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Quality assurance and certification of training for the vegan food industry

Workpackage 4 Implementation of trainings, its quality assurance, certification and recognition

Task 4.6 Quality assurance and certification of trainings for the vegan food industry

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Foreword

The work described in this report was developed under the project EQVEGAN: European Qualifications & Competences for the Vegan Food Industry (621581-EPP-1-2020-1-PT-EPPKA2-SS). If you wish any other information related to this report or the EQVEGAN project please visit the project web-site (www.eqvegan.eu) or contact:

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Summary

The report on "Quality Assurance and Certification of Trainings for the Vegan Food Industry" underscores the pivotal role of rigorous training frameworks in ensuring competence and adherence to industry standards.

By aligning learning outcomes with the dynamic needs of the vegan food sector, the report lists a comprehensive certification framework, incorporating ECVET and ECTS systems at EQF Levels 4-7. This framework not only meets regulatory requirements but also instils confidence in learners through its emphasis on ethical, sustainable, and high-quality practices.

As a catalyst for professional development and global market access, the proposed learning outcomes position the EQVEGAN courses delivered as a leader in innovation and fosters a skilled workforce, contributing to its sustained growth and global recognition. Through robust quality assurance mechanisms and continuous improvement strategies, the report advocates for a standardized, adaptable, and industry-responsive training approach, setting the stage for a resilient and competitive outcome.

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1. Introduction

Quality assurance and certification play a crucial role in the context of this project when related to the training for the vegan food industry.

Certification provides a formal recognition that individuals have acquired the necessary skills and knowledge in vegan food production, preparation, and related areas; whilst quality assurance processes guarantee that the training programs meet industry standards, ensuring the competence of professionals entering the vegan food industry.

The vegan food industry, like any other sector, has specific standards and regulations related to food safety, ethical sourcing, and production practices. Certification ensures that professionals are trained in compliance with these standards. This subsequently helps the industry maintain and enhance its reputation for producing high-quality, ethically sourced, and sustainable products.

Moreover certification acts as a signal to consumers that the individuals involved in these trainings related to the vegan food industry have undergone rigorous training and adhere to recognized standards. Companies and consumers are increasingly conscious of the ethical and sustainable aspects of their food choices. Certification provides assurance that products align with their values, fostering trust in the course and its deliverables.

The quality assurance processes employed, including feedback mechanisms and evaluations, lead to continuous improvement in the training programs. This ensures that the training remains relevant and up-to-date with the latest developments in the vegan food industry. The partners of this project, as the certification bodies can encourage innovation by promoting the adoption of new technologies, sustainable practices, and advancements in vegan food production.

Certification serves as a benchmark for individuals seeking to enhance their professional development. It provides a structured pathway for career advancement within the nascent vegan food industry. Furthermore employers can use certifications as a criterion for hiring or promoting employees, creating a more skilled and competent workforce.

Most importantly, certification frameworks contribute to the standardization of training programs amongst the partners, ensuring consistency in content, delivery, and assessment methods across different institutions and regions. Standardisation simplifies the evaluation of qualifications, making it easier for employers to assess the skills and competencies of potential hires.



In summary, quality assurance and certification in this context contribute to the professionalism, credibility, and sustainable growth of the courses delivered and in turn the industry itself. They create a framework that benefits individuals, consumers, employers, and the industry as a whole by promoting excellence, ethical practices, and global competitiveness.

2. Learning Outcomes

In the design of units and courses, the use of learning outcomes is a fundamental aspect that significantly influences the effectiveness of educational programs. Incorporating learning outcomes into the design process shapes the learning experience into a meaningful and purposeful one.

Learning outcomes are statements that articulate what learners are expected to know, understand, and be able to do upon the completion of a unit, course, or program. These outcomes serve as a guide for educators, learners, and stakeholders, outlining the intended achievements and skills gained through the learning process. Part of the reason why learning outcomes are crucial is that they provide clarity and focus to the design of units and courses. By explicitly stating what students should achieve, educators can structure content, activities, and assessments in a way that aligns with these predetermined goals. This clarity enhances the overall logic of the educational experience across the partners delivering the units developed for EQVEGAN.

One of the aims agreed upon during the initial meetings was a focus on a student-centred approach to education. This can be achieved through learning outcomes as these shift the emphasis from what educators teach to what learners are expected to learn. This shift encourages active engagement, self-directed learning, and a sense of ownership over one's educational journey which are also part of the aims of this work package. Learning outcomes ensure alignment with the broader objectives and help maintain consistency and coherence in educational delivery of the units. This alignment is essential for accreditation, quality assurance, and demonstrating the value of education.

Learning outcomes also provide a basis for designing appropriate assessments, allowing educators across partners to measure the extent to which students have met the specified goals. This, in turn, facilitates meaningful feedback and supports continuous improvement. Through regular assessment and analysis of student performance in relation to outcomes, educators can identify areas for enhancement, update content, and adapt teaching strategies to optimize the learning experience.

The incorporation of learning outcomes in the design of the EQVEGAN units was an integral step to fostering clarity, alignment, student-centred learning, and continuous improvement. By emphasizing what students are expected to achieve, educators can create purposeful, effective, and inclusive learning experiences that contribute to the overall success of learners and the project partners they represent.

The learning outcomes agreed upon between the partners at EQF Level 4, for each unit are the following:

Unit and Topic	Learning Outcomes
Plant-Based Processing Technology / Technologies	<ul style="list-style-type: none"> - Recognize the differences between vegan and other vegetarian diets and the potential health benefit - Recognize the main conservation/preservation technologies and identify the manufacturing phases of Vegan foods, Dairy & Meat substitute - Handle the appropriate equipment for each method of preservation/processing of Vegan foods, Dairy & Meat substitutes respecting the standards of quality, hygiene and food safety and health and safety at work - Identify the factors that influence the quality of vegan products from receipt of raw materials to dispatch.
Plant-Based Processing Technology / Nutrition	<ul style="list-style-type: none"> - Name and explain basic types of vegetarian diets, definitions, and rules of their application. - Define the primary categorization of nutritional value vegan diets. - Name and understand the general rules of bioavailability and bio accessibility nutrients in plant diets. - Understand the basics roles of protein's complementation on vegetarian's dietary patterns. - Understand the risks and benefits in terms of health and moncommunicable diseases.
Plant-Based Processing / Food Safety	<ul style="list-style-type: none"> - Define the components of the EU food safety system - State physical, chemical and physical hazards - Name prerequisites for safe vegan food processing, principles, and steps of the HACCP system
Plant-Based Processing / Analysis	<ul style="list-style-type: none"> - Understand the principles of sampling and basic analytical methods in vegan food production - Identify gluten content materials and main food allergens. Understand the principles of allergen and gluten cross-contact prevention
Green Skills / Sustainability	<ul style="list-style-type: none"> - List sustainable parameters - Name conventional technologies and VFP (vegan food processing) and energy/water/ waste critical points in VFP - Relate food waste reduction in VFP with consumers - Underline possible by-products in VFP - Discuss data that should be obtained to perform sustainability evaluation in VFP
Green Skills / Vegan food processing	<ul style="list-style-type: none"> - Implement "no waste" philosophy in VFP. - Create a plan for mapping in sustainable production of vegan food.
Green Skills / Economy and marketing	<ul style="list-style-type: none"> - Understand role and objectives of business organisations within the economy - Understand the difference between linear and circular economy - Understand an economy based on low carbon, resource efficiency and social inclusiveness - Recognise the impact that economic environments leave on the business - community

	<ul style="list-style-type: none"> - Identify the traceability regulations applicable to a specific food industry - Understand the principles of food traceability
Green Skills / Society and visibility.	<ul style="list-style-type: none"> - Distinguish between sustainable and vegan food systems - Discuss the relationship between the different components in the food system with <ul style="list-style-type: none"> - environmental goals and with SDG 2030 - Explain the environmental impacts of food industry and vegan food processing - Explain how vegan food processing is impacted by environmental threats - Discuss the factors that may influence the environmental footprint of food systems - Identify environmental performance indicators - Identify appropriate measures of environmental performance of the vegan food processing - Propose and discuss changes on diet to reduce the carbon footprint and the water footprint - Discuss of diet changes to reduce carbon footprint and water footprint
Digitisation and Automation / Automation	<ul style="list-style-type: none"> - Operate effective cooperation with automation specialists - Recognize manual controlling of machines and processes - Explain basic understanding of automated systems - Identify common sensors in the automation of components and use cases for <ul style="list-style-type: none"> - sensors - Discuss PLC and how it can be used in systems control units
Digitisation and Automation / ICT	<ul style="list-style-type: none"> - Operate with basic ICT (working with human-machine interface; use different software, like traceability, IoT)
Digitisation and Automation / Robotics	<ul style="list-style-type: none"> - Identify various types of robots - Identify how to use robots in factory automation and other areas where robotics are used - Recognise the structure, properties, co-ordinations of robots, as well as the additional devices used in robots
Soft Skills / Critical and innovative thinking,	<ul style="list-style-type: none"> - Understand the problem before making decisions and taking action. - Evaluate available information for problem solving. - Identify the reasonableness of the decision and find out alternatives. - Take into account the consequences of the decision. - Choose problem solving methods and procedure - Apply relevant knowledge - Evaluate the results of the decision.
Soft Skills / Ethical understanding	<ul style="list-style-type: none"> - Recognizing the breadth of ethical judgements and factors that affect it; they will be able to reflect on an ethical issue and to produce sound decisions considering the judgements of different stakeholders.
Soft Skills / Active listening	<ul style="list-style-type: none"> - Understand what it takes to be a good listener. - Understand the importance of paying attention.

	<ul style="list-style-type: none"> - Know a few techniques to practice and improve active listening. - Use body language (non-verbal communication through gestures, tone of voice, etc.). - Provide feedback by questioning or asking for clarification. - Show appropriate responsiveness. - Show assertiveness with respect. - Hold judgement. - Paraphrase.
Soft Skills / Teamwork and leadership	<ul style="list-style-type: none"> - is able to learn proper team habits - is aware of the team structure - understands how to create a team - knows how to manage a team - is able to empower both already available and new members in the team

The learning outcomes agreed upon between the partners at EQF Level 5, for each unit are the following:

Unit and Topic	Learning Outcomes
Plant-Based Processing Technology / Technologies	<ul style="list-style-type: none"> - Identify the problems inherent in the production, processing and preservation of Vegan foods, Dairy & Meat substitutes - Describes the technological principals of processing of Vegan foods, Dairy & Meat substitutes - Applies the general principles of food preservation to Vegan foods, Dairy & Meat substitutes - Sketch Vegan foods, Dairy & Meat substitutes processing diagrams - Operates methods of quality control and food safety
Plant-Based Processing Technology / Nutrition	<ul style="list-style-type: none"> - Name and explain basic types of vegetarian diets, descriptions and rules of their application. Foods proportions in diets. - Name and define nutritional value of plant-based diets, with distinguishing sources of nutrients. - Identify the major antinutrients from plant sources and discuss how two manage them with technological operations in food industry. - Name and understand risks and benefits of plant-based diets in terms of health and noncommunicable diseases.
Green Skills / Sustainability	<ul style="list-style-type: none"> - List sustainable parameters - • Name conventional technologies and VFP (vegan food processing) and energy/water/ waste - critical points in VFP - • Relate food waste reduction in VFP with consumers - • Underline possible by-products in VFP - • Identify data that should be obtained to perform sustainability evaluation in VFP - • State possible ways of reporting sustainability evaluation that should be present in VFP
Green Skills / Legislation	<ul style="list-style-type: none"> - Identify the role of policy in promoting sustainable food practices - Identify the main government policies associated with sustainable food systems - Know European Legislation on Food Waste

	<ul style="list-style-type: none"> - Recognize the importance of the legal regulations related to the production and consumption processes of vegan foods - Recognize the terminology for food ethics and food fraud
Green Skills / Economy and marketing	<ul style="list-style-type: none"> - Understand role and objectives of business organizations within the economy - Understand the concept and the importance the green economy - Understand the difference between linear and circular economy - Understand an economy based on low carbon, resource efficiency and social inclusiveness - Explore the concept of the entrepreneurial mindset
Green Skills / Society and visibility.	<ul style="list-style-type: none"> - Distinguish between sustainable and vegan food systems - Explain the environmental impacts of food industry and vegan food processing - Analyze the relationship between the different components in the food system with environmental goals and with SDG 2030 - Discuss the factors that may influence the environmental footprint of food systems - Identify appropriate measures of environmental performance of the vegan food processing
Digitisation and Automation / Automation	<ul style="list-style-type: none"> - Operate effective cooperation with automation specialists - Recognize manual controlling of machines and processes - Explain basic understanding of automated systems - Identify common sensors in the automation of components and use cases for sensors • Organize PLC and how it can be used in systems control units
Digitisation and Automation / ICT	<ul style="list-style-type: none"> - Operate with basic ICT (working with human-machine interface; use different software, like traceability, IoT)
Digitisation and Automation / Robotics	<ul style="list-style-type: none"> - Identify various types of robots - Identify how to use robots in factory automation and other areas where robotics are used • Recognise the structure, properties, coordinations of robots, as well as the additional devices used in robots
Soft Skills / Ethical understanding	<ul style="list-style-type: none"> - Recognise the breadth of ethical judgements and factors that affect it - Be able to reflect on an ethical issue and to produce sound decisions considering the judgements of different stakeholders.
Soft Skills / Active listening	<ul style="list-style-type: none"> - Understand what it takes to be a good listener. - Understand the importance of paying attention. - Know a few techniques to practice and improve active listening. - Use body language (non-verbal communication through gestures, tone of voice, etc.). • Provide feedback by questioning or asking for clarification. - Show appropriate responsiveness. - Show assertiveness with respect. - Hold judgement. - Paraphrase.

Soft Skills / Teamwork	<ul style="list-style-type: none"> - is able to learn proper team habits - is aware of the team structure - understands how to create a team - knows how to manage a team - is able to empower both already available and new members in the team
Soft Skills / Intrapersonal and Interpersonal Skills	<ul style="list-style-type: none"> - differentiate between intrapersonal and interpersonal skills - • understand that intrapersonal and interpersonal skills can be practiced and improved • use different techniques to enhance self-awareness - • use different techniques to enhance self-discipline - • organise better their personal and professional lives
Soft Skills / Leadership	<ul style="list-style-type: none"> - Define leadership. - • Understand and explain how leadership operates in organizations. - • Identify his own strengths and development needs as a leader. - • Describe qualities and behaviours of effective leaders. - • Work effectively with other people, by applying leadership techniques related to specific situations

The learning outcomes agreed upon between the partners at EQF Level 6, for each unit are the following:

Unit and Topic	Learning Outcomes
Plant-Based Processing Technology / Technologies	<ul style="list-style-type: none"> - Principles and legislation to follow when producing vegan food that make the product safe - for the consumer - The influence of technological processes on nutrients of food plant products - Chemical composition, functional properties and biochemical processes occurring in plant - raw materials used for vegan food production - Properties of typical pathogens and microorganisms that cause vegan foods spoilage - (origins, development conditions, health impact) - Operations and technologies applied in production of plant food including machinery and - equipment selection - Contemporary information concerning vegan food production
Plant-Based Processing Technology / Nutrition	<ul style="list-style-type: none"> - Name and explain basics types of vegetarian diets, descriptions and rules of their application. - Foods proportions in diets. - Name and explain nutritional value vegan diets, with distinguishing sources of nutrients and - anti-nutritional compounds - Name and understand rules of bioavailability and bioaccessibility nutrients in plant diets. - Name and understand basics roles of protein's complementation on vegetarian's dietary - patterns. - Name and understand risks and benefits in terms of health and moncommunicable diseases.

Plant-Based Processing Technology / Marketing	<ul style="list-style-type: none"> - Explain the concept of market and its rules in national and global economy - Explain basic methods and techniques for shaping market processes and using marketing to develop food production - Identify methods of basic marketing analysis, appropriate tools in particular food marketing processes, and basic activities in marketing vegan products - Express basic principles of food law, identifies legal regulations that shape food safety - Identify legal requirements in vegan food production (procedures, documentation) - Complete a food product label that follows the current food labelling legislation and is ethically acceptable - Suggests a package material suitable to examples of vegan products
Plant-Based Processing Technology / Safety	<ul style="list-style-type: none"> - Explain the EU food safety system and hygiene control in food industry - Describe hazards in vegan food processing - Compare hazards in terms of sources of contamination, growth and survival in foods and control options - Create generic prerequisite program for vegan food processing - Elaborate principles and steps of HACCP system - Analyse HACCP plan of selected vegan food processing plant
Plant-Based Processing Technology / Analysis	<ul style="list-style-type: none"> - Discuss specialized methods of vegan food compounds and physical properties analysis - Evaluate potential allergenicity of new raw materials - Discuss instrumental methods of organoleptic characteristics and design their applications in solving technological problems - Explain intentional and unintentional food adulteration and their implications - Assess the health risks associated with food adulteration - Distinguish between genomic and proteomic-based methods of fraud detection - Evaluate the importance of the analysis of food origin and authenticity - Appraise the importance of professional and ethical responsibility for the production of authentic/high-quality food - Plan sensory techniques used in the analysis of plant products. - Design research in order to determine the preferences of vegan consumers (preference mapping) and to indicate possible sensory optimization options for the product intended for them.
Green Skills / Sustainability	<ul style="list-style-type: none"> - Identify sustainable parameters - Explain vegan food processing in terms of sustainability - Compare conventional technologies with VFP - Distinguish energy/water/ waste critical points in VFP - Create a plan for food waste reduction in VFP - Manage education for consumers regarding sustainability in VFP - Estimate by-products in VFP - Evaluate food byproducts worth for further processing - Analyze data obtained from sustainability evaluation in VFP

	<ul style="list-style-type: none"> - Apply tools for sustainability evaluation in VFP in complete value chain
Green Skills / Vegan Food Processing	<ul style="list-style-type: none"> - Implement “no waste” philosophy in VFP. - Create a plan for mapping in sustainable production of vegan food. - Prepare procedures of the assessment system in VFP. - Preparation of documents for the system & Test
Green Skills / Economy and marketing	<ul style="list-style-type: none"> - Assess the ‘take-make-dispose approach forming the basis of the existing economic system - Apply theories based on circular economy approach to design more sustainable products - Examine theories that enable the shift from a linear model to a circular economy - Examine interdependencies of both local and global environmental problems - Evaluate economy of green energy generated from various energy sources - Map food processes using flow charts and communication diagrams - Explore blockchain properties as applied to critical control points for food quality and traceability - Compare techniques used to generated and evaluate business ideas - Examine important considerations when developing a business idea - Apply business planning and control initiatives
Green Skills / Food Legislation	<ul style="list-style-type: none"> - Identify the role of policy in promoting sustainable food practices - Analyse government policies associated with sustainable food systems - Analyse European Legislation on Food Waste - Evaluate the concept of food law and legislation - Evaluate the legal regulations related to the production and consumption processes of vegan foods - Examine the background and terminology for food ethics and food fraud - Inspect relevant control measures to combat the vulnerability to fraud for various cases - Evaluate legislation on food fraud in the EU - Analyse definition of vulnerability assessment tools such as The Rapid Alert System for Food and Feed (RASFF), EMAAlert, etc. - Appraise consumer perceptions of food ethics and food fraud - Evaluate what voluntary food labelling is. - Illustrate the importance of labelling for vegan industry
Green Skills / Society and Visibility	<ul style="list-style-type: none"> - Distinguish between sustainable and vegan food systems - Explain what does ‘sustainability’ mean, in the context of food systems - Analyse the relationship between the different components in the food system with environmental goals and with SDG 2030 - Explain the environmental impacts of food industry and vegan food processing - Explain how vegan food processing is impacted by environmental threats - Discuss evidence-based strategies to promote sustainable diets (including vegan diets) - Discuss the factors that may influence the environmental footprint of food systems

	<ul style="list-style-type: none"> - Identify environmental performance indicators - Identify appropriate measures of environmental performance of the vegan food processing - Propose and discuss changes on diet to reduce the carbon footprint and the water footprint - Use simple software tools - Design a vegan food consumption survey - Discuss of diet changes to reduce carbon footprint and water footprint - Public presentation of documents elaborated during classes
Digitisation and Automation / Automation	<ul style="list-style-type: none"> - Operate effective cooperation with automation specialists - 2. Explain basic understanding of automated systems - 3. Identify common sensors in the automation of components and use cases for sensors - 4. Organize PLC and how it can be used in systems control units - 5. Design sensing for specific vegan food processes - 6. Identify online offline need of sensing - 7. Identify instruments and systems used in process automation, such as control rooms, control instruments and field buses in the process industry
Digitisation and Automation / ICT	<ul style="list-style-type: none"> - Arrange version control for natural origin raw material changes and properties - 2. Operate with basic ICT (working with human-machine interface; use different software, like traceability, IoT) - 3. Apply Manufacturing Enterprise System software for documentation
Digitisation and Automation / Robotics	<ul style="list-style-type: none"> - Identify various types of robots - Operate fault diagnostic of robots - Recognise the structure, properties, co-ordinations of robots, as well as the additional devices used in robots - Operate in handling and programming industrial robots using online and offline methods of programming - Select devices for the automatic handling of products. - Integrate devices for the automatic handling of products.
Digitisation and Automation / Electives	<ul style="list-style-type: none"> - Categorize additive manufacturing technologies (e.g. 3D printing to the food processing) - Select correct methods of automated quality control, e.g. machine vision, Artificial Intelligence (AI) and Machine Learning (ML) - Analyze the meaning of thermal processing control
Soft Skills / Ethical understanding	<ul style="list-style-type: none"> - Recognise the breadth of ethical judgements and factors that affect it; - Reflect on an ethical issue and to produce sound decisions considering the judgements of different stakeholders.

Soft Skills / Critical and Innovative Thinking	<ul style="list-style-type: none"> - Understand the problem before making decisions and taking action. - Evaluate available information for problem solving. - Identify the reasonableness of the decision and find out alternatives. - Take into account the consequences of the decision. - Choose problem solving methods and procedure - Apply relevant knowledge
Soft Skills / Teamwork	<ul style="list-style-type: none"> - is able to learn proper team habits - is aware of the team structure - understands how to create a team - knows how to manage a team - is able to empower both already available and new members in the team
Soft Skills / Intrapersonal and Interpersonal Skills	<ul style="list-style-type: none"> - differentiate between intrapersonal and interpersonal skills - • understand that intrapersonal and interpersonal skills can be practiced and improved - • use different techniques to enhance self-awareness - • use different techniques to enhance self-discipline - • organise better their personal and professional lives
Soft Skills / Active Listening	<ul style="list-style-type: none"> - Understand what it takes to be a good listener. - Understand the importance of paying attention. - Know a few techniques to practice and improve active listening. - Use body language (non-verbal communication through gestures, tone of voice, etc.). - Provide feedback by questioning or asking for clarification. - Show appropriate responsiveness. - Show assertiveness with respect. - Hold judgement. - Paraphrase.
Soft Skills / Leadership	<ul style="list-style-type: none"> - Define leadership. - Understand and explain how leadership operates in organizations. - Identify his own strengths and development needs as a leader. - Assess their own styles of influencing others and of exercising leadership and power - Integrate knowledge about the different styles of leadership and influence and understand their impact on behaviour in the workplace - Describe qualities and behaviours of effective leaders. - Work effectively with other people, by applying leadership techniques related to specific situations.

The learning outcomes agreed upon between the partners at EQF Level 7, for each unit are the following:

Unit and Topic	Learning Outcomes
Plant-Based Processing Technology / Technologies	<ul style="list-style-type: none"> - In-depth theoretical foundations in the field of vegan food technology and keeps track of current trends, innovations and research directions in this field - The health risks associated with contamination and adulteration of vegan foods and its estimation and reduction - Analyze situations related to the vegan food technology, storage and manage activities to improve the quality and efficiency of production, and sustainability of the natural environment - Analyze in detail and critically evaluate various technical and technological solutions - Evaluate and put into practice the standards of the food sector (e.g., EC, ISO, BRC, IFS) as well as the production and safety of vegan food - Develop and design a food product, technological process and packaging in accordance with the technical knowledge and market requirements
Plant-Based Processing Technology / Nutrition	<ul style="list-style-type: none"> - Name and explain basics types of vegetarian diets, descriptions and rules of their application. Foods proportions in diets. - Name and explain nutritional value vegan diets, with distinguishing sources of nutrients and anti-nutritional compounds - Name and understand rules of bioavailability and bioaccessibility nutrients in plant diets. - Name and understand basics roles of protein's complementation on vegetarian's dietary patterns. - Use a roles of increase bioavailability and protein complementation for vegan diet planning - Name and understand risks and benefits in terms of health and moncommunicable diseases.
Plant-Based Processing Technology / Marketing	<ul style="list-style-type: none"> -
Plant-Based Processing Technology / Safety	<ul style="list-style-type: none"> - Propose hygienic solutions in vegan food processing and methods for cleaning validation - Conduct a hazard analysis and determine critical control points - Explain the significance of critical limits and corrective action - Develop a HACCP plan
Plant-Based Processing Technology / Analysis	<ul style="list-style-type: none"> - Discuss specialized methods of vegan food compounds and physical properties analysis - Evaluate potential allergenicity of new raw materials - Discuss instrumental methods of organoleptic characteristics and design their applications in solving technological problems - Explain intentional and unintentional food adulteration and their implications - Assess the health risks associated with food adulteration - Distinguish between genomic and proteomic-based methods of fraud detection - Evaluate the importance of the analysis of food origin and authenticity - Appraise the importance of professional and ethical responsibility for the production of authentic/high-quality food

	<ul style="list-style-type: none"> - Plan sensory techniques used in the analysis of plant products. - Design research in order to determine the preferences of vegan consumers (preference mapping) and to indicate possible sensory optimization options for the product intended for them.
Green Skills / Sustainability	<ul style="list-style-type: none"> - Identify primary and secondary sustainable parameters - Explain vegan food processing in terms of sustainability - Compare vegan food processing in terms of sustainability with conventional meat processing - Plan management of mapping energy/water/waste critical points in conventional technologies with VFP - Measure efficiency in energy/water/waste requirements in VFP (usage of life cycle assessment software) - Create a plan for food waste reduction in VFP - Evaluate most effective plan for waste reduction in VFP - Manage education for consumers regarding sustainability In VFP - Score the consumers knowledge in sustainable indicators and societal impact (usage of life cycle assessment software) - Estimate by-products in VFP - Rate most valuable by-product from VFP (in terms of nutraceuticals/energy/proteins) (usage of life cycle assessment software) - Analyze data obtained from sustainability evaluation in VFP. On-site case study (visiting to processing plant) and collected data - Justify sustainability evaluation in VFP in complete value chain (case study) – impact to ecology, environment and society. On-site case study (visiting to processing plant) and collected data
Green Skills / Vegan Food Processing	<ul style="list-style-type: none"> - Apply tools for traceability of VFP. - Evaluation of production processes in terms of quality assurance in VFP. - Choose the type of packaging and information for the label of VFP. - Formulate the main rules in the developing and designing process of VFP and create a new VFP. - Preparation of documents for the system & Test
Green Skills / Economy and marketing	<ul style="list-style-type: none"> - Construct a multidisciplinary view of the ecosystem of ideas, legislation and stakeholders at play in the Circular Economy. - Evaluate Circular Economy opportunities and solutions in an food related organization sector - Support an outlook for the green economy - Examine Bio-diversity and ecosystem services - Analyse a production supply chain and design a traceability system - Assess the implications involved in product recalls and food fraud - Appraise the value of research and development as an essential tool in the development and progress of business activity. - Manage a market strategy, taking into consideration the ethical aspects that a business must take into consideration
Green Skills / Society and Visibility	<ul style="list-style-type: none"> - Distinguish between food systems, sustainable and vegan food systems - Discuss, from an environmental perspective, the differences between sustainable and vegan - food systems

	<ul style="list-style-type: none"> - Explain the contribution of vegan food systems to SDG 2030 - Explore the broad tools that can be used to make food systems sustainable - Develop strategies for communicating about vegan food systems - Compare the impact of food systems (including vegan food systems) on natural resources and ecosystems services - Discuss the influence of effects of environmental issues into the vegan food systems (including land use, climate change and biodiversity loss) - Explore some tools used to collect information about the impact of vegan diet in environmental issues (such as the use of big data, modeling and behavior change models) - Propose food systems changes to achieve an environmental integrity - Explore the environmental performance indicators associated with sustainable and vegan diet - Discuss the how we collect data from individuals and how to translate that into a measure of impact - Use some tools to collect information about environmental impacts of food systems and diets - Use software tools to evaluate footprints diets, including vegan diet - Discuss appropriate measures of environmental performance of the vegan food processing - Calculate the environmental footprint of vegan diet - Propose strategies to reduce environmental footprint - Communicate the environmental footprint of vegan diet - Public presentation of documents elaborated during classes
<p>Digitisation and Automation / Automation</p>	<ul style="list-style-type: none"> - Operate effective cooperation with automation specialists - 2. Explain basic understanding of automated systems - 3. Identify common sensors in the automation of components and use cases for sensors - 4. Organize PLC and how it can be used in systems control units - 5. Design sensing for specific vegan food processes - 6. Identify online offline need of sensing - 7. Identify instruments and systems used in process automation, such as control rooms, control instruments and field buses in the process industry
<p>Digitisation and Automation / ICT</p>	<ul style="list-style-type: none"> - Arrange version control for natural origin raw material changes and properties - 2. Operate with basic ICT (working with human-machine interface; use different software, like traceability, IoT) - 3. Apply Manufacturing Enterprise System software for documentation
<p>Digitisation and Automation / Robotics</p>	<ul style="list-style-type: none"> - Identify various types of robots - Operate fault diagnostic of robots - Recognise the structure, properties, co-ordinations of robots, as well as the additional devices used in robots - Operate in handling and programming industrial robots using online and offline methods of programming - Select devices for the automatic handling of products.

	<ul style="list-style-type: none"> - Integrate devices for the automatic handling of products.
Soft Skills / Ethical understanding	<ul style="list-style-type: none"> - Recognize the breadth of ethical judgements and factors that affect it; they will be able to reflect on an ethical issue and to produce sound decisions considering the judgements of different stakeholders.
Soft Skills / Critical and Innovative Thinking	<ul style="list-style-type: none"> - Understand the problem before making decisions and taking action. - Evaluate available information for problem solving. - Identify the reasonableness of the decision and find out alternatives. - Take into account the consequences of the decision. - Choose problem solving methods and procedure - Apply relevant knowledge - Evaluate the results of the decision.
Soft Skills / Teamwork	<ul style="list-style-type: none"> - is able to learn proper team habits - is aware of the team structure - understands how to create a team - knows how to manage a team - is able to empower both already available and new members in the team
Soft Skills / Active Listening	<ul style="list-style-type: none"> - Understand what it takes to be a good listener. - Understand the importance of paying attention. - Know a few techniques to practice and improve active listening. - Use body language (non-verbal communication through gestures, tone of voice, etc.). - Provide feedback by questioning or asking for clarification. - Show appropriate responsiveness. - Show assertiveness with respect. - Hold judgement. - Paraphrase.
Soft Skills / Leadership	<ul style="list-style-type: none"> - Define leadership. - Understand and explain how leadership operates in organizations. - Identify his own strengths and development needs as a leader. - Describe qualities and behaviours of effective leaders. - Work effectively with other people, by applying leadership techniques related to specific situations

3. ECVET, ECTS Credits and Delivery Methods

ECVET (European Credit System for Vocational Education and Training) and ECTS (European Credit Transfer and Accumulation System) are two credit systems developed in Europe to facilitate the recognition and transfer of credits between educational institutions and systems. These systems aim to enhance mobility and the transparency of qualifications across European countries.

ECVET is specifically designed for vocational education and training (VET) programs with its primary goal being to facilitate the transfer, recognition, and accumulation of learning outcomes and credits in the vocational education sector across European countries. ECVET breaks down qualifications into smaller units of learning outcomes, and hence the reason why the learning outcomes above were developed and agreed upon by all partners. These units are assessed and can be accumulated toward a full qualification. ECVET uses the ECVET credit as a measure of the volume of learning outcomes achieved by a learner. This credit system allows for the recognition and transfer of credits between different VET systems. Moreover, ECVET enhances transparency by providing a common framework for describing qualifications and their components and it also supports the mobility of learners and workers across European countries.

ECTS main purpose is to facilitate the recognition of study achievements and the transfer of credits between higher education institutions in Europe. ECTS focuses on the credit transfer of entire study programs or individual course units. Each course is assigned a certain number of ECTS credits based on the estimated workload required to complete it successfully. ECTS credits represent the student workload required to achieve the intended learning outcomes. One ECTS credit is generally equivalent to 25-30 hours of student work, including lectures, seminars, independent study, and examinations. ECTS contributes to the transparency of higher education systems by providing a common language for describing study programs and their components. It facilitates student mobility by allowing them to transfer their credits seamlessly between different European institutions.

Both ECVET and ECTS play crucial roles in the European education landscape by providing standardized systems for credit transfer and recognition. While ECVET is tailored for vocational education and training, ECTS is primarily used in higher education. These systems contribute to the broader goals of the European Higher Education Area and the European Qualifications Framework by promoting transparency, comparability, and mobility across educational systems.

The units developed for EQVEGAN were always aimed to be in alignment with ECTS (European Credit Transfer and Accumulation System) and ECVET (European Credit System for Vocational Education and Training). This was crucial because following ECTS and ECVET ensures that the units are structured in a way that allows for the easy transfer and accumulation of credits. This is critical for student mobility, as it enables learners to move seamlessly between educational

institutions and countries, pursuing part of their education in different locations. More importantly, in this case, ECTS and ECVET provide a standardized way of describing and measuring learning outcomes, workload, and credits. The EQVEGAN partners always aimed of having this transparency in the design and delivery of courses, making it easier for students, educators, and institutions to understand and compare qualifications.

Courses developed in adherence to ECTS and ECVET are more likely to be recognized internationally. This is particularly important in the context of globalized education and the increasing mobility of students and workers. Institutions and employers from different countries can more easily understand and evaluate the qualifications earned through these systems. Since the EQVEGAN partners longed for flexibility, ECTS and ECVET are designed to be flexible and applicable across various education levels. This flexibility supports the concept of lifelong learning, allowing individuals to accumulate credits and qualifications over time, even if their educational journey is non-linear or involves periods of work and study. This allowed the project a broader outreach as can be seen through the results achieved.

Also, it is important to keep in mind that ECTS and ECVET are closely linked to the European Qualifications Framework (EQF), which provides a common reference framework for qualifications in Europe. Aligning new courses with these credit systems ensures consistency between the partners and with the broader European educational and qualifications framework. ECTS and ECVET were also the foundation for collaborative initiative and exchange of ideas between the partners. Compatibility in credit systems facilitates partnerships between institutions, encourages joint programs, and promotes academic and professional collaboration across borders.

They also provide a standardized approach to course design and assessment and this in turn helps ensure that courses meet certain criteria and standards, promoting the quality and comparability of education and training programs. Following ECTS and ECVET also allowed the project to simplify the administrative processes related to credit transfer and recognition. The partner institutions could more easily evaluate the learning outcomes and credits earned by students, streamline administrative procedures and reduce bureaucratic barriers.

In summary, adherence to ECTS and ECVET in course development contributed to a more interconnected and transparent development and implementation of the units between the participating. In the future it will also support the mobility of learners, facilitate international recognition, and promote the overall quality and consistency of education and training programs.

It was agreed during WP2 that learning outcomes, ECVET and ECTS credits will be validated across the different countries to facilitate the design of a reliable European certification scheme. Also, the certification scheme will be designed to include recognition of prior non-formal and informal learning and guidelines will be issued for guidance by the training organizations.

3.1 Level 4

For example the implementation of the units at EQF Level 4 at MCAST, took the following shape. MCAST opted for face-to-face delivery of these sessions.

Unit	Contact Hours	Non-Contact Hours	Assessment Hours	ECVET
Digitisation and Automation	30	35	10	3
Green Skills	30	35	10	3
Plant-Based Technologies	30	35	10	3
Soft Skills	20	15	15	2

At ETP Sicó, the EQF Level 4 units were delivered as follows. Sessions at ETP Sicó were 100% online teaching, learning and assessment.

Unit	Synchronous Hours	Asynchronous Hours	ECVET
Digitisation and Automation	25	50	3
Green Skills	25	50	3
Plant-Based Technologies	25	50	3

3.2 Level 5

At EQF Level 5, AU along with TAGEM, opted for a 2-day seminar approach, with a total of 18 contact hours spread over the 2 days. No assessment has taken place for these sessions and a certificate of attendance was distributed to those who attended both days. The seminar was organised as completely face-to-face.

AGRIA-ACTIA-CRITT implemented a two-hour session on robotics/automation and a one-hour session on plant-based technologies. ITERG implemented a one-hour session. Like AU and TAGEM, no assessment took place, with the session being held in hybrid format (both face-to-face and online). In this case it is cannot be confirmed whether the learning outcomes set out have been achieved.

3.3 Level 6

The most number of deliveries by different partners occurred at Level 6. FFTB implemented as follows:

Unit	In-Class Hours	Online Hours	Practice Hours	Assessment Hours	ECTS
Digitisation and Automation	75	75	115	11	11
Green Skills	52	45	45	8	6
Plant-Based Technologies	45	45	52	8	6
	In-Class, Contact and Assessment Hours			Self-Study	
Soft Skills	44			56	

IPC implemented as per the table below:

Unit	Contact Hours	ECTS
Digitalisation and Automation	30	3
Environmental Skills for the Food Industry	38 (12 lectures and 24 practical)	6
Meat and Dairy Analogue Technology	38	6

PULS implemented as per the table below. At PULS the lectures were conducted online, and the practical sessions were carried out face-to-face at their facilities.

Unit	Contact Hours	ECTS
Digitalisation and Automation	10 (6 lectures and 4 practical)	1
Green Skills	12 (8 lectures and 4 practical)	1
Plant-Based Processing	28 (14 lectures and 12 practical)	3

At SEAMK, each unit was provided with 5 contact hours of lecturing. Further to that a three-hour practical session was provided for Digitisation and Automation along with a six-hour practical session to cover plant-based processing, green skills, and soft skills.

AU along with TAGEM, opted for a 2-day seminar approach, with a total of 18 contact hours spread over the 2 days. No assessment has taken place for these sessions and a certificate of attendance was distributed to those who attended both days. The seminar was organised as completely face-to-face.

4. The EQAVET Cycle

The EQAVET (European Quality Assurance in Vocational Education and Training) cycle is a framework designed to support the continuous improvement of quality assurance systems in vocational education and training. The EQAVET cycle consists of several interconnected stages, providing a structured approach to quality assurance.

The inception EQAVET can be traced back to the 2009 recommendation of the European Parliament and Council¹. It serves as a comprehensive European framework designed to facilitate quality assurance in vocational education and training (VET) throughout Europe.

EQAVET is structured around a quality assurance and improvement cycle, encompassing planning, implementation, evaluation/assessment, and review/revision. Additionally, it incorporates a set of descriptors and indicators applicable to quality management at both the VET system and VET provider levels.

It's important to note that EQAVET does not advocate for a specific quality assurance system or approach. Instead, it offers a framework consisting of common principles, indicative descriptors, and indicators. This framework functions as a versatile 'toolbox,' allowing users to select descriptors and indicators that align with the specific requirements of their quality assurance system.

Furthermore, EQAVET aligns with the 2020 recommendation on vocational education and training for sustainable competitiveness, social fairness, and resilience². The VET Recommendation provides guidance on leveraging EQAVET to enhance the quality of both initial and continuing VET, presenting the complete EQAVET Framework.

The EQAVET Framework serves as a valuable resource for VET providers and VET systems, supporting the quality assurance of diverse learning environments (such as school-based provision, work-based learning, apprenticeships, formal, informal, and non-formal provision) across various learning contexts (including digital, face-to-face, and blended modalities). It is applicable to both public and private sector VET providers and extends its coverage to encompass VET awards and qualifications at all levels of the European Qualifications Framework.

At the provider level, during the evaluation stage, self-assessment and self-evaluation was carried out at the initiative of each partner. Evaluation and review cover processes and the results and outcomes of education and training including the assessment of learner satisfaction as well as staff performance and satisfaction. Reference to this can be found in the D4.2 to D4.5

¹ [https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX:32009H0708\(01\)&qid=1611571795661](https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX:32009H0708(01)&qid=1611571795661)

² <https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX%3A32020H1202%2801%29>

deliverables, for each level at which the units were delivered. Evaluation and review should also include the collection and use of data, and adequate and effective mechanisms to involve internal and external stakeholders. Unfortunately, due to time constraints this aspect was not carried out.

During the review stage, learners' feedback was gathered on their individual learning experience and on the learning and teaching environment. Together with teachers', trainers' and all other relevant stakeholders' feedback this data is to be used to inform further actions. Information on the learning outcomes is available in the deliverables prepared for WP2. Procedures on feedback and review are part of a strategic learning process of the partners and support the development of high-quality provision and improve opportunities for learners. The results and outcomes of the evaluation process are discussed in the D4.2 to D4.5 deliverables along with the with relevant action plans that were put in place.

The individual EQAVET indicators introduced as part of the deliverables of WP4 were also referenced to during the review and assessment stages. The **first indicator** was related to the participation and progression in VET, measuring the percentage of young people participating in VET and the percentage of VET learners who complete their training. This data is made available in the D4.2 to D4.5 deliverables.

The **second indicator** measured the alignment of VET with the needs of the labour market and the employment outcomes of VET graduates. This indicator was not directly assessed at this stage, however from feedback gathered from students who are already with the industry, the early indications are that the units do align with the needs of the labour market and to where it is heading. The **third indicator** measures the contribution of VET to the economic development of the region or country. This indicator was beyond the scope of the project. A follow-up study along with a tracer study would need to be implemented to be able to gather the necessary data for this indicator. The **fourth indicator** measures the quality of the learning environment, the teaching and learning process, and the outcomes of VET. This was extensively assessed for the project and further details are provided in the D4.2 to D4.5 deliverables.

Once again, the **fifth indicator**, being the measurement of the effectiveness of the governance and management of VET at the national, regional, and local levels, was deemed to be outside the scope of the project. However, the recognition, validation, and accreditation of learning, being the **sixth indicator** was part of our review and analysis. This indicator aims to measure the processes in place for recognizing, validating, and accrediting the learning that takes place in VET. It is imperative to underscore at this stage that the diverse requisites across various countries and partners regulations compelled the collaborators to implement the units with varied methods. These variations encompassed disparate ECTS (European Credit Transfer and Accumulation System) allocations, durations, and content structures. It is noteworthy that, in some instances, despite utilizing the deliverables from Work Package 2 (WP2) as guiding

principles, these distinctive implementations posed a hindrance for the partners to accurately quantify credits and learning outcomes.

The **seventh indicator** was also assessed as part of our study. This relates to the quality assurance of VET, measuring the effectiveness of the quality assurance systems in place for each partner of this project. In this case this was carried out through feedback gathered from the lecturers involved in the delivery of the units.

The **eight indicator**, cooperation and partnerships are a testimony to the work carried out by the EQVEGAN sector skills alliance. This project wouldn't have been possible without the cooperation and partnerships formed by the various institutions involved in this project. The **penultimate indicator** measures lifelong learning and mobility. As reported in deliverables D4.2 to D4.5 the units developed allowed the students to enhance their knowledge in the vegan food industry sector. Moreover, where units have been accredited, this also provides a measure mobility for learners and professionals.

Finally, to form an opinion on the **final indicator**, one would need to carry out a follow-up study following the delivery of the units. Since the unit delivery took place at the very end of the project timeframe, this indicator could not be properly explored and assessed.

5. Conclusion

In essence, the integration of learning outcomes into the fabric of educational design elevates the learning experience from a mere dissemination of information to a purposeful and student-centric journey. This approach, aligned with broader educational objectives, not only fosters clarity and coherence but also empowers learners to actively shape their educational paths.

As a catalyst for meaningful assessment, flexibility, and continuous improvement, learning outcomes stand as pillars supporting the creation of dynamic, inclusive, and forward-thinking educational environments. Through their implementation, this project was able to navigate the vegan educational landscape with purpose, ensuring that each step taken contributes to the holistic development of the learners and the enduring success of the sector skills alliance.