SustAgri4.0

Understanding gaps, challenges and interests of the agri-food sector within sustainability, digitalisation and entrepreneurship

J.D. Badia, N. Levikov, M. Öztürk, A. Chafer, A. Halili

DISCLAIMER

COPYRIGHT NOTICE

CONTRIBUTIONS

Irish Cooperative Organisation Society (ICOS)

Urban Co-Op

Istituto Istruzione Superiore "N. Pellegrini" Di Sassari

Cooperativa Agricola Coraggio

IES Vicent Gandía

IES Josep Segrelles

Agricultural Cooperative KOSMOS

REPOSITORY

Zenodo: Understanding Gaps, Challenges And Interests Of The Agri-Food Sector Within Sustainability, Digitalisation And Entrepreneurship. Zenodo. 10.5281/ zenodo.7491479

CITATION

JD Badia, M Öztürk, N Levikov, A Chafer, A. Halili SUSTAGRI4.0 Erasmus+ Project."
doi: 10.5281/ zenodo.7491479

EXECUTIVE SUMMARY

SUSTAGRI4.0 will bring digital and marketing skills to small-scale farmers and agribusiness owners towards a sustainable and community-driven future. Its core aim is to promote and support sustainable agriculture and agribusinesses in their transition to Agriculture 4.0.[1]

This report centres around existing best practices within partner countries and reviews needs and barriers identified from qualitative research to serve as the foundation for creating an appropriate E-Course on **sustainability**, **entrepreneurship** and **digitalisation** in the agri-food sector.

National-level analyses were based on a literature review of similar, successful projects (i.e. their publications) and open source data, including from national and regional/municipal organisations, EU regulations, formal education curricula, scientific publications and NGO reports.

Focus groups, conducted in each partner country, targeted local producers and sustainable agribusiness owners, as well as Vocational Education and Training (VET) professionals to further explore needs and interests within the digital/tech and marketing sectors.

The key results were:

- **Sustainability is a complex concept that goes beyond just environmental impact** and should include social sustainability, circular economy, bioeconomy, biodiversity, renewable energies and waste management, among other key strategies, that move towards fair, healthy and sustainable food systems.

- **Digitalisation skills are essential for agri-food production as a thriving enterprise**, including knowledge of digital apps and Internet of Things (IoT), and simple introductions to technology are necessary to increase the efficiency of agri-food production. Initiatives to make technology accessible and easily comprehensible are also vital to break the barrier for farmers in adopting new tech and overcoming their fears and mistrust.

- **Digital marketing skills are poor for both older and younger farmers, thus training should include the how in optimising social networks to boost commerce.**

---

[1] Agriculture 4.0 is the current transition towards adoption of advanced technologies to allow for more profitable, efficient and sustainable agriculture. (De Clercq, M., Vats, A. Biel, A. 2018).

Farm owners are very concerned about the ability to access educational opportunities in smart agriculture and digital marketing, although they are eager to incorporate these practices into their work. Having a market-focused understanding of the internet and social networks should be a basic skill with emphasis on how to create engaging videos.

- Regarding entrepreneurship, the results show that the agri-food sector is mainly dominated by older people, and therefore, more **initiatives around training and the development of educational tools to incentivise digitalisation skills uptake is necessary**.

- **Intergenerational collaboration is essential to encompass a smooth transition into the digital sphere.** Emerging businesses can be built on novel digital relationships whilst encouraging behaviour patterns deviating away from single-use consumption, for example, which can also act as a bridge between older farmers who are passing on their operations to younger generations.

The SUSTAGRI4.0 project will develop an open access E-Course designed in a hybrid format allowing for in-person training and an E-Commerce Platform to help overcome these barriers. It will also provide a direct route-to-market, with the long-term aim of increased awareness of sustainable agriculture, reduced food waste alongside more consumption of local products and increased uptake of advanced technologies to mitigate climate change effects in the agri-food sector.

KEYWORDS

Digitalisation, Sustainability, Entrepreneurship, Farming, Agriculture, Marketing

TABLE OF CONTENTS

ACRONYMS

BMC: Business Model Canvas

CAP: Common Agricultural Policy

EU: European Union

ICT: Information and Communication Technology

NGO: Non-governmental organisation

PESTEL: Political, Economic, Social, Technological, Environmental and Legal

SUSTAGRI4.0: Digital marketing to promote sustainability in the agri-food industry

SWOT: Strengths, Weaknesses, Opportunities and Threats

VET: Vocational Education and Training

VPC: Value Proposition Canvas

1. FRAMEWORK AND METHODOLOGY

The European Union (EU) has made considerable efforts to shift towards sustainable agriculture. Both the European Green Deal and the new EU Common Agricultural Policy (CAP) strive to achieve **sustainability at social, environmental and economic levels** and set different goals, among which securing a fair income and a stable economic future for farmers is essential. In recognising the crucial role of agriculture in wider society, supporting rural communities, increasing competitiveness and supporting the **digital transition in agriculture** are also necessary. In fact, EU policies and strategies have placed a strong focus on making sure farmers have the necessary skills and knowledge to produce high quality and safe agricultural products.

The advent of digital technologies has been a revolutionary force in all sectors of industry, including agriculture. **Digitalisation in the agri-food sector** has the potential to drastically improve agricultural production, boosting sustainability and entrepreneurship[2] and providing a pathway from farming as an unsustainable lifestyle to a thriving business working in harmony with the surrounding environment.

Through digitalisation, farmers can access detailed data about their crops, such as soil quality, temperature and moisture levels. These data can be used to inform sustainable farming practices, such as crop rotation, soil management and water conservation. In addition, digital technologies can be used to monitor and control pests, reducing the need for environmentally harmful chemical pesticides. Digitalisation also enables farmers to precisely measure their inputs and outputs, allowing them to optimise the use of natural resources[3].

In addition, it provides **opportunities for entrepreneurship**. Digital tools, such as drones and sensors, can help farmers increase their crop yields whilst decreasing their labour costs. This can enable farmers to expand their operations, diversify products and reach new markets. Technologies can also facilitate access to capital and business advice, allowing farmers to develop their businesses more efficiently. Digital platforms, such as online marketplaces and crowdfunding, can help farmers expand their clientele for increased profits[4].

The lack of **digital communication skills** is typical of rural areas, however, characterised by weak technological infrastructure, high costs of technology and low levels of literacy. Local producers face an increasing lack of ICT knowledge, preventing the transition of their business to Agriculture 4.0.[5]

New tools, approaches and technologies are thus necessary to facilitate easier and more direct interaction with customers, create a sense of community and promote a more **sustainable food culture** whilst simultaneously regaining access to a niche market that was once closed.

Digitalisation of the agri-food sector is essential for sustainable agricultural production and the development of entrepreneurial opportunities. Technologies can enable farmers to access detailed data about their crops, facilitating sustainable practices. Digitalisation can also enable

---

[2] The Digitalisation of the European Agricultural Sector 2022
[3] McFadden, J., et. al. 2022
[4] Van Es, H., & Woodard, J., 2017
[5] De Clercq, M., et. al. 2018

farmers to reach new markets, increase their yields and develop smart farming practices. Finally, digitalisation allows for sustainable business models that prioritise the welfare of farmers. The provision of methodologies and resources to enhance the **digital competencies[6]** of current and future farmers is crucial.

Adopting new technologies is only part of the necessary shift, however. According to the **Farm to Fork Strategy**, 20% of food produced within the EU is wasted. Worryingly, food costs are also rising and healthy foods remain out of reach for many. Objectives to develop a fair, healthy and environmentally-friendly food system must also consider nutrient management, seed security and diversity and government regulations, among other strategies, to address these issues[7].

The Strategy also notes the importance of enterprise by using renewable energy and other entrepreneurial ventures as a way to contribute to a circular bio-based economy. It has been recognised within this research that providing foundational business skills is crucial to working towards this shift.

SUSTAGRI4.0 hopes to see a reduction in food waste through increased consumption of local products whilst removing the "middleman" and giving farmers a direct route-to-market, thereby also reducing operational costs.

Reskilling and upskilling are also central to achieving these goals. The **CAP[8]** encourages the development and implementation of training and education programmes targeted at farmers to ensure they can meet the challenges that arise from new technologies and changes in the market.

The EU has also invested heavily in the **development of training and education programmes** that are tailored to the needs of individual farmers in different Member States. In particular, the CAP encourages the development of training and education programmes aimed at the following areas:

- Farm management and business planning
- Soil and water management
- Sustainable agriculture
- Food safety and traceability
- Animal welfare
- Risk management
- Biotechnology
- Climate change adaptation

These programmes are designed to help farmers understand and apply the latest technologies, understand and comply with food safety regulations and develop the necessary skills to manage their farms in a more economically and environmentally sustainable way. The success of these initiatives will ultimately depend on the commitment and cooperation of Member States and

---

[6] DigComp: The Digital Competence Framework for Citizens (DigComp) provides a common understanding of what digital competence is

[7] Farm to Fork Strategy 2020

[8] The common agricultural policy at a glance

their respective agricultural sectors to ensure that farmers across the EU can benefit from these initiatives.

To help push local producers and VET professionals towards the above aims, the SUSTAGRI4.0 project has focused on two core approaches to understand gaps, needs and challenges in the small-scale agri-food sector:

a) Review of best practices in each partner country
b) Qualitative research in the form of an online survey and in-person focus groups

This report highlights outcomes of research focusing on the professional skills of the future European farming community built on the cornerstones of **sustainability, digitalisation and entrepreneurship**.

2. INSPIRATION FROM BEST PRACTICES

2.1 PROJECTS TAKEN INTO CONSIDERATION

Several European projects have been explored to highlight the most relevant synergies and inspire the structure of SUSTAGRI4.0's E-Course and E-Commerce Platform. Identifying successful projects involved understanding overlapping objectives, beneficiaries, activities and achieved results.

The list of identified projects and initiatives is below:

- AGRISKILLS: Innovative Skills Transfer for the Development of Agricultural Entrepreneurs
  http://www.agri-skills.eu/

- BURREN: BurrenLife Project
  http://burrenprogramme.com/

- CAMARG: Clusters of Innovative Zero-km Agrofood Marketplaces for Growth
  https://camarg.interreg-med.eu/

- DIGIFARMER: Developing Farmers' Digital Skills
  https://www.digifarmer.net/

- ENOCULTURE: Start of European Enology, Prefiloxeric European Grapes
  https://proyectoenologico.wixsite.com/en

- FARMINC: Introducing Marketing & Branding Principles in the Agricultural Sector
  http://farminceu.militos.org/

- FUTURE FARMERS: Skills for Future Farmers
  http://future-farmer.eu/

- GENERATIONAG: Digital Transformation and Digital Communication for Agrifood Businesses
   https://www.generationag.org

- THE FOOD ASSEMBLY
  https://laruchequiditoui.fr/en

- L' ITALIA VOLA
  https://italiavola.com/

- MYFARMWEB
  https://public.myfarmweb.com/

- RBAPS: Result-based Agri-environment Measures in Ireland and Navarra
  https://rbaps.eu/

- SMART FARM: Smart Farm Training for Employment
  http://sfate.eu/

- URBAN CO-OP: Urban Cooperative Limerick
  https://www.theurbanco-op.ie/

2.2 LEARNING OUTCOMES

The analysis provided the following learning outcomes, which served as building blocks to develop SUSTAGRI4.0's mobility exchange event and E-Course.

1. **Initiatives** are focused on:
   a. Increasing employability of young adults from rural and remote areas.
   b. Bridging the gap between labour market needs and the lack of knowledge and competences in youth (pertaining to sustainability, digital and marketing sectors).
   c. Providing personalised training to young adults to improve work and agri-food production, according to the needs identified at the national level.
   d. Sustainable food systems and exploring innovative ways of producing and consuming.
   e. Ensuring farmers use internet tools and smartphone applications in social and business life effectively.
   f. Supporting social justice: assuring fair prices for producers.
   g. Increasing knowledge and the uptake of smart farming skills in VET institutions and colleges.

2. **Connection** with land must be considered to:
   a. Preserve the culture and heritage of the region.
   b. Support the economic and social sustainability of farmers.

3. **EU regulations** and envisioning frameworks should be addressed, such as the EU Green Deal and the Farm to Fork strategy, which help strengthen the initiatives of the CAP and open the door to funding opportunities.

4. **Long-term outcomes** and vision:
   a. Rural farmers will become more active socially and professionally, thereby fostering a growth in community engagement and increased consumption of local products whilst simultaneously reducing food waste.
   b. The E-Commerce Platform will provide a direct route to market for local producers with effective marketing and branding of agri-food products.
   c. There will be a shift from farming as a lifestyle to farming as a business towards a sustainable agriculture that is also profitable.

3. ONLINE QUESTIONNAIRE

3.1 AIM AND STRUCTURE OF QUESTIONNAIRE

After the analysis of best practices, and considering the key themes in future training, an online questionnaire was designed to delve into needs and interests.

The questionnaire was divided into three main areas of skills: sustainability, entrepreneurship and digital business. It was designed to semi-quantitatively (Likert scale: 1-5)[9] analyse three dimensions under each "skills" area: a) awareness of current personal skills, b) interest in learning the given topic and c) perception of difficulty to implement this topic professionally. In addition, open-answer questions focused on needs, barriers and strengths in these areas. The questionnaire was also designed to provoke the curiosity and reflection about the different skills that may be of interest at a professional level. It can be found under **Annex 1.**

After compiling it on Google Forms and translation into the national languages of the partners, a social media campaign and mailshots were implemented for wide dissemination.

3.2 LEARNING OUTCOMES AND LIMITATIONS

The dissemination campaign ran for several weeks with a target of 50 responses per partner country. However, apart from the University of Valencia who disbursed a printed version of the questionnaire to people within our target group, the response rate was low, and the following conclusions were drawn:

1. **No specific results** were extrapolated due to an inappropriately small sample size.
2. Limitations included a **difficult and long survey,** which was likely the predominant barrier for potential respondents. However, a simplified questionnaire would not have covered all key areas essential for this research.
3. A modified version of the questionnaire will be used as an **evaluation tool** at the start of the E-Course and once again at the end to (self-)assess level of skills acquisition.

---

[9] Allen, E. & Seaman, C. 2007

4. FOCUS GROUPS

4.1 AIM AND PREPARATION OF FOCUS GROUPS

Focus groups were conducted in each partner country in local languages as the third component of this research. They have been long recognised as a standard form of qualitative research to gather behavioural sociological knowledge[10].

The focus groups were held in-person, apart from one hybrid and one online event due to difficulties in organisation and recruitment. Questions and setting were planned according to guidelines from Krueger and Morgan[11]. Separate questions and activities were planned according to the target group, i.e. one session focused on end users of the E-Course (farmers/agribusiness) and the second session on e-learning from the perspective of VET professionals/students. A total of 10 sessions were conducted.

- **Roles**: Two people ran the focus group, one acting as the moderator and the second as the assistant/note-taker.
- **Participants**: The SUSTAGRI4.0 approach was to distinguish between current and future professionals in the agri-food sector. For current professionals, associations of farmers or individual workers were targeted. For future professionals, VET students and teachers in the agri-food sector, as well as experts in digital learning, were invited to participate.
- **Preparation**: A set of common provisions for the development of focus groups was agreed among the SUSTAGRI4.0 consortium, considering guidelines for the introduction, climate and motivation for lively discussions.
- **Analysis:** Each partner performed a review of their focus groups by reflecting on and analysing notes taken. A set of guiding questions were developed to aid in reflection and interpretation. Partners were also instructed to take photos and videos to incorporate into their analyses.

---

[10] Litosseliti, L. 2003
[11] Morgan, D.L., et. al. 1998

4.2 PARTICIPANT GROUPS AND ORGANISATIONS

Two focus groups were conducted by every partner. The list is shown below:

- KOSMOS Agricultural Cooperative – Veroia, Greece
- VET trainers – Thesaloniki and Kozani, Greece
- Urban Co-op – Limerick, Ireland
- Digital learning companies & the Irish Co-operative Organisation Society (ICOS) – Dublin, Ireland
- School N. Pellegrini, VET trainers & students (Agricultural Production and Methodologies Course) – Sassari, Italy
- Agricultural Cooperative Coraggio – Rome, Italy
- VET trainers (online) – Italy
- VET Centre IES Vicent Gandia, students (Agricultural and Landscaping Management Course) – Castelló de la Ribera, Spain
- VET Centre IES Josep Segrelles, students (Agricultural Production Course) – Albaida, Spain

4.3 MAIN LEARNING OUTCOMES

The focus groups provided the most relevant and insightful results to understand needs when it comes to training of VET professionals, as a train-the-trainer approach, and farmers/agribusiness owners. The main outcomes are outlined below:

1. **Digital skills are considered essential** to boost businesses in the agri-food sector.

2. Both farmers/agribusiness owners and VET professionals see a gap in digital and entrepreneurship skills uptake. However, specific needs and interests are highly variable. Any **training must be flexible**, allowing for users to take modules which suit their schedules and current competencies, as well as interests.

3. Main needs and interests in **sustainability** and approaches were focused on:
   a. <u>Sustainability is a complex concept</u>, merely understood in terms of environmental impact and connecting to issues such as resource consumption, climate change and waste management. A wider perspective should be explored and incorporate the social and economic pillars.
   b. <u>The road to impact is long.</u> A shift towards sustainability, both in attitude and practice, will not result in immediate positive changes, thus farmers and agribusiness must understand that results will generate impact over a long-term commitment.
   c. <u>Circular economy</u> practices can help create sustainable businesses.

d. <u>Bioeconomy, biodiversity, renewable energies, management of waste</u> <u>and/or zero-km strategies</u> are important topics for both farmers and VET professionals.

e. Connection with <u>regulations</u> at local, national and European level is necessary to avoid bans and allow more access to EU funds.

4. Main needs and interests in **digitalisation skills** and approaches were focused on:

   a. Knowledge of digital applications (<u>software</u>) for agricultural production are of high interest.

   b. Introduction of novel technologies (e.g., <u>hardware and IoT</u>) are necessary to increase efficiency of agri-food production.

   c. <u>Simple introductions to technology and the digital world</u> are important to <u>break the barrier</u> for farmers in adopting new tech and overcoming their fears and mistrust.

   d. <u>Content creation</u> (images, infographics, videos, animations) are considered key skills from the perspective of VET professionals.

5. Main needs and interests in **entrepreneurship skills** and approaches were focused on:

   a. The agricultural sector, which is mainly dominated by older people, <u>need more initiatives for training and the development of educational</u> <u>tools to support its digitalisation phase</u>. For current agribusinesses, intergenerational collaboration is essential to encompass a smooth transformation. New businesses can be built on novel digital relationships and alternative, conscious consumption patterns whilst incorporating traditional methods and cultural heritage.

   b. <u>Strategy-focused thinking</u> is beneficial to move from standard business operations to sustainable operations. Methods for this include Strengths, Weaknesses, Opportunities and Threats (SWOT) analysis, Value Proposition Canvas (VPC), Business Model Canvas (BMC) and/or Political, Economic, Social, Technological, Environmental and Legal analysis (PESTEL) approaches, among others.

   c. <u>Collaborative approaches and networking</u> should be taught, in contrast to individual battles.

   d. Farmers have an interest in <u>crowdfunding platforms and strategies to raise funds.</u>

   e. <u>Knowledge related to basic skills around processing information, for example, data management</u> (i.e., Excel, spreadsheets) and statistics, allows farmers to take informed decisions, rather than working solely from perceived realties and therefore should take part in any training programme.

6. Main needs and interests in **digital marketing skills** and approaches were focused on:

   a. <u>Digital skills related to marketing are poor for both older and younger generations</u>. The tool does not ensure the knowledge, and the knowledge does not ensure the impact. Training needs to include the *how* in making the most of social networks to boost commerce.

   b. Farm owners are very <u>concerned about the ability to access educational</u>

opportunities in smart agriculture and digital marketing, although they are eager to incorporate these practices into their work.

c. Having a market-focused understanding of the internet and social networks should be a basic skill.

d. Understanding the benefits and strategies for advertising through the internet is essential.

e. Digital literacy, including the understanding email etiquette, is important to reach wider audiences online.

f. Not only computers, but also the use of smartphones as an operation centre, benefits business as it allows for decentralisation. The use of cloud systems and synchronous collaborative applications are also important for efficient production and decentralisation.

g. The ability to create stimulating videos (which encapsulates both technical skills and storytelling) is potentially a very effective way to engage younger generations to their (i.e. farmers and agribusiness owner) markets.

h. Responsible digital communication and storytelling is a potentially effective method to promote consumers' knowledge around sustainability and conscious consumption and move away from greenwashing.

7. Concerns and requirements of a **future training pathway** should consider the following:

a. The training programme should be carefully designed in terms of length, conciseness and clarity.

b. Language and tone are important to be clear, but also avoid technical terminology which learners may find off-putting.

c. The programme should be easily accessible and compatible with smartphones.

d. Micro-learning and flexible lessons are crucial to retain learners and increase the chances that they will complete the E-Course.

e. All key topics should be connected to entrepreneurship, which serves as a tool to turn future envisioning/goals into reality.

f. Sustainability should be included in all aspects throughout the programme as a transversal issue.

g. The programme should directly address the potential difficulties and barriers that individuals may face when investing in advanced technologies and learn about benefits to investment, as well as being able to conduct cost/benefit analyses.

h. Digital marketing should be inclusive and consider specific approaches to engage people with personal disabilities, such as deafness or dyslexia, and neurodivergence.

i. Hybrid strategies are essential. Therefore, partnering with appropriate centres and collages is a potentially effective approach for allowing this E-Course to be disseminated in-person as well. The following entities are considered for collaboration:

- VET institutions and colleges
- Chambers of Commerce
- Agribusiness cooperatives

5. CONCLUSION

The EU is making efforts to shift towards more sustainable agriculture through the EU Common Agricultural Policy (CAP) and the GreenComp[12]. These policies and initiatives aim to achieve sustainability at social, environmental and economic levels and set goals such as fair income for farmers, supporting rural communities and increasing competitiveness through digitalisation. In this sense, digitalisation in the agri-food sector has the potential to improve agricultural production and sustainability by providing farmers with detailed data about their crops, thus enabling precision farming practices including monitoring and controlling pests and optimising the use of natural resources whilst reducing harmful environmental effects. It also provides opportunities for entrepreneurship through digital tools and platforms for farmers to expand operations, diversify products and reach new markets. However, farmers in rural areas may lack the digital skills and infrastructure to fully take advantage of these opportunities.

The SUSTAGRI4.0 project is aimed at developing an E-Course and E-Commerce platform to help overcome these barriers. The present report shows the results from a review of best practices and qualitative research.

The results highlight the importance of **digital skills** in the agri-food industry, specifically focusing on the need for sustainability, digitalisation, entrepreneurship and digital marketing skills. Interestingly, both farmers/agribusiness owners and VET professionals/students aligned in recognising low competencies around skills. For example, despite many young farmers using social media regularly, it is understood from both target groups that specific skills around marketing and branding such that social media becomes a key tool to grow their business is lacking. It was also widely recognised that committing to an online course is time consuming, therefore, a flexible programme allowing users to take specific modules which fit directly with their needs and interests is vital for greater impact and wider reach.

Results also highlighted that knowledge of **digital applications** for agricultural production is of high interest, and the introduction of novel technologies, such as hardware and IoT, are necessary to increase the efficiency. Introductions to advanced technologies, and the digital world in general, must be implemented in simple and straightforward ways, allowing farmers to overcome their fear and mistrust.

Although farmers appear to have more competencies around apps, in particular social media, marketing skills remain poor across different generations. Training therefore must include the *how* in making the most of social networks to boost commerce. Agribusiness owners and farmers have also shown a keen interest in accessing educational opportunities to adopt smart farming and digital marketing techniques and thus training centred around marketing, branding and smart farming technologies are a priority.

---

[12] Bianchi, G. et. al. 2022

Sustainability is considered a complex topic that goes beyond environment and lessons should incorporate a wider perspective addressing the social and economic pillars. Both target groups were able to associate several concepts with sustainability including biodiversity, wellbeing and renewable energies. However, any inputs that incorporate new strategies and technologies will require long-term investment with significant impacts observed after a period of years. Training must emphasise the importance of deviating from short-term gains and the thinking around quick results such that farmers and agribusiness remain committed over longer periods to allow for maximum impact.

Farming as an enterprise was seen as essential from the perspective of VET professionals, however, it is unclear whether farmers themselves agree with a need to adopt specific entrepreneurship skills. Regardless, Agriculture 4.0 as a movement has already begun and farmers must be prepared to enter this transition which requires a combination of enterprise and digital skills. Interestingly, results also indicated an opportunity for intergenerational collaboration, such that younger farmers equipped with enterprising and marketing tools can take on board traditional methods and embrace cultural heritage as part of the transition. This may also facilitate new, healthier relationships to the digital sphere and encourage an attitude shift towards sustainable and conscious consumption of local products.

There are a number of initiatives, funding schemes, tools and training programmes required to enable the Agriculture 4.0 shift, preparing future generations of small-scale farmers to operate sustainably whilst profiting and working harmoniously in their surrounding environments and communities. Through this research, SUSTAGRI4.0 has understood the needs, barriers and opportunities to create open access training and commerce as part of this movement.

6. REFERENCES

Allen, I. E. & Seaman, C. A. (2007). Likert scales and data analyses. *Quality progress*, *40*(7), 64-65.

Bianchi, G., Pisiotis, U. & Cabrera Giraldez, M. (2022). *GreenComp The European sustainability competence framework* (No. JRC128040). Joint Research Centre (Seville site).

De Clercq, M., Vats, A. & Biel, A. (2018). Agriculture 4.0: The future of farming technology. *Proceedings of the World Government Summit, Dubai, UAE*, 11-13.

DigComp: The Digital Competence Framework for Citizens (DigComp) provides a common understanding of what digital competence is. [https://joint-research-centre.ec.europa.eu/digcomp_en].

Farm to Fork Strategy. (2020). [https://food.ec.europa.eu/horizontal-topics/farm-fork-strategy_en].

Kovács, I. & Husti, I. (2018). The role of digitalization in the agricultural 4.0–how to connect the industry 4.0 to agriculture? *Hungarian agricultural engineering*, (33), 38-42.

Litosseliti, L. (2003). *Using focus groups in research*. A&C Black.

McFadden, J., Casalini, F., Griffin, T. & Antón, J. (2022). The digitalisation of agriculture: A literature review and emerging policy issues.

Morgan, D. L., Morgan, D. L., David, M. & Krueger, R. A. (1998). *The focus group guidebook*. Sage.

The common agricultural policy at a glance. [https://agriculture.ec.europa.eu/common-agricultural-policy/cap-overview/cap-glance_en].

The Digitalisation of the European Agricultural Sector. (2022). [https://digital-strategy.ec.europa.eu/en/policies/digitisation-agriculture].

Van Es, H. & Woodard, J. (2017). Innovation in agriculture and food systems in the digital age. *The global innovation index*, 97-104.

7. ANNEX 1. QUESTIONNAIRE

The following pages gather the questionnaire that was designed to analyse the background scenario and envision of future enrolment on a training program focused on sustainability, digitalisation and entrepreneurship.

SUSTAGRI 4.0 - Digital marketing to promote sustainability in the agri-food industry

2021-2-IE01-KA220-VET-000049494

Survey – Needs of upskilling in the agri-food sector

SECTION 1: CONTEXT OF THE SURVEY

This survey is part of the Erasmus+ project SUSTAGRI 4.0 - Digital marketing to promote sustainability in the agri-food industry, with reference number 2021-2-IE01-KA220-VET-000049494. This initiative seeks to co-create, together with VET-trainers, an upskilling and training e-course to boost the skills of current and future agri-food professionals and enhance sustainable business.

Your input is crucial and this survey will take only 10 minutes of your time!

With your feedback, we will structure a specific training e-course to meet the needs of upskilling in the agrifood sector to benefit not just the sector, but also your own professional development.

Stay tuned on our website and social media pages for updates and to see how your input is being applied towards a green and digital transformation in agriculture!

Webpage
Newsletter
Twitter
LinkedIn
Facebook
Instagram

SECTION 2: SUSTAINABILITY SKILLS

Please rate from 1 (low) to 5 (high), or 0 (don't know/unsure), your level of (i) Awareness of current personal skills; (ii) Interest in learning this topic; and (iii) Perception of difficulty to implement this topic professionally. In addition, please explain your needs, barriers and strengths in these areas.

Topic	Awareness (1-5)	Interest (1-5)	Difficulty (1-5)	Id
Sustainability				2.1
Environmental impact of your profession				2.2
Social impact of your profession				2.3
Economic impact of your profession				2.4
European initiatives: GreenComp – EU Framework of skills on sustainability				2.5
European initiatives: Green Deal				2.6
European initiatives: Strategy from farm to fork				2.7
European initiatives: Strategy of Circular Economy				2.8
European initiatives: Strategy of Bioeconomy				2.9
Climate change				2.10
Food and non-food by-products and co-products valorisation				2.11
Best practices in agri-food digitalisation				2.12
Soil nutrients and water management				2.13
Biodiversity				2.14
Waste management				2.15
Unforeseen skills/topics				2.16
Needs				2.17
Barriers				2.18
Strengths				2.19

SECTION 3: ENTREPRENEURSHIP SKILLS

Please rate from 1 (low) to 5 (high), or 0 (don't know/unsure), your level of (i) Awareness of current personal skills; (ii) Interest in learning this topic; and (iii) Perception of difficulty to implement this topic professionally. In addition, please explain your needs, barriers and strengths in these areas.

Topic	Awareness (1-5)	Interest (1-5)	Difficulty (1-5)	Id
European initiatives: EntreComp – EU Framework of skills in entrepreneurship				3.1
Analytical techniques (e.g.SWOT or PESTEL)				3.2
Creative design thinking for business models				3.3
Diversification of businesses				3.4
Marketing strategies: metrics and insights				3.5
Collaboration and networking				3.6
Economic issues (e.g., cost/benefit analysis, ROI, funding…)				3.7
Storytelling				3.8
Pitching				3.9
Blogging				3.10
Corporative visual identity				3.11
Decision making strategies				3.12
Planning and coordinating production				3.13
Quality management, quality assurance and quality control				3.14
Ethics for agri-food products				3.15
Unforeseen skills/topics				3.16
Needs				3.17
Barriers				3.18
Strengths				3.19

SECTION 4: DIGITAL BUSINESS SKILLS

Please rate from 1 (low) to 5 (high), or 0 (don't know/unsure), your level of (i) Awareness of current personal skills; (ii) Interest in learning this topic; and (iii) Perception of difficulty to implement this topic professionally. In addition, please explain your needs, barriers and strengths in these areas.

Topic	Awareness (1-5)	Interest (1-5)	Difficulty (1-5)	Id
European initiatives: DigComp - Framework of digital skills				4.1
Digital technologies to communicate (e.g., web, social media, newsletters, forums)				4.2
Data handling and analysis				4.3
Logistics and farm management information systems				4.4
B2C e-commerce				4.5
B2B e-commerce				4.6
Use of Internet of Things (IoT)				4.7
Weather forecasting tools				4.8
Farming-focused apps for the smartphone				4.9
Combine online and offline promotion activities				4.10
Combine online and offline logistics activities				4.11
Unforeseen skills/topics				4.12
Needs				4.13
Barriers				4.14
Strengths				4.15

SECTION 5: TRAINING AND INNOVATION ECOSYSTEM

Please rate from 1 (low) to 5 (high), or N/A (don't know/unsure), your level of perception in the following items:

Topic	Perception (1-5)	Id
Awareness of training programs in the agri-food industry		**5.1**
Quality of training programs to meet challenges for professionals in the agri-food industry		**5.2**
Willingness to attend to in-person training programs.		**5.3**
Willingness to attend to online training programs.		**5.4**

Please identify 3 training providers at your professional sector, or else say "Unknown". Please include webpage, if possible [Id 5.5]
1. Provider 1:
2. Provider 2:
3. Provider 3:

Please identify 3 examples in which technology has aided your profession, or else answer "Unknown". Please include webpage, if possible [Id 5.6]
1. Example 1:
2. Example 2:
3. Example 3:

SECTION 6: PROFILE

- Age (number):

- Gender:
    - Male
    - Female
    - Non-binary
    - Other

- Current professional status:
    - Agrifood professional worker
    - Agrifood VET trainer
    - Agrifood VET student
    - Agrifood consultant
    - Other (Please specify)

- Area of work:

- Years working:

- Satisfaction with professional development (0-5):

- Main barriers for professional development (Open question)

- Main boosters of professional development (Open question)

SECTION 7: YOUR THOUGHTS, YOUR PERSONAL VISION, ADDITIONAL COMMENTS

Optionally, please use this free space to show your vision on the topics related in this survey, in relationship to your professional development and career. Your thoughts are welcome to help design proper intervention actions for training in digital skills for sustainable businesses in the agri-food sector. We warmly appreciate your contribution.

SECTION 8: ACKNOWLEDGEMENTS

Thank you very much for your kind contribution. Your answers will be analysed by the experts of the Erasmus+ project SUSTAGRI 4.0 - Digital marketing to promote sustainability in the agri-food industry, ref. 2021-2-IE01-KA220-VET-000049494, to co-create with VET-trainers an upskilling on-line training course to help you boost your skills in your professional sector.

DATA CONSENT

"In submitting this form, I agree to my details being used for the purposes of the development of the project, in terms of training design and with no commercial reasons. The information will only be accessed by necessary project staff. I understand my data will be held securely and will not be distributed to third parties. I have a right to change or access my information. I understand that when this information is no longer required for this purpose, official administrative procedure will be followed to dispose of my data."

8. ANNEX 2. FOCUS GROUP QUESTIONS

The following pages gather the guidelines to conduct appropriate focus groups, both focused on current (agri-business owners) and future (VET students and trainers) professionals of the Agri-food sector. Driving questions and participating activities are proposed.

8.1 VET PROFESSIONALS

1. Focus group environment

[DESCRIPTION OF THE FOCUS GROUP ENVIRONMENT]
Place:
Environment:
Working tools:
Number of attendees:
Research team roles:
Pictures (4)

2. Focus group profile

[CHARMING AND PARTICIPATIVE ENVIRONMENT - 30 min]

2.1. Ice-breaking Roundtable

- Short introduction, focusing on training profile, professional experience and future envisioning.

2.2. Presentation of the challenge

- Presentation of SUSTAGRI4.0 (5-10 slides)

3. Key topics focus
[ACTIVATION STAGE, 30 MIN]

3.1. Sustainability focus

a. Write down your perception on:
- **Sustainability**
    - How important do you think sustainability is for your professional development?
    - How important do you think sustainability is for your life?
    - How much would you be interested in learning about sustainability-driven business opportunities?
b. Round table and discussion.
c. Report (10-15 lines + pictures, if any), with focus on needs for training.

3.2. Digitalisation focus

a. Write down on a post-it (1 per question) and hang on the wall:
   ○ What comes to your mind when I say "**digitalisation of agrifood businesses**"?
   ○ What types of digitalisation tools (ICT) do you consider most important for the sector?
   ○ What types of digitalisation skills do you consider most important for your professional development?
b. Round table and discussion
c. <u>Report</u> (10-15 lines + pictures, if any), with focus on needs for training.

4. Active Coffee Break

[ACTIVE DIALOGUE AND CHARMING COFFEE, 15 MIN]
- Chat with attendees in an informal relaxed coffee-break environment. Focus questions on envisioning futures and needs, to get back with feedback to these questions during next working section.
- Make sure attendees follow social networks of SUSTAGRI 4.0.

5. Key topics focus
[DEEP-REFLECTION STAGE, 30 MIN]

5.1. Training focus

a. Activity
- Connected to the topics we are talking about in this focus group: sustainability, digitalisation, marketing, write down what you consider should be part of a very basic training program in the agrifood sector, and mark each other from 1-5 the level of intensity of training, according to your experience.

b. Round table and discussion. Suggested questions:
- Based on your understanding of small business and our shift to a digital world, what specific skills and knowledge do farmers and agribusiness owners need to adapt?
   o Think about a time when someone (student or classmate) didn't complete the course. Write down what you believe were the main barriers to their success.
   o Talk about a positive experience you've had when *teaching* an upskilling course.
- Revision of post-its and connection to the training needs.

c. <u>Report</u> (10-15 lines + pictures, if any), with focus on needs for training.

6. Conclusion

a. Activity

Video-pitching. Prepare a 1 min pitch in which you answer the following questions, and then we'll record them. Ask for formal permission to reproduce them for the project purposes.

- Short-list the barriers and hopes for the agrifood business, under your perspective.
- We want to ensure that VET professionals are able to confidently teach the e-course we are currently designing and be part of a sustainability shift. What should be our key takeaways?

d. Final round table and invite them for further feedback, if any.

e. <u>Report</u> (10-15 lines + pictures, if any), with focus on needs for training.

f. Family picture, acknowledgement and project involvement for next steps.

g. <u>Report</u> (10-15 lines + pictures, if any), with focus on needs for training.

1.   Focus group environment

[DESCRIPTION OF THE FOCUS GROUP ENVIRONMENT]
Place:
Environment:
Working tools:
Number of attendees:
Research team roles:
Pictures (4)

2.   Focus group profile

[CHARMING AND PARTICIPATIVE ENVIRONMENT - 30 MIN]

2.1. Ice-breaking Roundtable

- Short introduction, focusing on training profile, professional experience and future envisioning. Activity: write on a piece of paper a bit about you, focusing on studies level, professional experience, level of digital skills (1-7) and level of entrepreneurship skills (1-7).
- Report (10-15 lines + pictures, if any), with focus on needs for training.

2.2.   Presentation of the challenge

- Presentation of Sustagri (5-10 slides)
- Open envisioning question: How can we empower local producers and sustainable agricultural business owners in the agriculture sector? Round table and discussion.
- Report (10-15 lines + pictures, if any), with focus on needs for training.

3.   Key topics focus
[ACTIVATION STAGE, 30 MIN]

3.1.   Sustainability Focus

a. Write down your perception on:
- **Sustainability**
    - How important do you think sustainability is for your professional development?
    - How important do you think sustainability is for your life?
    - How much would you be interested in learning about sustainability-driven business opportunities?
b. Round table and discussion.
c. Report (10-15 lines + pictures, if any), with focus on needs for training.

3.2.   Digitalisation Focus

a. Write down on a post-it (1 per question) and hang on the wall:
- What comes to your mind when I say "**digitalisation of agrifood businesses**"?

- ○ What types of digitalisation tools (ICT) do you consider most important for the sector?
- ○ What types of digitalisation skills do you consider most important for your professional development?

b. Round table and discussion
c. Report (10-15 lines + pictures, if any), with focus on needs for training.

4. Active Coffee Break

[ACTIVE DIALOGUE AND CHARMING COFFEE, 15 MIN]
- Chat with attendees in an informal relaxed coffee-break environment. Focus questions on envisioning futures and needs, to get back with feedback to these questions during next working section.
- Make sure attendees follow social networks of SUSTAGRI 4.0.

5. Key-topics focus

[DEEP-REFLECTION STAGE, 60 MIN]

5.1. Business focus

a. Round table and discussion. Suggested trigger questions:
- Talk about barriers you face in the agriculture sector.
- If you could influence existing agricultural policy, what would you change?
- Is it possible to run a business and farm sustainability and profit at the same time?

b. Report (10-15 lines + pictures, if any), with focus on needs for training.

5.2. Digital marketing focus

c. Activity
- Take out your smartphone and open up one of your social media apps, then make a post about your business. Please share with each other how you felt when doing this activity.
- Discuss about digital skills: barriers, formal training, interests.
- Discuss about storytelling: barriers, formal training, interests.

d. Round table and discussion. Suggested questions:
- Let's talk about clients. How do you connect with your clients?
- What is most important for you when it comes to reaching existing and new customers?
  - ○ How can digitalisation help your business from a sustainability perspective?
  - ○ Talk about a positive experience you've had with a digital and/or marketing tool.

e. Report (10-15 lines + pictures, if any), with focus on needs for training.

6. Conclusion

a. Activity

Video-pitching. Prepare a 1 min pitch in which you answer the following questions, and then we'll record them.
Ask for formal permission to reproduce them for the project purposes.

- Short-list the barriers and hopes for the agrifood business, under your perspective.
- We want to empower farmers and agribusiness owners in the uptake of digital and marketing skills to grow their business as part of a sustainability shift. What should be our key takeaways?

b. Final round table and invite them for further feedback, if any.
 Report (10-15 lines + pictures, if any), with focus on needs for training.

b. Family picture, acknowledgement and project involvement for next steps.

c. Report (10-15 lines + pictures, if any), with focus on needs for training.