1007/s11119-016-9482-5.

[83] H. Baumüller, “Towards Smart Farming? Mobile Technology Trends and their Potential for Developing Country Agriculture,” River Publishers, 2017.

[84] T. Kutter, S. Tiemann, R. Siebert, and S. Fountas, “The role of communication and co-operation in the adoption of precision farming,” *Precis. Agric.*, vol. 12, no. 1, pp. 2–17, Feb. 2011, doi: 10.1007/s11119-009-9150-0.

[85] T. B. Long, V. Blok, and I. Coninx, “Barriers to the adoption and diffusion of technological innovations for climate-smart agriculture in Europe: Evidence from the Netherlands, France, Switzerland and Italy,” *J. Clean. Prod.*, vol. 112, pp. 9–21, Jan. 2016, doi: 10.1016/j.jclepro.2015.06.044.

[86] M. Reichardt and C. Jürgens, “Adoption and future perspective of precision farming in Germany: Results of several surveys among different agricultural target groups,” *Precis. Agric.*, vol. 10, no. 1, pp. 73–94, Feb. 2009, doi: 10.1007/s11119-008-9101-1.

[87] A. G. F. Teacher, D. J. Griffiths, D. J. Hodgson, and R. Inger, “Smartphones in ecology and evolution: A guide for the app-rehensive,” *Ecol. Evol.*, vol. 3, no. 16, pp. 5268–5278, Dec. 2013, doi: 10.1002/ece3.888.

[88] V. Bonke, W. Fecke, M. Michels, and O. Musshoff, “Willingness to pay for smartphone apps facilitating sustainable crop protection,” *Agron. Sustain. Dev.*, vol. 38, no. 5, Oct. 2018, doi: 10.1007/s13593-018-0532-4.

[89] D. C. Rose *et al.*, “Decision support tools for agriculture: Towards effective design and delivery,” *Agric. Syst.*, vol. 149, pp. 165–174, Nov. 2016, doi: 10.1016/j.agsy.2016.09.009.

[90] J. Alvarez and P. Nuthall, “Adoption of computer based information systems: The case of dairy farmers in Canterbury, NZ, and Florida, Uruguay,” *Comput. Electron. Agric.*, vol. 50, no. 1, pp. 48–60, Jan. 2006, doi: 10.1016/j.compag.2005.08.013.

[91] “Scopus preview - Scopus - Document details.” https://www.scopus.com/record/display.uri?eid=2-s2.0-85030467289&origin=inward&txGid=56fa15b6995802adc40e71c1b31b8e10 (accessed May 07, 2021).

[92] C. S. L. Dias *et al.*, “A Status Quo Review of Climate Change and the Agriculture Sector of the Western Cape Province,” *Ecosyst. Serv.*, 2016.

[93] M. Ryan *et al.*, “Developing farm-level sustainability indicators for Ireland using the Teagasc National Farm Survey,” *Irish J. Agric. Food Res.*, vol. 55, no. 2, pp. 112–125, Dec. 2016, doi: 10.1515/ijafr-2016-0011.

[94] F. Caffaro, M. Micheletti Cremasco, M. Roccato, and E. Cavallo, “Drivers of farmers’ intention to adopt technological innovations in Italy: The role of information sources, perceived usefulness, and perceived ease of use,” *J. Rural Stud.*, vol. 76, pp. 264–271, May 2020, doi: 10.1016/j.jrurstud.2020.04.028.

[95] J. Mendes *et al.*, “Smartphone applications targeting precision agriculture practices - A systematic review,” *Agronomy*, vol. 10, no. 6. MDPI AG, p. 855, Jun. 01, 2020, doi:

10.3390/agronomy10060855.

[96] J. Ingram and P. Gaskell, “Searching for meaning: Co-constructing ontologies with stakeholders for smarter search engines in agriculture,” *NJAS - Wageningen J. Life Sci.*, vol. 90–91, Dec. 2019, doi: 10.1016/j.njas.2019.04.006.

[97] S. M. Cooper and D. L. Owen, “Corporate social reporting and stakeholder accountability: The missing link,” *Accounting, Organ. Soc.*, 2007, doi: 10.1016/j.aos.2007.02.001.

[98] O. Gupta and G. Roos, “Mergers and acquisitions through an intellectual capital perspective,” *Journal of Intellectual Capital*. 2001, doi: 10.1108/14691930110400092.

[99] V. Rossi, F. Salinari, S. Poni, T. Caffi, and T. Bettati, “Addressing the implementation problem in agricultural decision support systems: The example of vite.net®,” *Comput. Electron. Agric.*, vol. 100, pp. 88–99, 2014, doi: 10.1016/j.compag.2013.10.011.

[100] J. Vitale, T. Boyer, R. Uaiene, and J. H. Sanders, “The economic impacts of introducing Bt technology in smallholder cotton production systems of West Africa: A case study from Mali,” *AgBioForum*, 2007.

[101] E. Lima *et al.*, “Drivers for precision livestock technology adoption: A study of factors associated with adoption of electronic identification technology by commercial sheep farmers in England and Wales,” *PLoS One*, vol. 13, no. 1, Jan. 2018, doi: 10.1371/journal.pone.0190489.

[102] Á. Regan, “‘Smart farming’ in Ireland: A risk perception study with key governance actors,” *NJAS - Wageningen J. Life Sci.*, vol. 90–91, Dec. 2019, doi: 10.1016/j.njas.2019.02.003.

[103] P. Davis-Walling and S. A. Batterman, “Environmental reporting by the Fortune 50 firms,” *Environmental Management*. 1997, doi: 10.1007/s002679900073.

[104] S. Stryker and R. T. Serpe, “Commitment, Identity Salience, and Role Behavior: Theory and Research Example,” in *Personality, Roles, and Social Behavior*, Springer New York, 1982, pp. 199–218.

[105] J. Mills, P. Gaskell, J. Ingram, J. Dwyer, M. Reed, and C. Short, “Engaging farmers in environmental management through a better understanding of behaviour,” *Agric. Human Values*, vol. 34, no. 2, pp. 283–299, Jun. 2017, doi: 10.1007/s10460-016-9705-4.

[106] T. Brudermann, K. Reinsberger, A. Orthofer, M. Kislinger, and A. Posch, “Photovoltaics in agriculture: A case study on decision making of farmers,” *Energy Policy*, vol. 61, pp. 96–103, Oct. 2013, doi: 10.1016/j.enpol.2013.06.081.

[107] A. Carlson and A. M. Isaacs, “Technological capital: an alternative to the digital divide,” *J. Appl. Commun. Res.*, vol. 46, no. 2, pp. 243–265, Mar. 2018, doi: 10.1080/00909882.2018.1437279.

[108] M. Popescu, D. Mocuta, and S. Cristea, “Trend on maize market evolution in Romania,” in *Proceedings of the 31st International Business Information Management Association Conference, IBIMA 2018: Innovation Management and Education Excellence through Vision 2020*, 2018.

[109] L. A. Sutherland, “Can organic farmers be ‘good farmers’? Adding the ‘taste of necessity’ to the conventionalization debate,” *Agric. Human Values*, vol. 30, no. 3, pp. 429–441, Sep. 2013, doi: 10.1007/s10460-013-9424-z.

[110] K. L. Blackstock, J. Ingram, R. Burton, K. M. Brown, and B. Slee, “Understanding and influencing

behaviour change by farmers to improve water quality," *Sci. Total Environ.*, vol. 408, no. 23, pp. 5631–5638, Nov. 2010, doi: 10.1016/j.scitotenv.2009.04.029.

[111] R. Owen, P. Macnaghten, and J. Stilgoe, "Responsible research and innovation: From science in society to science for society, with society," *Sci. Public Policy*, vol. 39, no. 6, pp. 751–760, Dec. 2012, doi: 10.1093/scipol/scs093.

[112] L. Asveld, J. Ganzevles, and P. Osseweijer, "Trustworthiness and Responsible Research and Innovation: The Case of the Bio-Economy," *J. Agric. Environ. Ethics*, vol. 28, no. 3, pp. 571–588, Jun. 2015, doi: 10.1007/s10806-015-9542-2.

[113] H. Molotch and H. E. Daly, "Beyond Growth: The Economics of Sustainable Development," *Contemp. Sociol.*, 1998, doi: 10.2307/2655177.

[114] D. Wright, N. Hammond, G. Thomas, B. MacLeod, and L. K. Abbott, "The provision of pest and disease information using Information Communication Tools (ICT); an Australian example," *Crop Prot.*, vol. 103, pp. 20–29, Jan. 2018, doi: 10.1016/j.cropro.2017.08.023.

[115] M. S. Allahyari, "Agricultural sustainability: Implications for extension systems," *African J. Agric. Res.*, 2009.

[116] C. Barbero-Sierra, M. J. Marques, and M. Ruíz-Pérez, "The case of urban sprawl in Spain as an active and irreversible driving force for desertification," *J. Arid Environ.*, 2013, doi: 10.1016/j.jaridenv.2012.10.014.

[117] H. Faruqee and M. Mühleisen, "Population aging in Japan: Demographic shock and fiscal sustainability," *Japan World Econ.*, 2003, doi: 10.1016/S0922-1425(02)00017-8.

[118] Y. Doppelt, "Implementation and assessment of project-based learning in a flexible environment," *Int. J. Technol. Des. Educ.*, 2003, doi: 10.1023/A:1026125427344.

[119] J. D. Shucksmith, J. B. Boxall, and I. Guymer, "Effects of emergent and submerged natural vegetation on longitudinal mixing in open channel flow," *Water Resour. Res.*, 2010, doi: 10.1029/2008WR007657.

[120] J. D. Kropp and A. L. Katchova, "The effects of direct payments on liquidity and repayment capacity of beginning farmers," *Agric. Financ. Rev.*, 2011, doi: 10.1108/00021461111177611.

[121] J. Kottmann, U. Grob, J. M. Rey, and M. W. Sigrist, "Mid-infrared fiber-coupled photoacoustic sensor for biomedical applications," *Sensors (Switzerland)*, 2013, doi: 10.3390/s130100535.

[122] P. Weißhuhn, K. Helming, and J. Ferretti, "Research impact assessment in agriculture - A review of approaches and impact areas," *Research Evaluation*. 2018, doi: 10.1093/reseval/rvx034.

[123] I. Llorente García, J. L. Álvarez, and D. Blanco, "Performance model for parabolic trough solar thermal power plants with thermal storage: Comparison to operating plant data," *Sol. Energy*, 2011, doi: 10.1016/j.solener.2011.07.002.

[124] F. T. S. Chan and A. Y. L. Chong, "Analysis of the determinants of consumers' m-commerce usage activities," *Online Inf. Rev.*, 2013, doi: 10.1108/OIR-01-2012-0012.

[125] W. N. Picoto, F. Bélanger, and A. Palma-Dos-Reis, "An organizational perspective on m-business: Usage factors and value determination †," *Eur. J. Inf. Syst.*, 2014, doi: 10.1057/ejis.2014.15.

[126] M. J. O'Grady, D. Langton, and G. M. P. O'Hare, "Edge computing: A tractable model for smart agriculture?," *Artif. Intell. Agric.*, 2019, doi: 10.1016/j.aiia.2019.12.001.

[127] "Enterprise analytics: optimize performance, process, and decisions through big data," *Choice Rev. Online*, 2013, doi: 10.5860/choice.50-3938.

[128] ONU, "¿Qué es el Estado de Derecho?," *Naciones Unidas y el Estado de Derecho*, 2019. .

[129] D. J. Teece, "Explicating dynamic capabilities: The nature and microfoundations of (sustainable) enterprise performance," *Strateg. Manag. J.*, 2007, doi: 10.1002/smj.640.

[130] P. Ghisellini, C. Cialani, and S. Ulgiati, "A review on circular economy: The expected transition to a balanced interplay of environmental and economic systems," *J. Clean. Prod.*, 2016, doi: 10.1016/j.jclepro.2015.09.007.

[131] D. S. Powlson, C. M. Stirling, C. Thierfelder, R. P. White, and M. L. Jat, "Does conservation agriculture deliver climate change mitigation through soil carbon sequestration in tropical agro-ecosystems?," *Agric. Ecosyst. Environ.*, 2016, doi: 10.1016/j.agee.2016.01.005.

[132] Y. Hu, B. Li, Z. Zhang, and J. Wang, "Farm size and agricultural technology progress: Evidence from China," *J. Rural Stud.*, 2019, doi: 10.1016/j.jrurstud.2019.01.009.

[133] R. W. Zmud, "Management of large software development efforts," *MIS Q. Manag. Inf. Syst.*, 1980, doi: 10.2307/249336.

[134] M. Hossain, "Frugal innovation: A review and research agenda," *Journal of Cleaner Production*. 2018, doi: 10.1016/j.jclepro.2018.02.091.

[135] T. Trinh-Phuong, A. Molla, and K. Peszynski, "Enterprise system-enabled organizational agility capability: A construct and measurement instrument," in *Proceedings - Pacific Asia Conference on Information Systems, PACIS 2012*, 2012.

[136] *Economic, Environmental, and Health Tradeoffs in Agriculture: Pesticides and the Sustainability of Andean Potato Production*. 1998.

[137] F. Constantin Severini, *New Challenges for Agricultural Research : Climate Change , Food Security , Rural Development , Agricultural*. 2009.

[138] M. B. Masuku and B. Xaba, "Factors Affecting the Productivity and Profitability of Vegetables Production in Swaziland," *J. Agric. Stud.*, 2013, doi: 10.5296/jas.v1i2.3748.

[139] G. Enjolras and M. Aubert, "Short food supply chains and the issue of sustainability: a case study of French fruit producers," *Int. J. Retail Distrib. Manag.*, 2018, doi: 10.1108/IJRDM-08-2016-0132.

[140] R. Cortignani and G. Dono, "Agricultural policy and climate change: An integrated assessment of the impacts on an agricultural area of Southern Italy," *Environ. Sci. Policy*, 2018, doi: 10.1016/j.envsci.2017.12.003.

[141] M. M. Queiroz and R. Telles, "Big data analytics in supply chain and logistics: an empirical approach," *Int. J. Logist. Manag.*, 2018, doi: 10.1108/IJLM-05-2017-0116.

[142] D. Gavalas and D. Economou, "Development platforms for mobile applications: Status and trends," *IEEE Softw.*, 2011, doi: 10.1109/MS.2010.155.

[143] G. M. Diiro, "Impact of Off-farm Income on Agricultural Technology Adoption Intensity and

Productivity," *Agric. Econ.*, 2013.

[144] F. Farneti and J. Guthrie, "Sustainability reporting by Australian public sector organisations: Why they report," *Account. Forum*, 2009, doi: 10.1016/j.accfor.2009.04.002.

[145] U. Knuth, T. S. Amjath-Babu, and A. Knierim, "Adoption of Farm Management Systems for Cross Compliance – An empirical case in Germany," *J. Environ. Manage.*, 2018, doi: 10.1016/j.jenvman.2018.04.087.

[146] K. Alomari, J. Gambatese, and J. Anderson, "Opportunities for using building information modeling to improve worker safety performance," *Safety*, 2017, doi: 10.3390/safety3010007.

[147] M. L. Nandi and J. Vakkayil, "Absorptive capacity and ERP assimilation: the influence of company ownership," *Bus. Process Manag. J.*, 2018, doi: 10.1108/BPMJ-11-2016-0228.

[148] Institutul Național de Statistică, "INSSE - Baze de date statistice - TEMPO-Online serii de timp," *website*, 2019. .

[149] Y. B. Ansah, E. A. Frimpong, and S. Amisah, "Characterisation of potential aquaculture pond effluents, and physico-chemical and microbial assessment of effluent-receiving waters in central Ghana," *African J. Aquat. Sci.*, vol. 38, no. 2, pp. 185–192, Aug. 2013, doi: 10.2989/16085914.2013.767182.

[150] "Lista firmelor active din România cu informaţii complete." https://www.listafirme.ro/ (accessed May 15, 2021).

[151] "Program de fertilizare TOMATE." https://www.semplus.ro/blog/program-de-fertilizare-tomate (accessed May 16, 2021).