Farm 4SD

TITLE: R1/A2: Research report in the subject area

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Project Information

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1 Executive Summary

The following report combines data research that was conducted in Germany, Belgium, Poland, Slovenia, and Greece. This international report contains a brief introduction to the project Farm4SD, as well as a description of the methodology that was applied for the data collection and analysis. The report includes a results and discussion section where quantitative and qualitative results are presented. Finally, conclusions and recommendations are made, based on the findings of the research and the analyses. The set of recommendations can be utilized to design and develop the Farm4SD training course.

2 Introduction

Farm4SD aims at developing a holistic, innovative, and inclusive approach for farmers, especially medium and small farm holders, to educate and train them on the European pillars of sustainable agriculture. The effort to upskill and reskill farmers and C-VET educators, also in entrepreneurial and soft skills, is necessary, so that they can become true factors of change and contribute to environmental protection, to the sustainable growth of our planet and to rural development.

This report aspires to provide data and insights regarding the:

- Farmers' skills gap concerning the sustainable agriculture's pillars: The Agenda 2030 for Sustainable Development, European Green Deal, Farm to Fork and Biodiversity Strategies, The new CAP, soft skills, and entrepreneurial skills
- Best practices in farmers' C-VET provision, as well as the skills' recognition paths based on established European VET tools and approaches: EQF, updated ECTS or/and ECTS, Micro-credential approach

Based on the results of this report, the Methodological Framework (R1) will be developed. The Methodological Framework will help VET institutions and VET trainers to better understand farmers´ needs and improve their capacity in advanced training methodologies and skill recognition, so they can better serve European farmers and the European sustainable agriculture labour market. Additionally, this report will serve as the foundation for the Farm4SD project´s learning resources and guidelines.

3 Methodology

Both qualitative and quantitative data collection techniques were used to collect the right data in each of the countries (Belgium, Poland, Slovenia, Germany, and Greece).

3. 1 Quantitative Research:

Quantitative data collection is a method of empirical social research that answers questions like "who?" "when?" "where?" "what?" and "how many?". A survey, carried out on LimeSurvey, was conducted amongst approximately 50 farmers per country. They were reached via direct personal phone contact or e-mail and via distribution of the survey through regional agricultural associations and social media. The survey was done online by the participants that answered the questionnaire. Additionally, the organization filled in the survey for those, who were reached via phone. The survey consisted of 22 closed-ended questions using the Likert scale on the five pillars of sustainable agriculture. Respondents were asked to indicate on a

five-point scale the degree of their awareness of several different policies and goals. Pie charts and graphs were chosen for an easier and more descriptive presentation of the data and results. In this way, the results to be discussed would be clearly illustrated.

3. 2 Qualitative Research:

Additionally, quality data collection was used to obtain detailed, subjective, and individual knowledge on various topics. Review-based scientific and grey literature research were deployed in order to collect the data for the qualitative research. More specifically, the following methods were used:

Internal Desk Research – part of the Information was generated internally within the two Greek organizations.

External Desk Research – this type of research conducted refers to the research done outside the organizational boundaries. The outside resources used are described below:

- Online Desk Research - data available online on internet collected by directly browsing the specific information from platforms providing scientific papers and from industrial, marketing or business sites or/and by using Google search engine. The searching was refined in such a way that results were promising, accurate and relevant.
- Using websites of universities and vocational schools – data was collected by accessing their websites and/or through interviews/discussions with professionals working at these organizations
- Government/EU published data - especially government websites on federal, regional, and community level and the European Commission's portal that provides information concerning Agriculture were accessed.

The qualitative research focused on a set of questions consisting of six research guiding questions:

1. What is the state of sustainable agriculture in your country? Which types of farming are practiced (conventional, organic farming, regenerative agriculture, other types); to what percentage (if there is data).
2. What is the level of integration of the pillars of sustainable agriculture in your country's laws/initiatives - Agenda 2030, CAP, Biodiversity Strategy, Farm to Fork Srategy, European Green Deal? Please shortly describe best practices of sustainable agriculture initiatives on national/regional or local policy level. Please describe the funding options in your country to implement the above-mentioned strategies.
3. Is the concept of sustainable agriculture taught in regular (higher) education programs such as the undergraduate and graduate studies in agriculture, in vocational training (VET) in agriculture or in adult training in general? Which institutions offer courses on Sustainable Agriculture (Universities, VET providers, adult training institutions, private institutes/schools, etc)?
4. How are the pillars of sustainable agriculture integrated in the C-VET offers? Does the provision of the training on sustainable agriculture incorporate entrepreneurship and soft skills?

5. What training methods and techniques are mostly used and are suitable for farmers' training? Is Work Based Learning (WBL) like apprenticeship programs integrated in the context of the offered trainings?
6. What are the recognition paths/qualification validation methods used by the offered trainings? Are they based on established EU VET tools and approaches: EQF, updated ECVET or/and ECTS, micro-credential approach?

The results of the analysis are presented in a summarized text in chapter 5.

4 Results and Discussion

4. 1 Quantitative research

The online questionnaire was conducted through the LimeSurvey software and took place in the months of June, July, and August 2022. The respondents were reached through e-mails, phone calls, and social media promotion. A small part of the questionnaires was collected on paper and then entered manually in the Lime Survey program by the partners.

Table 1 shows that a total of 1039 questionnaires were answered, of which 268 were fully completed.

Country	Survey completed 100%	Total no. of questionnaires
Germany	50	274
Greece	71	245
Belgium	40	188
Slovenia	56	249
Poland	51	83
Total No.	**268**	**1039**

Table 1 LimeSurvey respondents

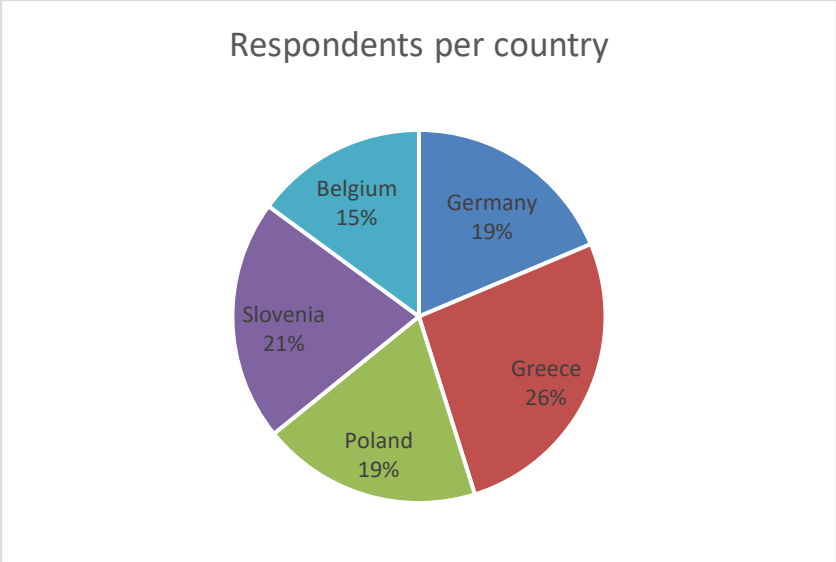

Figure 1 Respondents per country

This means, as shown in figure 1, that Greece has the highest number of participants in the survey (26%), followed by Slovenia (21%), Germany (19%), Poland (19%) and Belgium (15%).

4.2 Introduction questions

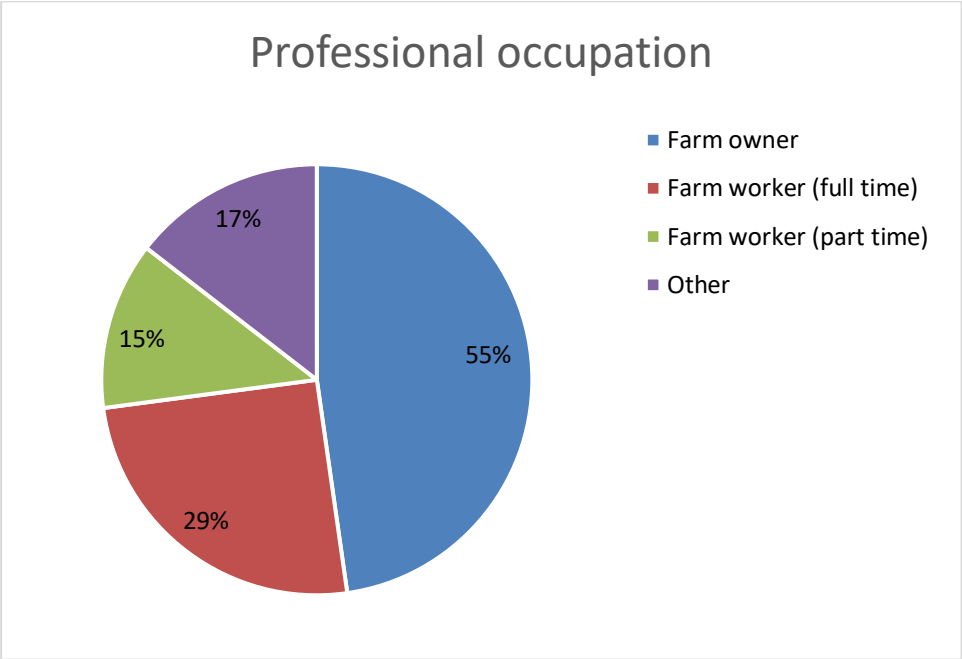

Figure 2 PIE CHART ABOUT THE PROFESSIONAL STATUS OF THE SURVEY PARTICIPANTS

It is indicated that a great majority (55%) of the survey participants are farm owners or occupied as farm workers in full time (29%), whereas 15% work only part time on a farm. The rest of the 17% participants are involved in other ways in the agriculture sector (e.g., executing on a farm, former farmer etc.)

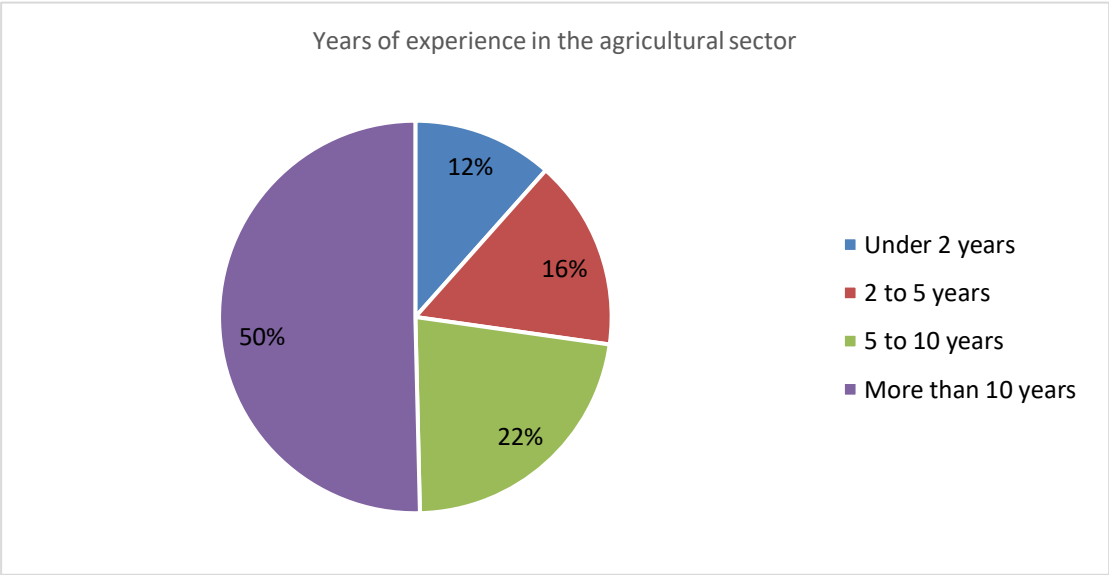

Figure 3 YEARS OF EXPERIENCE

The survey clearly states that the answers come from highly experienced farmers: 50% of the participants have more than 10 years of experience and 22% have five to ten years of

experience in the agricultural sector. It should be noted, that 12% of the responses were made by farmers who just got into the business (under 2 years) and that 16% have had experience between two and five years.

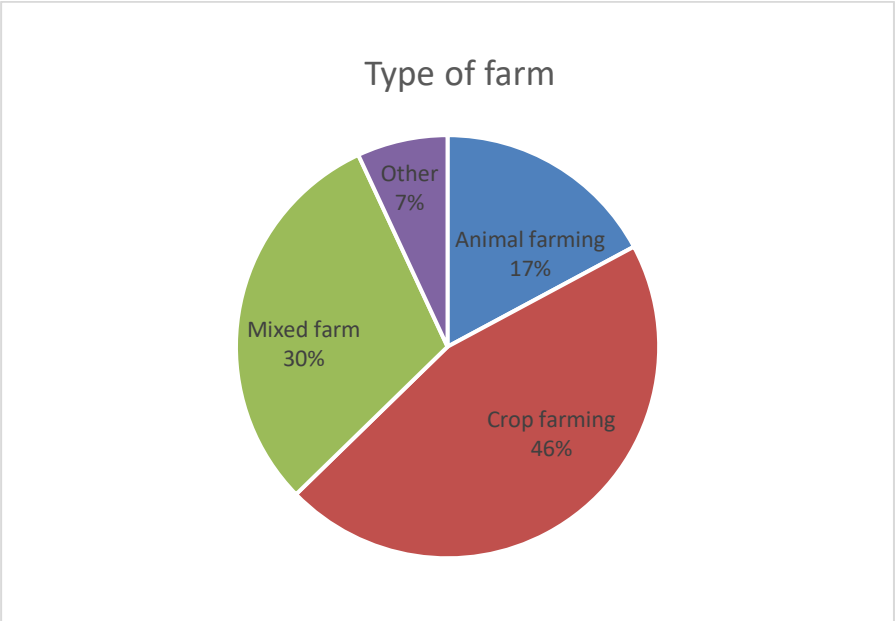

Figure 4 Type of farms

When asked about the type of farms they are involved with, the responses clearly show that the majority of farms are crop farms (46%) and mixed farming (30%). This leaves animal farming with a number of 17% and other kind of farming with seven percent. Interesting is that Greece shows the highest number in crop farming (90%), followed by Belgium with 57%. Slovenia shows the highest number of farms in mixed farming (64%) as well as Poland (47%) and Germany (33%).

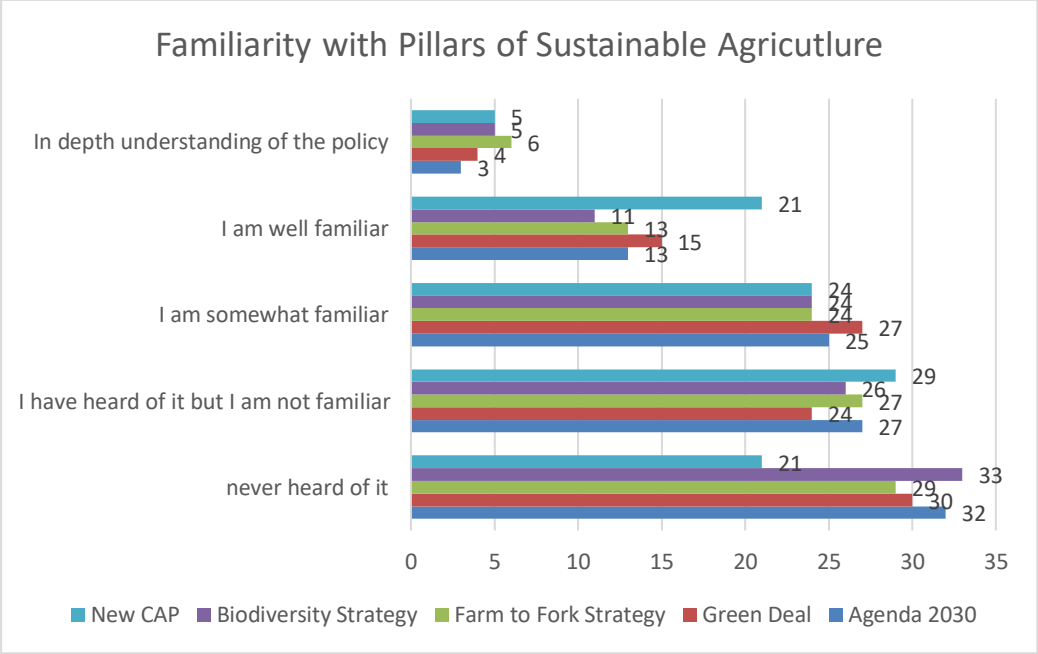

Figure 5 Familiarity with Pillars of Sustainable Agriculture

Regarding the five pillars of the sustainable agriculture, farmers in Greece, Germany, Slovenia, Poland and Belgium show a big lack of knowledge about the content and objectives of each policy. Under seven percent of the asked farmers say that they have a deep understanding of the policies. The majority (29-33%) say, that they have never heard about the asked policy. 24% - 29% heard about the asked policy but are not familiar with it. Only 24% - 27% are somewhat familiar with the policies. Here it seems that there is the same knowledge about the Biodiversity Strategy (24%), Farm to Fork Strategy (24%) and the Agenda 2030 (25%). Only 21% of all farmers say that they are well familiar with the New CAP. The data clearly shows that education and training activities regarding the pillars of sustainable agriculture are lacking to reach and inform farmers.

4. 3 Agenda 2030

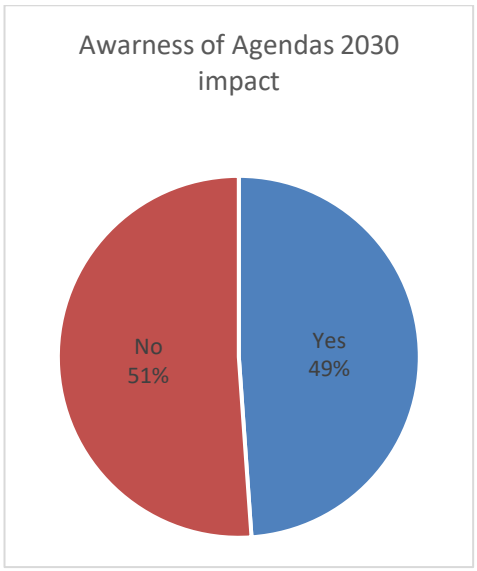

Figure 6: Level of awareness - Agenda 2030

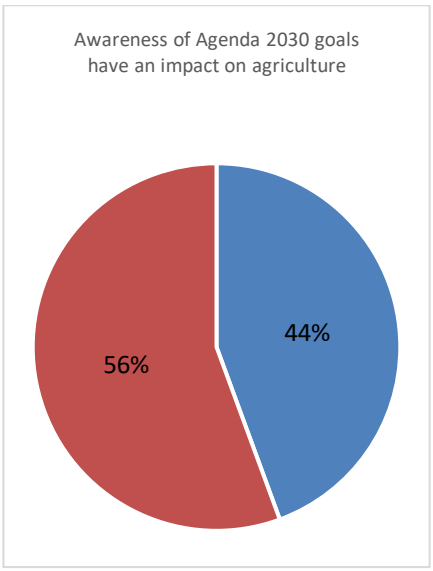

Figure 7: Agenda 2030 impact on agriculture

The respondents have been asked about their level of awareness regarding the Agenda 2030: 51% are aware that the goals of the Agenda 2030, including the 17 sustainable development goals, are supposed to be reached by 2030. 56% of the respondents are aware that the Agenda 2030 has a direct impact on agriculture and farming, whereby 44% are not aware of this.

4. 4 European Green Deal

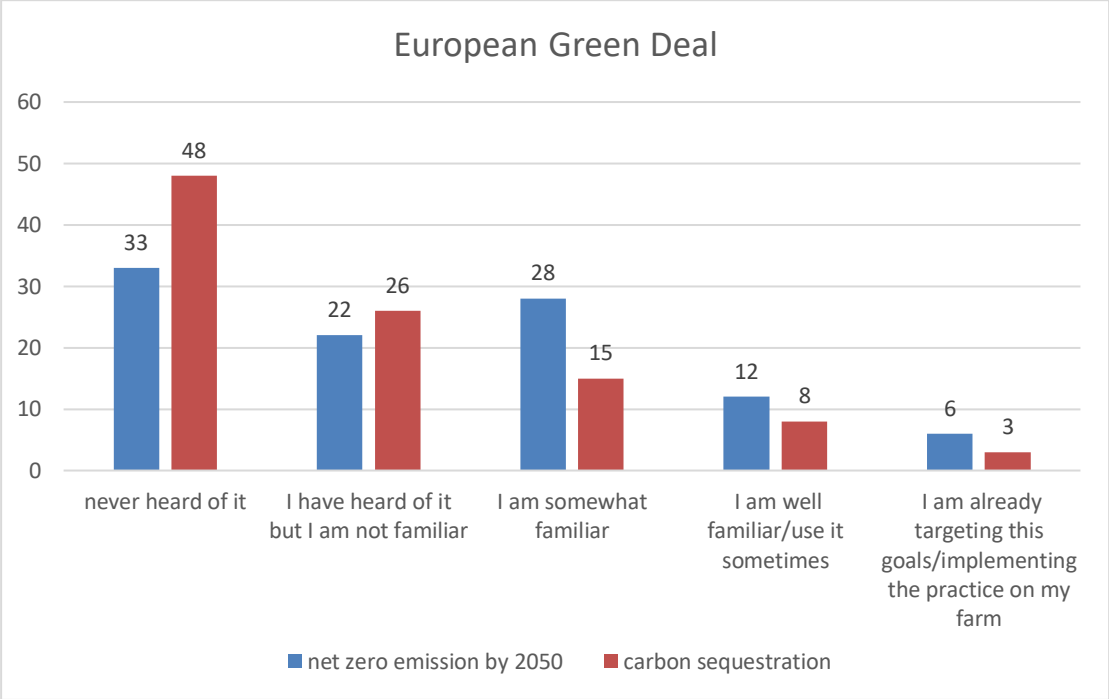

Figure 8 European Green Deal

Respondents were asked about their knowledge about the European green deal. The responses underline the earlier outcome, that farmers have heard about the goal of zero net emission by 2050 and the practice of carbon sequestration but are not familiar with it. 33% of the respondents have not heard of the goal of net zero emission by 2050 at all. And 48% are completely unfamiliar with the goal of carbon sequestration. Most farmers do not seem to know about the content and goal of the European green deal: only 8% - 12% say that they are familiar with the net zero emission by 2050 and use carbon sequestration at least sometimes on their farm.

4. 5 Farm to Fork Strategy

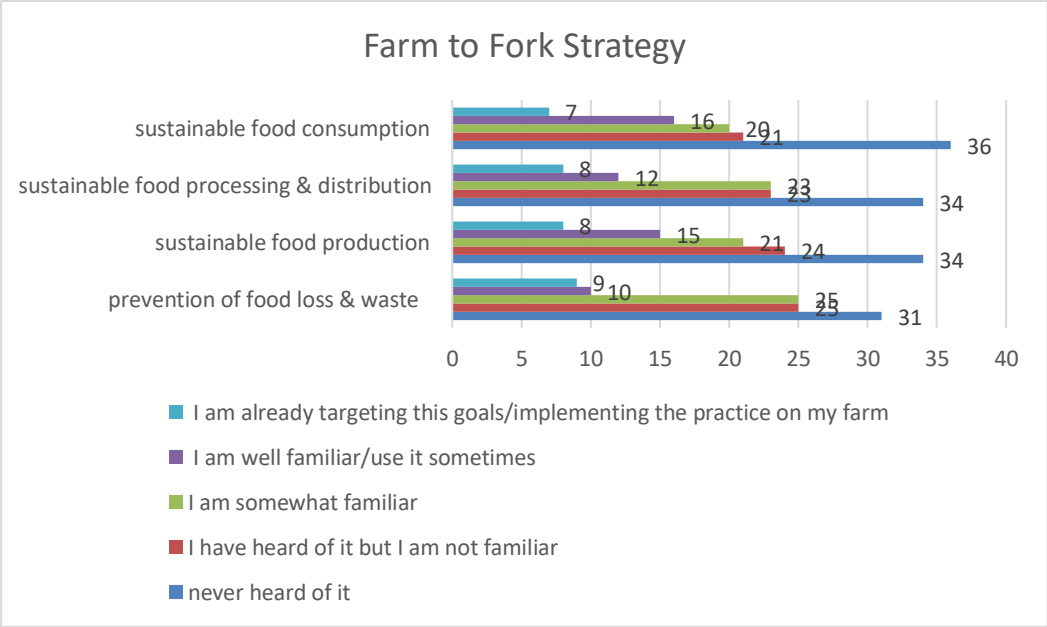

Figure 9 Farm to Fork Strategy

The Farm to Fork Strategy is at the heart of the European Green Deal. A sustainable food system will be essential, to achieve the climate and environmental objectives of the European Green Deal. Therefore, it is critical to notice that the objectives of the Farm to Fork Strategy remain completely unfamiliar to over 36% of the respondents. Only nine percent have been in deep understanding of the goal of prevention of food loss & waste and under nine percent of the farmers are aware of the other goals of sustainable food production and consumption.

4. 6 EU Biodiversity Strategy

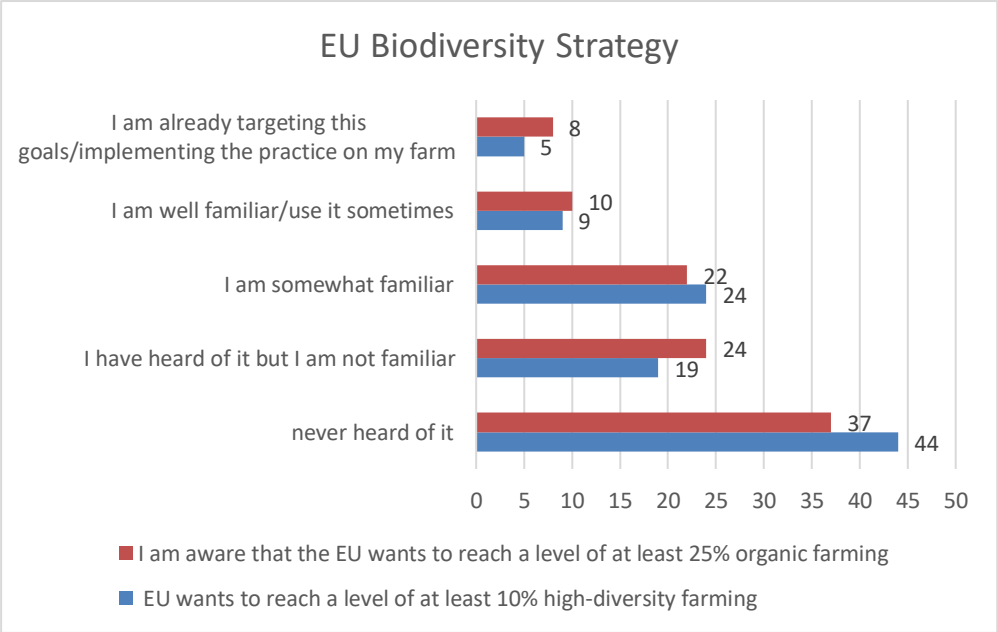

Figure 10 EU Biodiversity Strategy

The EU Biodiversity Strategy aims to put Europe's biodiversity on a path to recovery by 2030 with benefits for people, the climate, and the planet. The strategy contains specific commitments and actions to be delivered by 2030, such as a share of 25% organic farming and a level of at least ten precent high-diversity farming. Farmers are not familiar with both goals (over 19%) or have not heard of those goals at all (37-44%). Only a few farmers say that they are already targeting the goals of 25% organic farming (eight percent) and only five percent are aware that the EU wants to reach a level of at least ten precent high-diversity farming and are working towards this goal.

4.7 New Common Agriculture Policy (CAP)

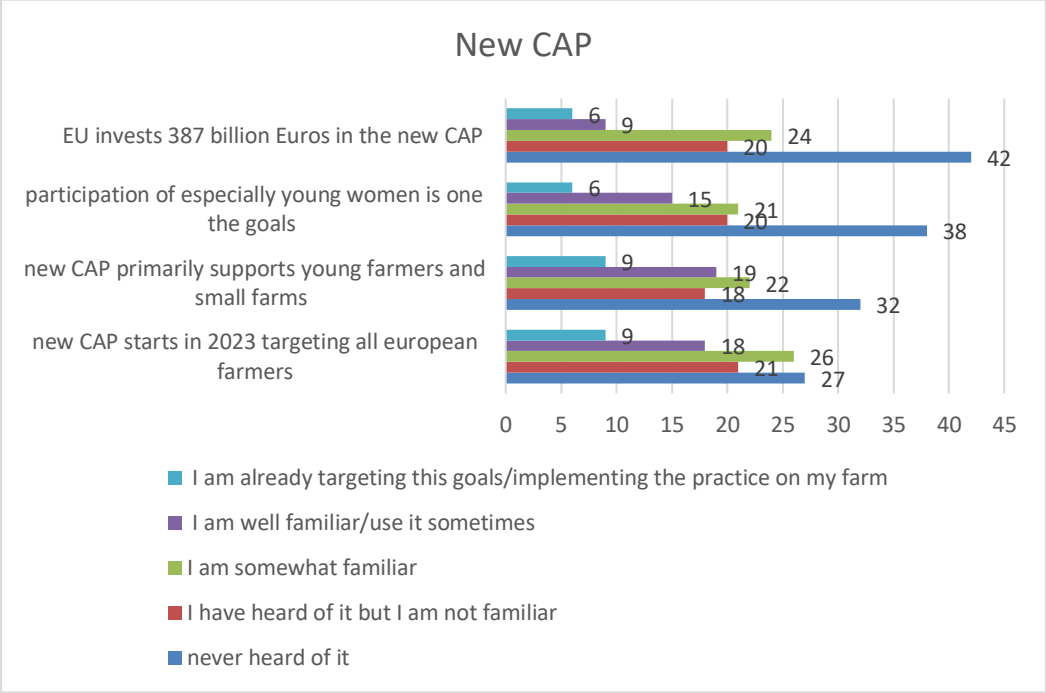

Figure 11 New CAP

In December 2021, the New Common Agriculture Policy was decided for the period of 2023-2027. The New CAP shall be a key tool for reaching the objectives of the Biodiversity and Farm to Fork Strategy. A Budget of 387 billion Euros was allocated to the New CAP, especially addressing young farmers and young women. Even though the New CAP addresses farmers directly and has a great impact on the daily life of all farmers, under ten percent are well familiar with the objectives: only nine percent are aware that the new CAP is affecting all farmers from 2023 and primarily supports young and small farmers. Only six percent are aware that the EU invests 387 billion Euros in the new CAP and addresses especially young women. The majority (27% - 42%) though has never heard of the objectives of the New CAP.

4.8 Sustainable Practices

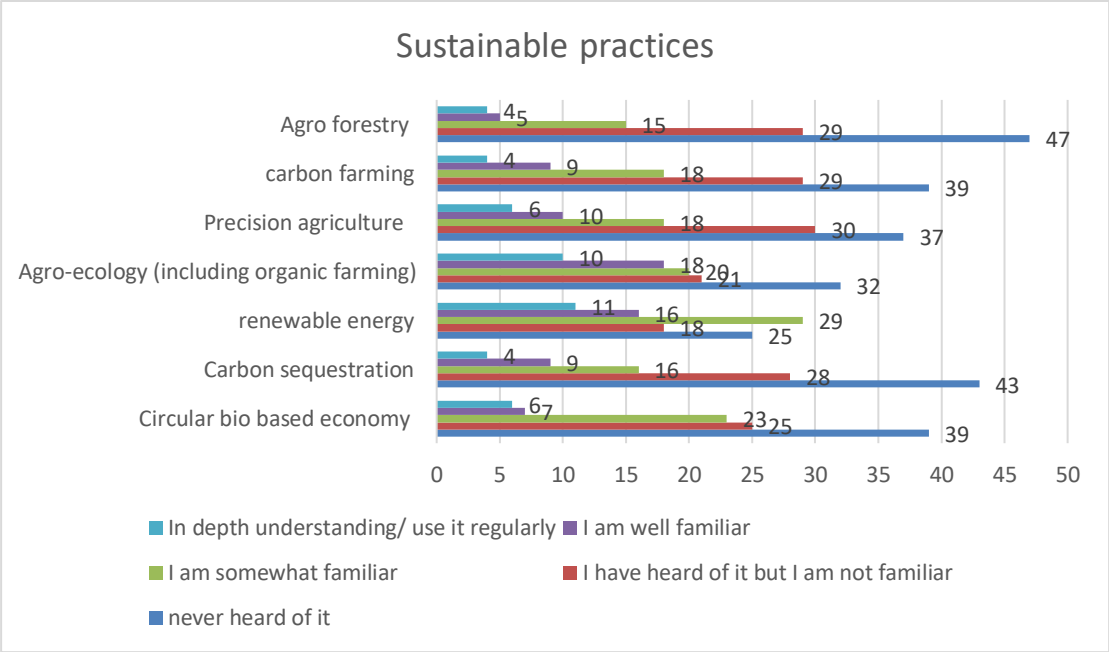

Figure 12 Sustainable practises

The respondents were asked to what extent they use sustainable practises around their own farm/ the farm there are working on. It is worth noticing that 29% of the farmers use renewable energy frequently or have it completely integrated in their farm (eleven percent). But the majority of sustainable practises stay unknown/not practised for the European farmers: Only six percent use carbon sequestration and precision culture; four percent practise carbon farming and agro-forestry; only six percent use Circular bio-based economy and ten percent practise agro-ecology, including organic farming.

4.9 Learning about sustainable agriculture

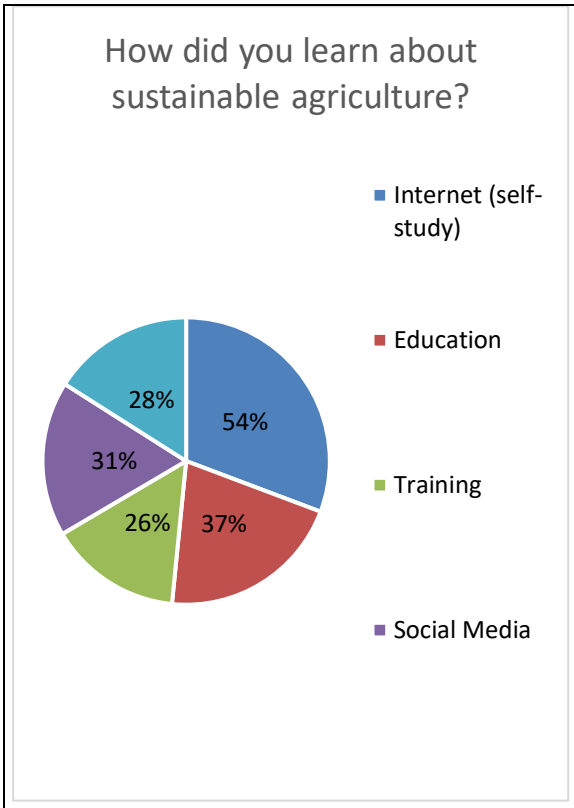

Figure 13 How did you learn about sustainable agriculture

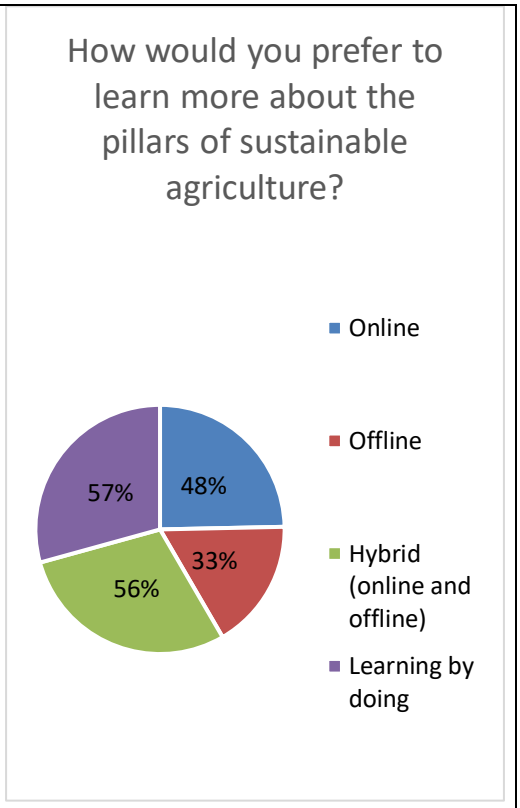

Figure 14 How would you prefer to learn more about sustainable agriculture?

Figure 13 shows how farmers gained their knowledge about sustainable agriculture so far. It is interesting, that 54% got their knowledge through self-study on the internet, and 37% percent through some kind of prior education. It is also worth noticing that 31% gained their knowledge through social media. Figure 14 supports the results: 56% of the asked farmers want to learn more about sustainable agriculture in the future in a hybrid way, meaning online and offline learning together. 57% of the respondents said, that they would prefer learning by doing, whereby 48% would prefer an online education/training.

Figure 15 Interest in free training course

It is highly significant that 86% of the respondent are interested in a free training course on the pillars of sustainable agriculture.

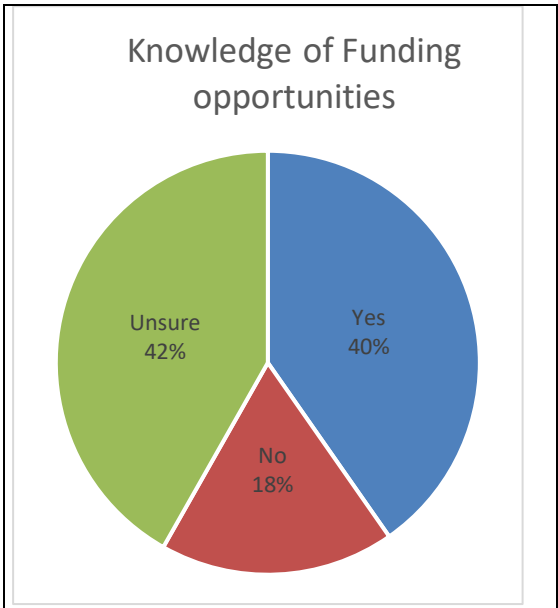

Figure 16 Knowledge of funding opportunities

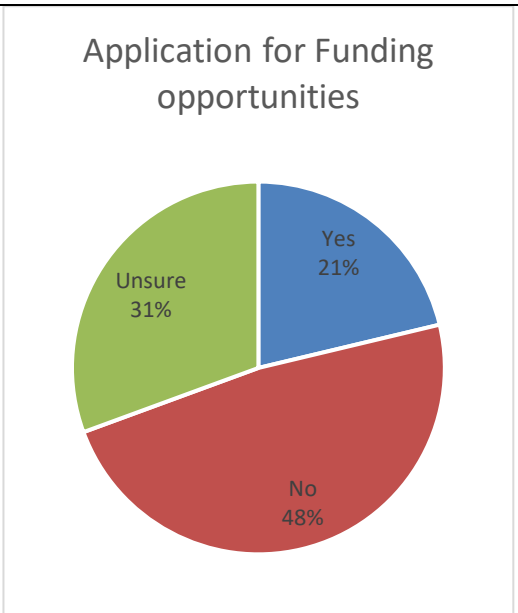

Figure 17 Application for Funding opportunities

While the pillars of sustainable agriculture will have an impact on European farmers and force them to change in their habits, the funding opportunities to help them in their process are bad known: 42% said that there are unsure about the funding options and only 21% have applied for funding before. Though the data differs throughout the countries and polish farmers are mostly aware of the funding opportunities, the data shows, that there is a clear lack of information about the right funding opportunities throughout Europe.

4.10 Entrepreneurial skills

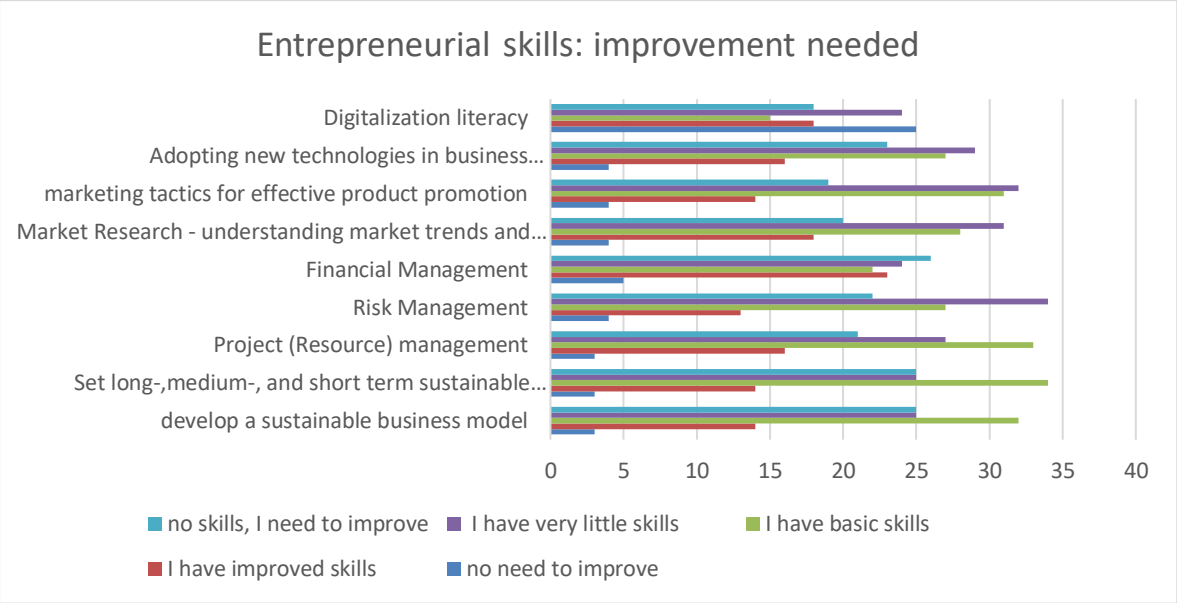

Figure 18 Scale of improvement for entrepreneurial skills

The survey aimed to identify the needs of farmers to upskills and reskill specific entrepreneurial skills. The answers show that there is a clear need for farmers to upgrade their entrepreneurial skills. The majority of the farmers state that they have very little skills in: Risk Management (34%), marketing tactics for effective product promotion (32%), Market Research - understanding market trends and consumer needs (31%), Adopting new technologies in business operations/projects (29%), Project (Resource) management (27%), develop a sustainable business model (25%), Set long-,medium-, and short term sustainable business goals (25%), Financial Management (24%) and Digitalization literacy (24%).

4.11 Soft Skills

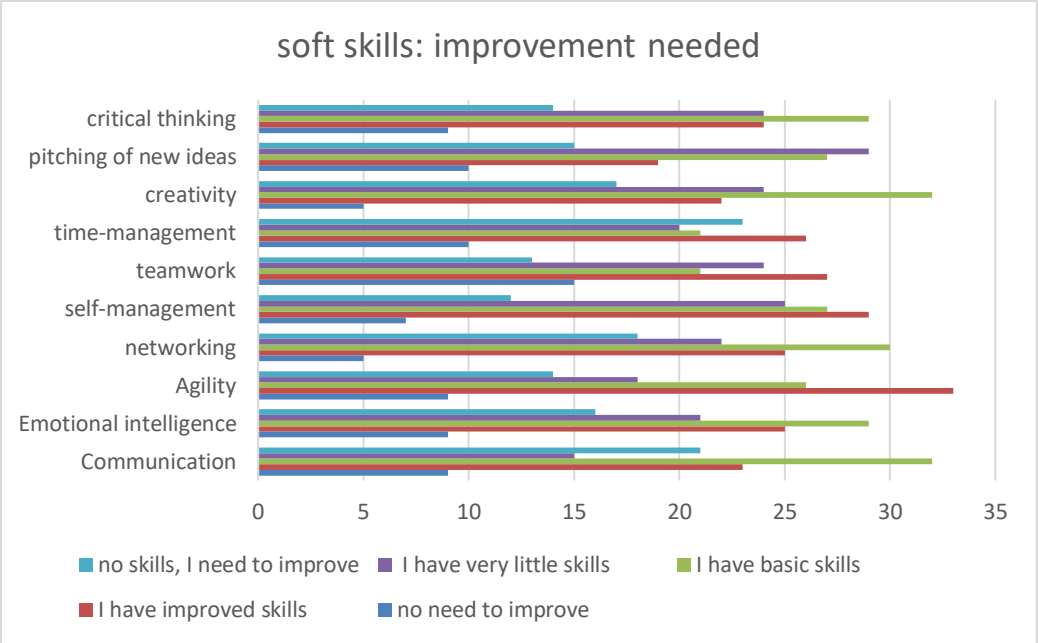

Figure 19 Scale of improvement for soft skills

The survey aimed to identify the needs of farmers to upskills and reskill specific soft skills. The answers show that farmers are somewhat confident (I have improved skills) in agility (33%) and self-management (29%). Though the majority of farmers say they need to improve their soft skills: Time Management (23%), Communication (21%), Networking (18%), creativity (17%), emotional intelligence (16%), Pitching of new ideas (15%), Agility (14%), critical thinking (14%), teamwork (13%) and self-management (12%).

5 Qualitative Research

5. 1 Germany

Question 1: What is the state of sustainable agriculture in your country? Which types of farming are practiced (conventional, organic farming, regenerative agriculture, other types); to what percentage (if there is data).

Germany counted 256.900 farms in 2021, of which 35.396 are ecological farms. This means that 1,8Mio ha of land are used for ecological farming, which represents 10,8% of German agriculture (Ahrens, 2022). There is clearly a trend in organic food: Sales of organic food reached a new record high in 2021 - German food retailers generated sales of organic food of around 15.87 billion euros. This corresponds to a sales growth of 5.8 percent compared to the previous year. In the past ten years, sales of organic foods have thus more than doubled (ebd.)

Question 2: What is the level of integration of the pillars of sustainable agriculture in your country's laws/initiatives - Agenda 2030, CAP, Biodiversity Strategy, Farm to Fork Srategy, European Green Deal? Please shortly describe best practices of sustainable agriculture initiatives on national/regional or local policy level. Please describe the funding options in your country to implement the above-mentioned strategies.

Over the last years and decades, Germany has made efforts to become more sustainable. In the "Report on the implementation of the 2030 Agenda for Sustainable Development" (2021) a number of implemented laws and initiatives are named. Most relevant in the scope of this project are the goals 2 (no hunger), 12 (responsible consumption) and 15 (life on land). Regarding goal 2, the government has published the National Bioeconomy strategy in 2020, the Climate Protection Program 2030 and the initiative "Sustainable Consumption for biodiversity in agriculture and food", which focuses on the cultivation and marketing of old regional fruit and vegetable varieties and endangered breeds of livestock in Germany (Die Bundesregierung, 2021). Related to goal 12 the new due diligence law in supply chains that was passed in June 2021 and the implementation of the National Strategy for reduction of food waste in 2019 are worth mentioning (Die Bundesergeierung, 2021). For goal 15, Germany has, for example, designed an Agrobiodiversity Strategy, a strategy for the future of organic farming and a National Bioeconomy Strategy (Die Bundesregierung, 2021). Going into details on each of the strategies, would lead to far at this point, but they can all be found on the webpage of the German government and/ or the responsible ministries. For the protection of biodiversity, the German government developed a National Strategy on Biological Diversity, which contains around 330 objectives and 430 concrete measures in 16 fields of action (Die Bundesregierung, 2021). In addition, they launched an insect protection program, in 2019, to reverse the trend in the decline of insects and their diversity (Die Bundesregierung, 2021). Regarding the Farm to Fork Strategy, Germany is on a good way to implement the 27 required measures. Some of them, such as a standardised nutrition labelling system, the animal welfare label and a strategy to reduce food waste are already put into practice (Die Bundesregierung, 2020).

To help farmers with the realization of activities and change, Germany offers different funding options. They are organized on the level of the federal states, so depending on where a farm is located, differences in accessibility and criteria occur (Deutsche Fördermittelberatung, n.d.). In general, funding can be obtained for three types of activities, including environmental protection, animal welfare and rural development. Farmers may apply for funding for more efficient machinery, resource-saving software, research and development of new processes and technologies, measures for protection against various weather conditions or the creation of overnight accommodation for tourists (e.g. Farm cafes, guest rooms, camping sites) (Deutsche Fördermittelberatung, n.d.).

Question 3: Is the concept of sustainable agriculture taught in regular (higher) education programs such as the undergraduate and graduate studies in agriculture, in vocational training (VET) in agriculture or in adult training in general? Which institutions offer courses on Sustainable Agriculture (Universities, VET providers, adult training institutions, private institutes/schools, etc)?

There are around 40 university degrees (Bachelor and Master) and 166 vocational schools in Germany that teach agriculture (Agrarstudieren, 2022; Bildungsserver Agrar, 2022). Out of the more than 40 degree programmes, only three have a particular focus on sustainability, namely "Sustainable International Agriculture" at the Georg-August-University in cooperation with the University of Kassel, "Agricultural Science and Resource Management in Tropics and Subtropics" at the Rheinische Friedrich-Wilhelms-University and "Sustainable Agriculture" at the Rhine-Waal University. Within these programmes, classes such as "climate change and water management", "sustainability and agri-food chains", "rural development and sustainable

behaviour", "land use and degradation", "responsible and sustainable food business in global contexts" and "livestock-based sustainable land use" are taught (Faculty of Life Science, n.d.; Georg-August-Universität Göttingen, 2011; Landwirtschaftliche Fakultät, n.d.).

In Germany several specializations in the agricultural sector are taught at vocational schools, including careers as "agricultural service specialist", "farmer", "animal farmer", "plant technologist", "dairy technologist" and many more. An apprenticeship lasts three years and consists of theoretical parts and practical components, similar to internships. While university classes are only available to graduates of a "Gymnasium", apprenticeships are more accessible with different types of educational backgrounds. Out of the mentioned 166 programmes, only one focusses on sustainability. At the "Landwirtschaftsschule Rendsbau" it is possible to select a programme focus on ecological methods, however only for one of the teaching years (BBZ am Nord-Ostsee-Kanal Europaschule). How much sustainability efforts are included in the apprenticeships then also highly depends on the selected practical experience that can completed at big companies, such as BASF and BAYER or on farms.

Overall, the number of study courses that focus on sustainability is limited (3 out of 40). For apprenticeships it is very difficult to obtain relevant information on the details of the programmes, as they are often not published or can be individualised by the students. It can be concluded that the limited number of offers and detailed information, restrict accessibility to education on sustainability in agricultural practices.

Question 4: How are the pillars of sustainable agriculture integrated in the C-VET offers? Does the provision of the training on sustainable agriculture incorporate entrepreneurship and soft skills?

As mentioned previously, there are programmes that teach sustainability in relation to agriculture. However, from the available materials it is not evident to what degree the pillars are explained within the courses, as they are not explicitly mentioned (Faculty of Life Science, n.d.; Georg-August-Universität Göttingen, 2011; Landwirtschaftliche Fakultät, n.d.). It cannot be ruled out though that information on them is taught, nonetheless.

Regarding the incorporation of entrepreneurship and soft skills, more information is accessible. The joined degree programme of the university in Göttingen and Kassel offers classes in "management and management accounting", "strategic management", "scientific writing in agricultural economics", "applied statistical modelling", "participatory research methods for sustainability" and "modelling climate impact on agroecosystems" (Georg-August-Universität Göttingen, 2011). The other two universities teach classes in "scientific communication", "sustainability and risk"; "data analysis and visualization", "principles of economics", "ethics in agriculture" and creditable language courses (Faculty of Life Sciences, 2022; Landwirtschaftliche Fakultät, 2022). The one apprenticeship with a focus on sustainability includes classes in English and "operations management training" (BBZ am Nord-Ostsee-Kanal Europaschule, 2022).

Overall, it can be said that entrepreneurship and soft skills form an important part of all programmes. Similar to the research on the general input on sustainable matters, it was again more difficult to obtain information on apprenticeships, compared to the university study programmes.

Question 5: What training methods and techniques are mostly used and are suitable for farmers' training? Is Work Based Learning (WBL) like apprenticeship programs integrated in the context of the offered trainings?

At universities, frontal teaching is still the standard. However, more and more elements of group work, self-study, individual research and presentations are being included. Further, it is most often possible and, in some universities even mandatory, to spend one semester with an internship. The later is for example the case at the Rhine-Waal University (Faculty of Life Science, n.d.). Another option is the so called "Dual-study". Within this concept, students spend only half their time in classes, with adapted study-programmes and the other half in a company or in this case on a farm. This concept is not particular to the agricultural sector, but also offered there.

Apprenticeships work very similar to the concept of "Dual-studies", as they always include practical parts that are done in cooperation with big companies or farms. This means that trainees can learn through hands-on-experience, in addition to the theoretical input in their various courses. This guarantees applicatory knowledge that can only be obtained via individual experience and scientific knowledge that can foster innovation and advancement.

Question 6: What are the recognition paths/qualification validation methods used by the offered trainings? Are they based on established EU VET tools and approaches: EQF, updated ECVET or/and ECTS, micro-credential approach?

All university programmes are based on the ECTS. Bachelor degrees include 180 credits for a six-semester course and 210 for a seven-semester course (usually a programme that contains a mandatory semester abroad or internship). Masters usually last four semester and therefore consist of 120 credits (Faculty of Life Science, n.d.; Georg-August-Universität Göttingen, 2011; Landwirtschaftliche Fakultät, n.d.).

5. 2 Greece

Sustainable Agriculture in Greece

Greece is moving towards a more competitive market-oriented agriculture, aiming at producing quality and branded products. Capitalizing on the comparative advantages of different areas and regions, agriculture contributes to the development of the Greek countryside. A greener and more sustainable agriculture is promoted, enhancing the complementarity between rural policy and the Renewable Energy Sources (RES). A new era of high nutritional value food products of the Greek land and sea is on track, emphasizing the importance of the Mediterranean-Greek diet (Hellenic Republic, Greece in China, 2022).

But in Greece, the agricultural sector is characterized by low productivity compared to the European average, which is attributed to a number of inherent ills, including (OT.gr, 2022):

- The level of agricultural education of farmers in the country, which is one of the lowest recorded in the EU, a phenomenon that is also associated with the old age of farmers
- The small size of the farms and the low level of cooperation

- The low level of adoption of technological innovation

Regarding the sustainable development and evolution of Organic Agriculture in Greece's peninsula, the National Rural Development Program (RDP) 2014-2020, with its extension for the period 2021- 2022, contributes significantly to the three dimensions of sustainable development and the achievement of a wide range of SDGs. It promotes the implementation of agriculture, environment, and climate commitments in relation to the reduction of pesticides and fertilizers and the related water and soil pollution (e.g., nitrates reduction commitments, alternative weed and insect protection for rice and trees cultivations), the protection of wild birds and the support for organic farming. Investments for water savings are also supported both through community public works and at farm level. Within the Recovery and Resiliency Fund (RRF) framework, the reform "Economic Transformation of the Agri-Food Sector" seeks, inter alia, to improve the environmental profile of agricultural holdings and to ensure food safety and adequacy, and the reform "Digital Transformation of the Agri-Food Sector" aims at promoting the sustainable management of natural resources (Presidency of the Hellenic Government, 2022).

Some key facts regarding the sustainable agriculture in Greece are (Mavridis, and Gkertsis, 2021):

- The organic cultivated area in Greece has been reduced significantly by ¼ (-25.9%) during the period 2012-2016. According to Eurostat (2020), the area utilized by organic farming corresponds to 10.3% of the total utilized agricultural area. The average plot area per bio farmer for the total OA in Greece is 15.66 ha, but this includes also the permanent organic pastures.
- There was a significant gap of a truly, all-inclusive, strategic approach for OA under a framework of economic crisis in Greece since 2010. For that issue, there was a focus towards economic policies that often create divergence, rather than contributing to achieving sustainable development.

The Greek Rural Development Programme (RDP) for the period 2014-2022 focuses mainly on enhancing farm viability and competitiveness, preserving, and enhancing ecosystems and promoting local development in rural areas. Greece's priorities for using the € 7.75 billion of public money that is available (€ 6.5 billion from the EU budget, out of which €365 million EURI, and € 1,25 billion of national co-funding) are: Farmers will receive support to put 26.31% of the Greek farmland under contracts to preserve biodiversity, 26/09% to improve water management and 25.30% to improve soil management and/or prevent soil erosion. Investment support for restructuring and modernization will be provided to 8 978 agricultural holdings and 36 900 young farmers will receive start up aid. In addition, 29 250 agricultural holdings will receive support to participate in quality schemes, local markets, develop short supply chains and producer groups/organizations and about 450 agri-food businesses will receive support for investments in processing and marketing of agricultural products. Support for knowledge and innovation activities makes up almost three percent of the planned public expenditure and the RDP will create around 28 600 training places for farmers and other rural businesses. The RDP will also support local development via LEADER Local Action Groups covering more than half of the country's rural population and improve access to basic services for approximately 10% of the rural population, including IT infrastructures (e.g. broadband internet) (European Commission, 2021).

Agricultural Education and Training in Greece

VET in Greece is strongly state-regulated and, until recently, mostly offered through a school-based approach; overall responsibility has the education ministry in cooperation, occasionally, with the labour ministry. It is offered, after the completion of compulsory schooling, mainly at upper secondary and post-secondary level. Greek society strongly favours general education and appreciates university studies. Both these factors reflect sociological stereotypes rooted in long-lasting perceptions and have affected overall VET attractiveness. VET has been characterised by higher dropout rates; multiplicity and complexity of the legal framework; challenges regarding the design and implementation of VET-related policies; and impediments to linking with the labour market. It remains a second choice and often attracts low performers, who may also come from lower economic backgrounds. The above-mentioned stand also for VET concerning the agricultural sector in general and in sustainable agriculture specifically (CEDEFOP, 2019).

According to the EIP-AGRI (2018) Greece has made only minimal investments in its agricultural knowledge system. The agriculture education system for farmers in Greece is fragmented, weak and deficient.

In Greece, only 5,5% of producers have received education and training, compared to an EU average of 55%, while 59.1% have finished compulsory education. 84.7% of young farmers receive only free training (Kaliakatsou, 2019). Furthermore, in Greece only 0.4 % and 0.6 % of farm managers respectively had full agricultural training, the overwhelming majority (96.7 % and 93.2 % respectively) having only practical experience (Eurostat, 2018). Finally, only 9.9% of the young farmers have high vocational education (Zondag et al., 2015b).

Within the framework of compulsory education, no substantial agricultural education is provided, except for some courses related to the environment. The Technical-Vocational Education that is provided through the Vocational High Schools (secondary education), lasts 3 years and the specialities regarding Agriculture, Food and Environment that are: Crop Science Technician, Animal Science Technician, Floriculture and Landscape Architecture Technician, Food and Beverage Technology Technician. There are also the Vocational School programs, provided by the Ministry of National Education and Religious Affairs, the Ministry of Agriculture, the Ministry of Health, and the Ministry of Employment (OAED), which last two years. The graduates have a Vocational degree, level 3. The Ministry of Employment, have included 24h/week training in companies and faculties in specializations oriented in industrial domains or services with only one exception for agricultural specialization.

Regarding Higher Education, there is the Higher Vocational education (Institute of Vocational training, IEK). It lasts 56 weeks, for both the graduates of Secondary General Education and the graduates of Secondary Technical-Vocational Education and includes 14 weeks of training in companies, public hospitalities, public departments, etc. The graduates have a Vocational degree, level 4. Furthermore, there are 20 universities that provide agricultural education at under-graduate and post-graduate level.

As far as further or continuous training concerns, this area is under the direct authority of the Ministry of National Education and Religious Affairs and the duration of each program is up to 250h. Training varies, according to the levels and sector of activity. This level includes programs as “Environment and Sustainable development”, “Culture, Tourism, Regional development”, etc.

There are also the Education and Lifelong Learning Centers (KE.DI.BI.M), that offer non-formal and informal learning opportunities at CVET, VET and adult training level, based on the national and European institutional framework concerning lifelong learning. Each university in Greece, operates this type of educational centers, but these centers could be also private. After learners complete their training programs, they take a recognized certification of attendance. From time to time, these centers provide training courses on agriculture entrepreneurship, digitalization, and sustainability. The programs regarding digitalization and sustainability are not focused on agriculture.

The main institutions that have undertaken VET provision in Greece and address farmers directly are:

- ELGO DIMITRA, with 6 Public Institutes of Vocational Training
- The American Farm School, providing Primary & Secondary Education, Vocational Education, Adult Education and Higher Education (Perrotis College)
- New Agriculture for New Generation, offering Continuous Education for farmers and Agriculture consultants and trainers
- Mediterranean Vocational Training Center MAICh

Within the context of meeting the educational needs of the agricultural sector, the role of the private initiative has emerged dominantly in recent years, in the entire spectrum of education (formal, non-formal and informal). Private organisations cover a large number of educational programs in all areas of farmers' activity. In a related investigation on the internet, it was found that the e-learning method claims a large part of the total activity of the sector, while at the same time networking and information services are offered to farmers. Among the purposes that are often presented is the cooperation of the people in the field, education, changing mentality and perceptions, the introduction of modern technology and the dissemination of information.

Sustainable Agriculture Education and Training in Greece

The agriculture educational programmes in Greece, offered by VET providers and Higher Institutions, are focused mainly on technical specialization, and include courses in the following fields: Plant Production, Animal Production, Food and Drink Technology, Botany and Landscaping, Agronomy & Sustainable Development, Principles in Economy, Health Education. Within these specializations, some lessons regarding sustainable agriculture are offered, but they are considered insufficient towards the direction of equipping farmers in sustainable agricultural practices. The Agricultural University of Athens has announced a lecturer's post in organic farming of arable land crops and recently, the Aristotle University of Thessaloniki, Faculty of Agriculture and Perrotis College (American Farm School) has initiated a Postgraduate Programme at MSc level, in Sustainable Rural Development. The Mediterranean Agronomic Institute at Chania (MAICh) performs research and training activities in the field of organic farming, including scientific networks, research projects, market surveys, short courses, and seminars. The International Hellenic University also offers a MSc in Sustainable Agriculture and Business (Bitsaki et al, 2018). Finally, the School of Professional Education of adults' education at the American Farm School of Thessaloniki, provides the course of "Contemporary Agricultural Practices" with experiential activities for adults through seminars (Mavridis, and Gkertsis, 2021). Yet, there is no University Department or Research Institute of VET programme that is devoted exclusively to organic agriculture. However, the Agricultural Universities and

some VET courses have included modules concerning various aspects of organic agriculture, especially related to plant protection methods and techniques, in their courses. Researchers deal with the specific problems of organic agriculture and often contribute to solving problems of organic farmers. Socio-economic research is also carried out, but of limited scope (Bitsaki et al, 2018).

The Inspection and Certification bodies of the country also perform training activities such as courses, seminars and the publication of reference books, booklets, and magazines regarding sustainable agriculture. Local authorities, as well as associations of growers very often contribute to these efforts. There are some introductory training courses for organic farming at vocational schools, agricultural schools, etc. but often the quality is low (Bitsaki et al, 2018).

It seems that only certain master's programmes are devoted to sustainable agriculture that do not address farmers. The same trend is observed regarding the provision of agricultural entrepreneurship, as well as digital and soft skills. There is lack of technological skills by bio farmers (and from farmers of other agricultural sectors too), as well as of the comprehension of the importance of digital methods/tools in the overall management activities of their plot. For example, only a small percentage (7.7%) of people related with the agricultural sector were using mobile phones to access to information or services about the agricultural sector back in 2003. However, a later study has shown that it is likely that the dominant motivation of farmers to use ICT is growing and it has professional characteristics and needs of their application (Mavridis, and Gkertsis, 2021). Regarding entrepreneurship, there is no dedicated course/programme that enhance the knowledge of farmers in this field. Only the American Farm School and Perrotis College, in 2012, established the Center for Agricultural Entrepreneurship (CAE), but it mainly serves agriculturists and not farmers. The lack of entrepreneurship training is confirmed by a study which indicates that farmers' need for entrepreneurship education is their greatest weaknesses at the start of their holdings (Pliakoura et al, 2020).

The Education and Lifelong Learning Centers (KE.DI.BI.M) from time to time, provide training courses on agriculture entrepreneurship, digitalization, and sustainability, but the programmes regarding the two last disciplines are not focused on agriculture/farmers.

The only course offered to farmers that leads to a certification and is compulsory is the "Rational Use of plant protection products and substances". The course's topics are mainly focused on technical aspects of the use of pesticides. Only some small part of the curriculum provides information on the established laws in Greece that concern the use of plant protection products and on the organic farming (Ministry of Rural Development and Food, 2022).

Finally, the approach of training system in Greece isn't global. There is specialization in concrete objects. The specializations in agricultural education are about instruments, floriculture, agrotourism, foods. But there is one general specialization named "Modern enterprising agriculture", which deals with culture of agricultural more generally than other specializations do (Secondary and Higher Vocational…, n.d).

Taking into consideration the aforementioned, it is important to mention that farmers are rarely taking part in university/college courses.

VET Methodologies and Qualification Validation Methods

Some of the key barriers that result in the high rate of abstinence from the educational processes in the rural population of Greece are:

- The training activities are organized in large cities

- The place where the training process is carried out must be friendly to the farmer
- The time chosen to be implemented which coincides with the time required to be in the field
- The training's topics
- Psychological obstacles – Bad training experiences
- The low educational level of the participants and the ability to cope with the demands of the program

In order to overcome the above-mentioned barriers, the research made showcases that the most effective learning methodology for farmers to be trained is Transformative Learning which is based on the idea that learners who are getting new information are also evaluating their past ideas and understanding and are shifting their very worldview as they obtain new information and through critical reflection. In addition, farmers prefer learning to take place in the field, and not in a classroom. Furthermore, nine in ten young farmers learn through experiential learning, eight in ten learn by the local agriculturists, while four in ten young farmers prefer learning by distance/online learning and want well-educated trainers (Kaliakatsou, 2019).

All VET providers that are authorized by the Greek Government are using EU qualification validation tools, such as ECVET, ESTS and EQF. According to CEDEFOP (2022) the following programme types are available regarding VET:

- School-based VET programs leading to EQF level 4. WPL>25%. ISCED 354 upper secondary vocational education (Epaggelmatiko Lykeio – EPAL, 3 years)
- Apprenticeship programs leading to EQF level 4. WPL>80%. ISCED 353 Epagelmatiki Sxoli (EPAS, 2 years)
- Post-secondary VET programs leading to EQF level 5. WPL>60%. ISCED 453 Institouto Epagelmatikis Katartisis (IEK)
- Apprenticeship programs leading to EQF level 5. WPL 100%. ISCED 453 Apprenticeship programs offered by upper secondary vocational schools (EPAL, 1 year)
- Higher professional programs leading to EQF level 5. ISCED 655 Higher Professional Programmes
- Post-secondary vocational programs provided by universities leading to EQF level 5. WPL>50%. (KEE programs 2.5 years – VET centers; currently not available)

For the time being, it seems that there is no VET course in agricultural sustainability and in general in agriculture, agriculture entrepreneurship, digital and soft skills that the newly acquired qualifications are validated by deploying micro-credentials (DISCO VET, 2022)

5. 3 Belgium

Sustainable Agriculture in Belgium

Statistically, organic agriculture is still developing in Belgium, with 2.494 farms falling under this category in 2020. This figure represents one out of fifteen farms in the Kingdom. In terms of area, organic agriculture accounts for 7.2% of the Belgian utilised agricultural area (UAA). The

regional breakdown of organic agriculture is of particular interest, since this type of agriculture accounts for a much higher amount in Belgium's South, namely for 12,2% of the UAA of the Region of Wallonia (Statbel, 2021, p. 46). As attested by Figure 1, organic agriculture has seen a boom in Wallonia between 2000 and 2020.

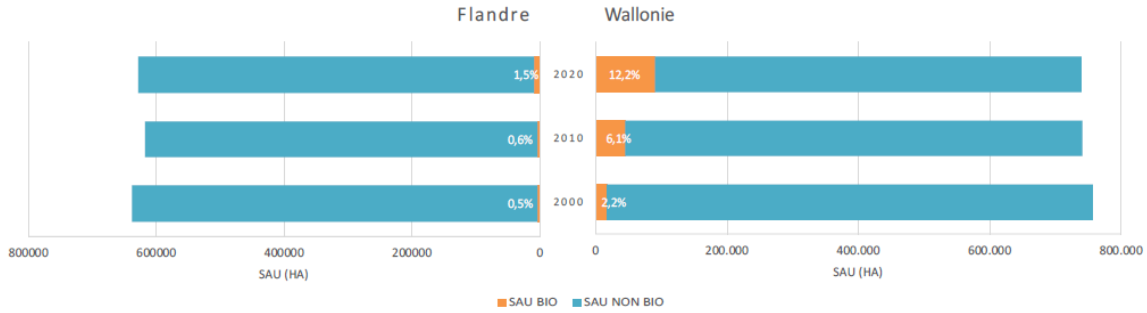

Figure 20 : UAA Evolution in Flanders and Wallonia. Numbers in hectares. Blue:Non-organic UAA, Orange:Organic UAA. Source: Statbel, 2021, p. 47)

Flanders is still lagging in respect to organic agriculture, with only 1.6% of UAA being dedicated to organic agriculture in 2021. Yet one can observe some clusters forming on a municipal level around specific areas and cities. For example, in the border area of Hageland and Haspengouw, there are several towns with more than three percent. The surrounding area of Antwerp also features higher-than-average share of organic agriculture than the rest of Flanders (De biologische Landbouw in 2021, 2022, pp. 11-12).

In regard to organic livestock farming, the poultry sector is the one with the most impressive development, followed by the organic dairy sector, which saw a tenfold increase of its cattle in the last decade. The pig sector is also marking a significant development, especially in the Region of Flanders. Between 2019 and 2020 the pig sector grew by 58.6% (Statbel, ibid.).

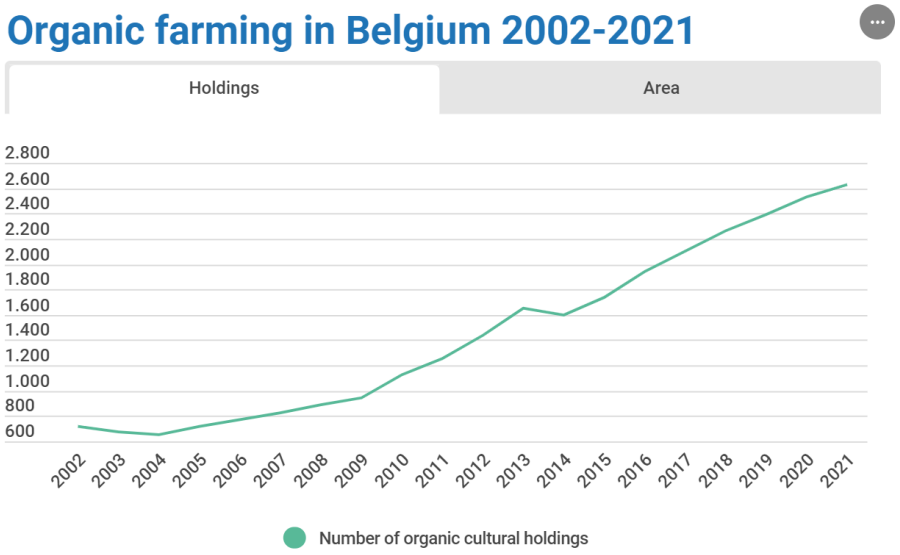

Figure 21: Organic Farming in Belgium 2002-2021 (Source: Statbel, 2022)

Belgium has incorporated the notion of sustainability into its national legislation since as early as 1997. With the "Law on the coordination of federal policy on sustainable development" (Moniteur Belge, 1997). The law's objective is to coordinate the state's activities regarding sustainable development and to transform Belgium's internal discourse and international commitments into tangible actions and policies. The law underwent a major revision in 2010 in order to better reflect EU policies and create a long-term federal strategic vision on sustainability. In 2012 the law was amended once again to include – among others – the legal basis for state subsidies for sustainable development. (Health Belgium, 2017).

Under that framework the Regions of Flanders and Wallonia have developed their own subsidies strategy for sustainable and organic farming. In Flanders, farmers active in organic farming can receive the following types of state aid:

- Advising
- Hectare-based aid: farmers can apply for state aid for the production of organic products based on the size of their farms.
- Subsidies for control costs: farmers can obtain state support for the costs incurring from the certification processes.
- Support from the Flemish Agricultural Investment Fund (VLIF): VLIF supports young farmers and new investments in organic farming.

The Region of Wallonia has outlined its state aid initiative in its own CAP Strategic Plan Project 2023—2027 (Rapport des incidences sur l' environment, 2022). The Strategic Plan includes specific state aid funding lines for:

- Farmers active in organic farming, conservation agriculture, precision farming, and simplified cultivation techniques ("green architecture")
- Investments aiming at increasing economic resilience and improving income and competitiveness

Those measures are based on a flat-rate amount for material investments and a unit amount for immovable investments. The Wallon strategy in regard to sustainable agriculture targets eight out of nine specific objectives of the EU Common Agricultural Policy (CAP). Those are 1) to ensure fair income, 2) to increase competitiveness, 3) improve the position of farmers in the value chain, 4) to mitigate climate change, 5) promote sustainable development, 6) to protect biodiversity, 7) to support generational renewal, and 8) to protect food and health quality (ibid., pp. 193-194).

Belgium aspires to be a model of sustainable development by 2030, exactly on the 200th anniversary of the country's independence. To this end, the country's federal government has developed a Federal Sustainable Development Plan, approved in October 2021. The Federal Plan is going hand in hand with the Agenda 2030 and the Sustainable Development Goals (SDGs), which serve as the plan's compass.

The Federal Plan aims to make the SDGs an integral part of every political action on the Belgian federal level. This is to be achieved through anchoring the SDGs to all pieces of legislation, as mandated by the federal government (Plan fédéral de développement durable, 2021, p. 20).

The plan then outlines the measures to be followed for incorporating SDGs to the country's political life.

Guided by the European Green Deal, the Federal Plan also describes Belgium's aspirations in enhancing its circular economy. After an introduction to the significance of circular economies on an EU level, pages 69-70 of the plan describe the legal steps taken by the Belgian government to enshrine the aims and objectives of the European Green Deal in the Belgian legal order. A draft plan had already been created by 2021, and it had the following objectives (the list is non-exhaustive):

- Contribute to the European programme regarding circular economy, taxonomy, and international trade
- Implement the "Belgium Builds Back Better" initiative to facilitate Belgium's transition to a circular economy
- Improve the ecological design of all products
- Promote repairability
- Promote the usage of recycled materials
- Build awareness for more sustainable consumption behaviours
- Strengthen demand for circular products through public procurement

In order to ensure a sustainable food production and consumption system, the Federal Plan takes heed of the EU Farm to Fork strategy and develops a three-pronged strategy to ensure a sustainable transition also regarding food. The first part of this strategy refers the national pollinator strategy envisaging the reduction of the use of pesticides. Secondly, a public dialogue is being organised to facilitate and accompany society's transformation. Finally, it provides for measures to be taken to guarantee the sustainability of food import chains (ibid., p. 79).

Wallonia has furthermore established an agricultural-environmental programme that can be classified as a best practice in promoting sustainability and environmental protection. The programme functions as a non-profit organisation named Natagriwal, supported by the Region of Wallonia and the EU in the framework of CAP. Its goal is to promote agricultural methods preserving biodiversity, soil, and water, as well as protecting fauna and flora and preserving the landscape of agricultural areas. It is based on the voluntary participation of farmers and provides them with financial assistance and subsidies for the implementation of the methods foreseen in the programme. Examples of Natagriwal's methods, defined as "agro-environmental and climate methods", include the installation of grassed headlands, environmentally friendly crops, and strips favourable to birds and small fauna. Another issue of interest for the organisation pertains to the maintenance of ponds and of meadows of high biological value. Natagriwal is also promoting practices contributing to the mitigation of climate change, thus contributing to the global struggle against global warming. Most of the programme's methods are available to all farmers in Belgium. There exist, however, some methods for which the approval of a Natagriwal advisor is needed.

Vocation Education and Training in Agriculture and Sustainable Agriculture in Belgium

VET activities on sustainable agriculture in Flanders is described in detail in the Organic Farming in 2021" (De biologische Landbouw in 2021) publication of the Flemish government (pp. 16-17). Landwijzer vzw is mentioned as a specialised VET centre offering trainings on organic and biodynamic farming in Flanders. Ninety-five persons were enrolled in 2021 for the 2021-2022 period, including forty first-year trainees. Landwijzer is also active in training professionals in agriculture, focusing on organic farming and agroecology. The VET centre is targeting farmers who are either contemplating becoming active in sustainable agriculture or are already active and wish to expand their knowledge and skills. Other certified Flemish VET centres include the "National Agricultural Centre" (*Nationaal Agrarisch* Centrum-NAC), "AgroCampus" (the training centre of the Flemish Farmers' Association), "Ferm for women farmers", and "Groene Kring".

The Flemish Organic Farming Strategic Plan 2018-2022 (Strategisch plan biologische landbouw 2018-2022) explicitly foresees the teaching of organic farming in agricultural education (p. 23). Yet this provision refers mainly to secondary education and to vocational education and training as an afterschool activity for students.

Vocational education and training on the issues of agriculture in Wallonia is regulated by the "ministerial decree relating to vocational training in agriculture" of January 2016 (Arrêté ministériel relatif à la formation professionnelle en matière d'agriculture). The decree – and the amendments that have followed – set up agricultural VET activities in Wallonia and define their scope and subjects they should cover. Among others, Wallonian agricultural VET activities should cover the topics of the Common Agricultural Policy, sector-specific aid, and the diversification of the agricultural economic base. No specific mention is made to sustainability. The courses can focus either on agricultural techniques (minimum duration 75 hours), agricultural management and economics (minimum duration 90 hours), as well as other topics in the form of advanced courses (minimum 8 hours). Following careful evaluation, the VET courses are subsidised by the state.

VET Methodologies and Qualification Validation Methods in Belgium

Due to Belgium's federal structure, qualifications are organised on the level of communities which are divided along language lines. Thus, the Flemish-speaking, French-speaking, and German-speaking communities have developed their own qualifications structures.

According to CEDEFOP (2020), Vocational Education and Training across communities in Belgium is recognised as level 5 of the European Qualifications Framework (EQF). Differences exist in regard to apprenticeships. The Flemish-speaking community recognises them as level 5 of the EQF, and the German-speaking community designating "craftsperson trainings" also as level 5 of the EQF. Yet the French-speaking community considers them as equal to either level 3 or level 4 of the EQF.

Credentials in VET are not yet applicable in Belgium, with neither ECVET nor ECTS being currently offered for VET programmes (CEDEFOP, 2022).

5.4 Slovenia

Introduction

Sustainable development is about achieving a balance between environmental, economic and social sustainability. Sustainable agriculture, according to the general definition of sustainability, is understood as economically viable, socially supported, competitive and environmentally friendly or benign in terms of the use of natural resources. Although interest in sustainable agriculture has emerged worldwide, the motivation to pursue sustainable agriculture development varies according to each country or region's political, ecological and socio-economic climate. Different agricultural techniques and practices are used to achieve the goals of sustainable agriculture, and the principles are derived from agroecology (Borec A, et al. 2021, p.11-13).

Sustainable Agriculture in Slovenia

Slovenia cultivates just over eight acres of arable land per capita, less than half the EU average of 20 acres per capita (2019 figures). This has not changed significantly between 2000 and 2019, which shows that Slovenia is maintaining its cultivation potential (Berdač M., et al. 2021)

According to provisional data from the 2020 census of agricultural holdings, there were 67,927 agricultural holdings in Slovenia. Two-thirds were involved in livestock farming, with more than half focused on cattle farming (63%). The number of livestock farms decreased by almost half (-42%) between 2000 and 2020. The average Slovenian livestock farm in 2020 had 9.2 LU, which is 50% more compared to the beginning of the period under consideration.

Organic agricultural land in use (certified) increased by 1,332 hectares (or three percent) in 2020 (45,787 hectares) compared to 2019 (44,455 hectares). Organic farming accounts for 5.4% of all agricultural holdings. Of this, the area of organic permanent grassland and pastures increased by 913 ha (or three percent) and the area of arable land by 227 ha (or four percent). The area under vegetable, melon and strawberry production in 2020 was 34 ha (or 14%) higher than in 2019. The area under organic orchards and olive groves were also higher than in 2019, the first by 207 hectares (or 12%) and the second by 0.7 hectares (or 0.3%); the area under vineyards was 15 hectares (or three percent) lower than in 2019. The majority of the total area of organic agricultural land in use was still under permanent grassland and pastures (81.5%) (SURS, 2021).

The awareness of agricultural policy and the favourable market conditions that support the expansion of organic farming is growing year by year. The area of land devoted to organic farming has increased from 2,400 ha to 52,078 ha between 1999 and 2020, or from 0.5% to 10.8% of all agricultural land in use. The structure of agricultural land under organic farming is strongly dominated by permanent grassland (80% in 2020), indicating that it is mainly livestock holdings that are choosing to convert to this type of production (SURS, 2021).

Slovenian agricultural policy

The managing authority in Slovenia is the Ministry of Agriculture, Forestry and Food. It is responsible for preparing and amending the programme, drafting national legislation, tenders and public procurement. The Agency for Agricultural Markets and Rural Development is

accredited to carry out the procedures for the allocation of financial resources and ensure the legal and timely disbursement of approved funds to the final beneficiaries.

The Sustainable Development Sector within the Ministry of Agriculture is responsible for monitoring the situation and preparing systemic solutions in the field of direct payment measures and less-favoured areas for agricultural activity. They are also responsible for maintaining and managing the register of less-favoured areas.

The Rural Development Programme of the Republic of Slovenia for the period 2014-2020 (hereafter: RDP 2014-2020) is a joint programming document of each Member State and the European Commission, which constitutes the programming basis for drawing financial resources from the European Agricultural Fund for Rural Development (EAFRD). The programme reflects the national priorities identified by the Member State based on an analysis of the state of agriculture, food and forestry. The programme places the greatest emphasis on preserving the environment and adapting to climate change. It also places a very important emphasis on strengthening the competitiveness of agriculture, food processing and forestry. Other relevant topics for Slovenia are young farm entrepreneurs, knowledge transfer and innovation, and networking (PRP 2014-2022, n.d.).

Slovenian 2014-2020 RDP is focused on three main areas in the need of improvement:

- Biodiversity, water and soil conditions,
- The competitiveness of the agricultural sector and social inclusion; and
- Local development in rural areas. (PRP 2014-2022, n.d.).

AGENDA 2030

According to the Ministry of Agriculture, Slovenia is making progress on almost all of the 17 goals set out in the 2030 Agenda, highlighting progress on Goal Nr. 1 - Eradicating poverty in all its forms. In three years, the risk of poverty and social exclusion rate has fallen from 19.2% to 16.2%. The share of agricultural land in use with organic production has increased over the three years. The recycling rate of municipal waste has also increased, and progress is being made in other areas (RS, n.d.).

BIODIVERSITY STRATEGY

The EU Biodiversity Strategy, adopted in the wake of the COVID-19 pandemic, is a central element of the EU's Recovery Plan, which is key to building resilience to future outbreaks and providing opportunities for the EU's economic recovery. It addresses key factors of biodiversity loss, such as unsustainable land and sea use, overexploitation of natural resources, pollution and invasive non-native species. It aims to consider biodiversity as an integral part of the entire EU economic growth strategy.

The Strategy proposes binding targets to restore damaged ecosystems and rivers, improve the condition of protected habitats, species and pollinators on agricultural land, reduce pollution, green our cities, promote organic farming and other more nature-friendly agricultural practices, and improve the condition of Europe's forests. The Strategy proposes concrete actions to include at least 30% of Europe's land and seas in protected areas with effective management and to transform at least ten percent of agricultural land into landscapes with high *biodiversity value (RS, n.d.).*

FARM TO FORK STRATEGY

„According to the 'Farm to Fork' strategy, 25% of agricultural land must be used for organic production by 2030 (currently 7.5% in the EU and 10% in Slovenia). This is a difficult goal to achieve, and it also raises the question of whether there is enough purchasing power in the EU. It should also be borne in mind that this could have an impact on food prices, as studies have shown that if the adaptation to environmental targets were to take place entirely in Europe, it would lead to a 10-20% increase in food prices, either in the developed world (30-40%) or globally (68%). In this case, food security would be put into serious question," he warned (Demokracija, 2021)

It is also worth mentioning that, in addition to reducing environmental pollution, the Farm to Fork Strategy will also have a positive impact on the health of consumers, who will have access to better quality and healthier food, which will at the same time reduce the costs associated with poor health.

GREEN DEAL

The European Commission has adopted a set of proposals for the EU's climate, energy, transport and taxation policies to reduce net greenhouse gas emissions by at least 55% by 2030 compared to 1990 levels.

The European Green Deal is based on:

- ensuring sustainable food production,
- ensuring food security,
- promoting sustainable food consumption, wholesale, retail, catering and food service practices,
- promoting sustainable food consumption and facilitating the transition to healthy and sustainable diets,
- reducing food loss and waste,
- preventing food fraud along the food supply chain (EC, 2019).

Organizations

In addition to governmental organisations, there are several NGOs that provide education, run projects and participate in the development of sustainable agriculture policies in various ways.

UMANOTERA

Our most visible organisation is Umanotera. Umanotera is the Slovenian Foundation for Sustainable Development - a foundation, a professional organisation that, by following new trends, aims to promote sustainable development in national policies and to strike a balance between people and the environment. They are initiators of necessary changes and beacons of sustainable practices and promote the integration of sustainable development principles into our lifestyles (Umanotera, n.d.)

Among the examples of good practices in Slovenia are good practices of community-based livelihoods management that have grown from communities or with significant participation or involvement of communities. They are in the fields of sustainable spatial planning, sustainable mobility, food self-sufficiency and organic agriculture, local circular economy and sustainable consumption, energy efficiency and energy supply from local renewable sources, participatory

governance or other community-based management of living resources. The organisations have been implementing the ''Enough for all'' programme since 2016. During this time, several publications on sustainable community resource management and videos of good practices (more on the projects, ideas, and resources subpage) have been made and annual national conferences with international participation have been organised (Dovolj za vse, n.d.).

To name a few ongoing projects: CARE4ClLIMATE, PODNEBNO MENI (EN climate me), PLAN B ZA SLOVENIJO (EN plan B for Slovenia), NAŠA SUPER HRANA (EN our super food),…

Educational programmes and instititions

Slovenia offers a number of programmes that provide insights into sustainable farming and some secondary school programmes orient and educate students towards sustainable development.

Secondary school programmes that support sustainable agriculture:

- *COUNTRY FARMER* (duration: 3 years)
- *AGRICULTURAL-ENTREPRENEURIAL TECHNICIAN* (duration: 4 years)

The programmes encourage students to learn about the impact of agricultural activities on the natural environment and to be able to work in a sustainable way, to participate in agricultural production planning and animal husbandry, and to produce crops and vegetables, fruit and grapes, fodder and animal husbandry, while managing energy resources with care and ensuring quality in agricultural production.

Institutions implementing these programmes: Biotechnical School Maribor, Biotechnical School Rakičan, Biotechnical Centre Naklo, Grm Novo Mesto, School Centre Nova Gorica, School Centre Ptuj, School Centre Šentjur, etc.

After secondary school, students can enrol in a higher education programme:

- *RURAL AND LANDSCAPE MANAGEMENT* (duration: 2 years)
- *ORGANIC FARMING*

Examples of educational institutions offering this programme are the Biotechnical Centre Naklo and the Faculty of Agriculture and Life Sciences in Maribor.

The following programmes are available at the Faculty of Agriculture and Life Sciences:

- *AGRICULTURE with moduls of sustainable agriculture* (duration: 3 years)
- *AGRICULTURE* (duration: 4 years)

The Bachelor's and Master's degrees in AGRICULTURE - AGRONOMY are provided by the Faculty of Biotechnology at the University of Ljubljana.

The main objective of the study programme is to train professionals who understand the interdisciplinary nature of the discipline, master the basic research methods of natural sciences, technology, economics and social sciences, and are able to apply them in the management and implementation of sustainable agricultural development. All programmes are evaluated by ECTS credits.

Some educational establishments also offer adult education programmes, for the acquisition of a publicly valid qualification, or offer retraining.

Slovenian agriculture faces an unfavourable tenure and size structure, which to a large extent prevents increasing the intensity and competitiveness of agricultural production. Certain agricultural policy measures and the application of new technological solutions (land

operations, optimisation of feed rations, reduced use of plant protection products, improvement of soil properties, etc.) can help to increase intensity while reducing negative pressures on the environment (Berdač M., 2021)

5.5 Poland

Introduction

Sustainable development has since long been at the heart of the European project and the EU Treaties give recognition to its economic, social and environmental dimensions that should be tackled together. Development must meet the needs of the present without compromising the ability of future generations to meet their own needs. A life of dignity for all within the planet's limits and reconciling economic efficiency, social inclusion and environmental responsibility is at the essence of sustainable development. (European Commission, n.d.[1]).

Agenda 2030

In September 2015, at the United Nations General Assembly, countries around the world signed up to the 2030 Agenda for Sustainable Development and its 17 Sustainable Development Goals (SDGs). World leaders committed to end poverty, protect the planet and ensure that all people enjoy peace and prosperity. (European Commission, n.d.[2]).

Biodiversity strategy

The EU's biodiversity strategy for 2030 is a comprehensive, ambitious and long-term plan to protect nature and reverse the degradation of ecosystems. The strategy aims to put Europe's biodiversity on a path to recovery by 2030, and contains specific actions and commitments. It is the proposal for the EU's contribution to the upcoming international negotiations on the global post-2020 biodiversity framework. (European Commission, n.d.[3]).

Farm to Fork strategy

The Farm to Fork Strategy is at the heart of the European Green Deal aiming to make food systems fair, healthy and environmentally-friendly. Food systems cannot be resilient to crises such as the COVID-19 pandemic if they are not sustainable. We need to redesign our food systems which today account for nearly one-third of global GHG emissions, consume large amounts of natural resources, result in biodiversity loss and negative health impacts (due to both under- and over-nutrition) and do not allow fair economic returns and livelihoods for all actors, in particular for primary producers. (European Commission, n.d.[4]).

The European Green Deal

Climate change and environmental degradation are an existential threat to Europe and the world. To overcome these challenges, the European Green Deal will transform the EU into a modern, resource-efficient and competitive economy, ensuring no net emissions of greenhouse gases by 2050, economic growth decoupled from resource use, and no person and no place left behind. (European Commission, n.d.[5]).

Sustainable agriculture in Poland

Sustainable agriculture incorporates several alternatives of nonconventional agriculture that are often called organic, regenerative, alternative, ecological or low input. Just because a farm is organic or alternative, it must not mean that it is sustainable, however. For a farm to be

sustainable, it must produce adequate amounts of high-quality food, protect its resources and be both environmentally safe and profitable. Instead of depending on purchased materials such as fertilizers, a sustainable farm relies as much as possible on beneficial natural processes and renewable resources drawn from the farm itself. (Reganold, 1990).

According to the Polish Sustainable Agriculture Association (ASAP), sustainable agriculture is the effective production of safe, high-quality food in a way that protects and improves the environment and the social and economic well-being of the farmer, the farm workers and local communities. (CDR, 2017).

Poland already joined the this discourse thirty years ago, declaring that it was taking a course towards sustainable national development. It expressed this by signing the documents of the Earth Summit in Rio de Janeiro in 1992 and the provision in the Constitution: The Republic of Poland shall ensure the protection of the environment, guided by the principle of sustainable development (Zegar, 2013).

The data collected so far indicate progress in agricultural sustainability, although not sufficient to assess comprehensively the level of such sustainability. And this is for two main reasons. Firstly, these changes are not unidirectional and unambiguous - in one area of sustainability their connotation is positive but negative in another. Secondly, there is still no universally accepted pattern of sustainability. (ibid.).

When considering the results of the agricultural activity of previous years in terms of material effects, it can be stated that they generally presented positive trends from the point of view of agricultural production efficiency and sustainability. The production of basic cereals per hectare of arable land was almost 50% higher in 2010 than in 2000. This was the result of both changes in the sowing structure and an increase in yields as a result of more effective agrotechnical methods. Currently, Polish agriculture still performs much worse in this respect than most EU countries. (ibid.).

Agricultural education and training in Poland

In Poland, farmers can farm sustainably by joining Package 1 of the agri-environment-climate programme ,'Sustainable agriculture' under the Rural Development Programme 2014-2020. (GOV, 2019). The aim of this package is to promote sustainable farming, with a particular focus on preventing the loss of soil organic matter, which is a reflection of soil fertility. When a farmer joins this programme, he or she undertakes to meet a number of requirements over a five-year period, for which he or she receives financial compensation. (CDR, 2017). These requirements go well beyond the cross-compliance requirements that a farmer must meet to receive a direct payment for his land. The ,,Sustainable Agriculture'' package is implemented on all agricultural parcels of the farm. The requirements under this package are to develop and adhere to a five-year crop rotation, limiting fertilisation to the level of the developed fertiliser plan. The crop rotation must include at least four crops in each year of the programme and three groups of crops over the five-year commitment period on each farm parcel. The share of the main crop as well as cereals in total may not exceed 65%, while the share of each crop may not be less than 10% of the arable land. The crop groups used in the rotation are crops with similar requirements in terms of soil conditions and pre-crop and agronomic requirements. The next requirement is to apply at least twice on each agricultural parcel in the duration of the commitment (5 years) one of the practices increasing the content of soil organic matter, i.e.: obligatory intercropping and the second practice - intercropping or ploughing in manure or ploughing in straw. The additional practices applied are intended to improve the level of organic matter in the soil.

VET education in Poland

The VET system in Poland comprises three levels: national, regional and local. Vocational education and training at the secondary (post-primary) and post-secondary level is mainly realised in schools. Education at the secondary level includes both vocational and general education. (Eurydice, n.d.).

Types of vocational schools in Poland:

1. Three-year vocational schools of the first degree, which allow to obtain professional qualifications after passing a professional exam confirming qualifications in each profession. Graduates can continue education in the second year of high school for adults or vocational school of the second degree and join vocational qualification courses.
2. Two-year vocational schools of second-degree providing education in a profession with a specific qualification common for a profession taught in vocational schools of first and second degree. Graduates will be able to take the Maturity Exam (A-levels), and after obtaining a maturity certificate, continue education at university.
3. Five-year technical schools, which allow students to obtain professional qualifications after passing a vocational exam, but also - after passing the Maturity Exam (A-levels) - to obtain a Maturity Certificate giving access to university.
4. Three-year special preparatory schools for pupils with special educational needs, leading to a certificate confirming that they have been prepared for work.
5. Adoptive units for pupils with special educational needs studying in primary schools.

CVET (Continuous Vocational Education and Training) are conducted in lifelong learning centres, vocational training centres and secondary vocational schools. These establishments offer:

1. Vocational qualification courses based on the core curriculum for qualifications in a given profession; they enable students to take vocational exams and obtain vocational qualifications.
2. Vocational skills courses based on the core curriculum for vocational education, including learning outcomes for qualifications, learning outcomes common to all occupations or learning outcomes for additional vocational skills.
3. A minimum of 30 hours of general competency courses based on the general education curriculum.

It is also possible to obtain so-called market qualifications, which can be awarded by all entities conducting economic activity who meet the conditions set out in the law. As of 2016, market qualifications market qualifications can be included in the *Polish Qualification Framework*. Market qualifications usually refer to knowledge, skills and social competences necessary to perform professional tasks. This knowledge and skills can be obtained e.g. in formal education, at work and in courses and trainings offered by training institutions.

5 Summary

5. 1 Introduction

The discourse about the finite nature of natural resources and anthropogenic (man-made) climate change was sparked more than 50 years ago. At the World Environment Conference in 1982, the term sustainable development emerged as part of this debate. (Michelsen & Adomßent, 2014). Although the impact of humans on their environment and the accompanying negative social and environmental consequences have been widely documented in the literature, it is only in recent years that the term sustainable development has received increasing attention. Despite major international and national efforts to drive a societal transformation, towards a more sustainable world, serious problems remain: global water scarcity, ongoing pollution of the world's oceans, chemical contamination of the environment, atmospheric aerosol pollution and ozone depletion, and loss of biodiversity are just a few of the world's crisis points (Stöcker, 2022).

The agricultural sector is recognized as one of the most important sectors in transforming the EU economy and society toward a long-term sustainable future. Farmers play a key role in achieving a societal transformation, as they are strategically positioned to be part of the solution. The EU recognizes the strength and importance of agriculture and farmers in the path to a sustainable future, five pillars regarding sustainable agriculture have been decided: The Agenda 2030 (2015-2030), European Green Deal (2019-2024), Farm to Fork Strategy (2020), Biodiversity Strategy (2020) and the New CAP (2023-2027).

5.2 Conclusion & Recommendations

A sustainable food system will be essential to achieve the climate and environmental objectives of the five pillars of sustainable agriculture. Farmers play a key role in achieving a societal transformation towards sustainable development: They need to act as agents of sustainable change.

The conducted research shows that European farmers are still at the beginning of this change.

The qualitative research in Germany and Slovenia shows that there is generally a high number of education possibilities (for Germany at university level and for Slovenia already starting from the secondary level) regarding sustainable agriculture. Nevertheless, all countries (Germany, Greece, Poland, Slovenia, and Belgium) show a sufficient lack of knowledge regarding the five pillars of sustainable agriculture. This can be explained by the fact that most of the farmers questioned in this study have been working on a farm for over ten years. There is a trend in education possibilities, already starting from an early age, which do not reach the adult education level. This leaves farmers working already for ten years on a farm with little knowledge about the upcoming trends and policy changes. Much has been published and implemented in the last years and it needs to be seen, how effective these strategies prove to reach the set targets. Right now, the education possibilities in the agricultural sector are weak, deficient, and fragmented: They do not offer enough education and training possibilities to reach, especially rural, farms and farmers. They need to be adapted and expanded in order to reach farmers, especially small and medium farm holders, but also VET providers, teachers, and trainers as well as Advisors, Researchers and Farmer Organisations, HEIs, adult education institutions, local authorities, policy makers, and NGOs.

The conducted research shows clearly that European farmers lack overall knowledge not only regarding the pillars of sustainable agriculture, but also in the skills they need to face the upcoming challenges and adapt successfully changes. The data furthermore suggests that the majority of farmers are highly interested in a free training course, preferably in a blended format.

In conclusion, it is recommended to develop **a blended training course** for farmers, that will:

1. Equip them with knowledge about the five pillars of sustainable agriculture: The Agenda 2030, European Green Deal, Biodiversity Strategy, Farm to Fork Strategy and the New CAP
2. Promote and explain in depth the future benefits of adopting and practicing sustainable agriculture (stay relevant to the market and Increase awareness regarding the environmental impact of agriculture in order to help them understand the need of change and their role of agents of sustainable change)
3. Equip them with knowledge about the EU funding opportunities in each country
4. Upskill and reskill farmers in order to become agents of sustainable change and to stay relevant to the market

The research showed that following entrepreneurial and soft skills need to be addressed (shown from lowest known to highest):
(see figure 18 and 19).

Entrepreneurial skills	Soft Skills
• Risk Management (34%), • Marketing tactics for effective product promotion (32%), • Market Research - understanding market trends and consumer needs (31%), • Adopting new technologies in business operations/projects (29%), • Project (Resource) management (27%), • Develop a sustainable business model (25%), • Set long-, medium-, and short-term sustainable business goals (25%), • Financial Management (24%) • Digitalization literacy (24%).	• Time Management (23%), • Communication (21%), • Networking (18%), • Creativity (17%), • Emotional intelligence (16%), • Pitching of new ideas (15%), • Agility (14%), • Critical thinking (14%), • Teamwork (13%) • Self-management (12%)

The suggested Training Course should consist of four Modules:

M1: The pillars of sustainable agriculture

M2: Entrepreneurial Skills for Sustainable Farmers

M3: Getting EU Funding for the Green Transformation of the Agricultural Sector

M4: Essential Soft Skills for the Sustainable Farmer

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