STATE OF THE ART REPORT

TRAIN CE FOOD PROJECT

TRAIN-CE-FOOD

European Commission

EPeKa Slovenia · STRATECO · Fakultet agrobiotehničkih znanosti Osijek · IED · PARAGON EUROPE · cantabria permacultura

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CONTENT

TABLES & FIGURES

1 INTRODUCTION

As argued by the European Commission Europe's economic growth and jobs depend on its ability to support the growth of enterprises. Thus, the Commission is encouraging people to become entrepreneurs and try to make it easier for them to set up and grow their businesses. Furthermore, the Commission discussed the importance of the circular economy (CE), bringing major economic benefits, contributing to innovation, growth, and job creation. A circular economy encourages sustainability and competitiveness in the long term and helps saving costs for European industries, unlocking new business opportunities, and creating local low and high skilled jobs. Food issues were defined as a priority area, promoting a circular economy. On May 6th, 2019, the Commission reported that each year around 20% of food produced in the EU is lost or wasted, causing unacceptable social, environmental, and economic harm. The EU is committed to solving this problem and putting its food system onto a sustainable path.

TRAIN-CE-FOOD objective is acquiring innovative, specialized competencies for youth, by empowering them to make use of entrepreneurship and cooperative skill-sets and mindsets, which will enable them to create much more efficient cooperative solutions and business models in the field of CE and food supply chains via open online learning, face-to-face workshops, and in-depth remote coaching.

A first step towards **TRAIN-CE-FOOD** goal is to realize the specific objectives, which depend also on the so called background activities, where one of them is "*Analysis of Competencies*". The objective is to build up a knowledge base, and map existing good practices, and it is in a compliance with the following specific objectives:

- develop and design curricula for secondary and higher education level (Entrepreneurship Competence Framework will be used as a basis for both levels);
- develop and design an open OER platform with 3 integrated modules, supported by an e-textbook to ensure that learners will acquire skills, competencies and knowledge – modules will be integrated in learning/ teaching at the secondary and university levels;
- create training material used during face-to-face workshops, focusing on interaction with peers and business world, and training material for in-depth remote coaching with business mentors.

This further comprehends an extensive analysis of the existing good practices (WP1, Task 1.2), which will be the basis of the work in WP2, WP3, and WP4.

2 METHODS & APPROACHES

This deliverable D1.3 covers the state-of-the-art analysis, as result of a systemic, theoretical and practical elaboration of present conditions about the food related topics and entrepreneurship education in partner countries. Initially, partners prepared national state-of-the-art reports, consisting of competences and mapping of good practices. Partners carried out a review of higher education and secondary education offerings, covering food, circular economy, and entrepreneurship trainings. This activity also comprehended a review of existing training materials, method used, etc.

In order to prepare national state of the art reports, the partners have to followed the guidelines, see Table 1.

Tab.1. Guidelines/methodology for preparing a national-state-of-the-art reports

	CHAPTER NAME	CONTENTS	MAX. NUMBER OF CHARACTER	NOTES
1	Introduction	General introduction of your country, education system	2,000	General introduction of your country educational system: • for higher education; • for secondary education; • try to relate this to the circular economy, food cooperatives, entrepreneurship.
2	Legal framework	Description of the legal framework: regional, national, municipal level	3,000	Description of the legal framework for the secondary and tertiary education, that were complied in development of this plan/case study: • the relevant regulations and documents at the EU level, national level, regional, municipal; • strategic documents on local/regional level (plans, regulations, spatial plans, strategies, etc.); • For example in Slovenia we have strategic documents for integrating sustainable development, CE into the education.
3	Main goals and methodology	Indicate the main goals of your study and methodology used	2,000	Main goals are: • to identify the present conditions in your country related to food, CE, entrepreneurship; • to review and integration into HEIs and secondary schools related to food supply chain issues and CE; • to evaluate existing training materials. Methodology: • describe your methodology of the curricula and materials review – how did you carry out the research, which methods, web pages were used.

	CHAPTER NAME	CONTENTS	MAX. NUMBER OF CHARACTER	NOTES
4	Educational offers	Description of the educational curricula offered in your country at the 2nd and 3rd level.	12,000	Partners should describe educational curricula at the national level. Please make a specific focus on the level of integration (if any) among CE, entrepreneurship, food related topics, cooperatives, at the university and secondary school level. Courses addressed are indicatively agriculture, food and catering, tourism and catering, environmental related, entrepreneurship: • this tasks covers an in-depth analysis of relevant curricula (secondary schools and HEIs), training materials, competencies, topics in partner countries and identification of good practices regarding integration of entrepreneurship, CE, cooperatives in existing education; • you have to select 3 good cases (2 HEI, 1 secondary or 1 HEI and 2 secondary) and discuss them in-depth – by identifying courses, competencies mentioned within these courses, and pedagogical methods.
5	Integration with our project, identifying gaps	Description of the level of integration between this case study and our project as well as 2 pilot projects financed by the EC: COOPilot and ECOOPE	6,000	In the good cases (best practice in your country) try to identify: • Any synchronisation, synergies with our TRAIN-CE-FOOD proposal if yes, where and explain (look form educational content perspective, competencies gained and learning/teaching methods) • is there any synchronisation, synergies with COOPilot and ECOOPE in your identified national good case studies (again, form educational content perspective, competencies gained and learning/teaching methods • what are the gaps at your national level in a relation to the legal framework chapter above • what are the gaps, needs, which TRAIN-CE-FOOD will fulfil for your national, regional level? Focus on the content of the courses offered, competencies and learning, teaching methods and materials.
6	Other informations	You can use this chapter if you want to add something that was not included in previous chapters, but is important for better under-standing of your study.		If there is something we did not mentioned and you feel to discuss it.
9	Annexes	Full text of described case study	/	Full text of described case studies, links to the curricula, copies of the curricula, content of the courses, learning methods used, etc.

3 RESULTS

This section represents the results obtained from the national state-of-the-reports. Each further section represents one of the partners' country. The section is structured into the following subsections:

- Introduction;
- Legal framework related to the education;
- Main goals and methodology;
- Educational offers;
- Project integration, and identifying gaps;
- Other supporting information.

4 AUSTRIA

4.1. INTRODUCTION

This national state-of-the-art-report gives a short overview of food and circular economy related good practices curricula in Austria. In addition it takes a look at entrepreneurship and co-operative related contents within the examined curricula.

To allocate the analysed examples Figure 1 shows the Austrian educational system as a whole. Examples from Secondary Level II (age 14 to 18) as well as tertiary level have been examined in this report. Examples from Secondary Level II (age 14 to 18) as well as tertiary level have been examined in this report.

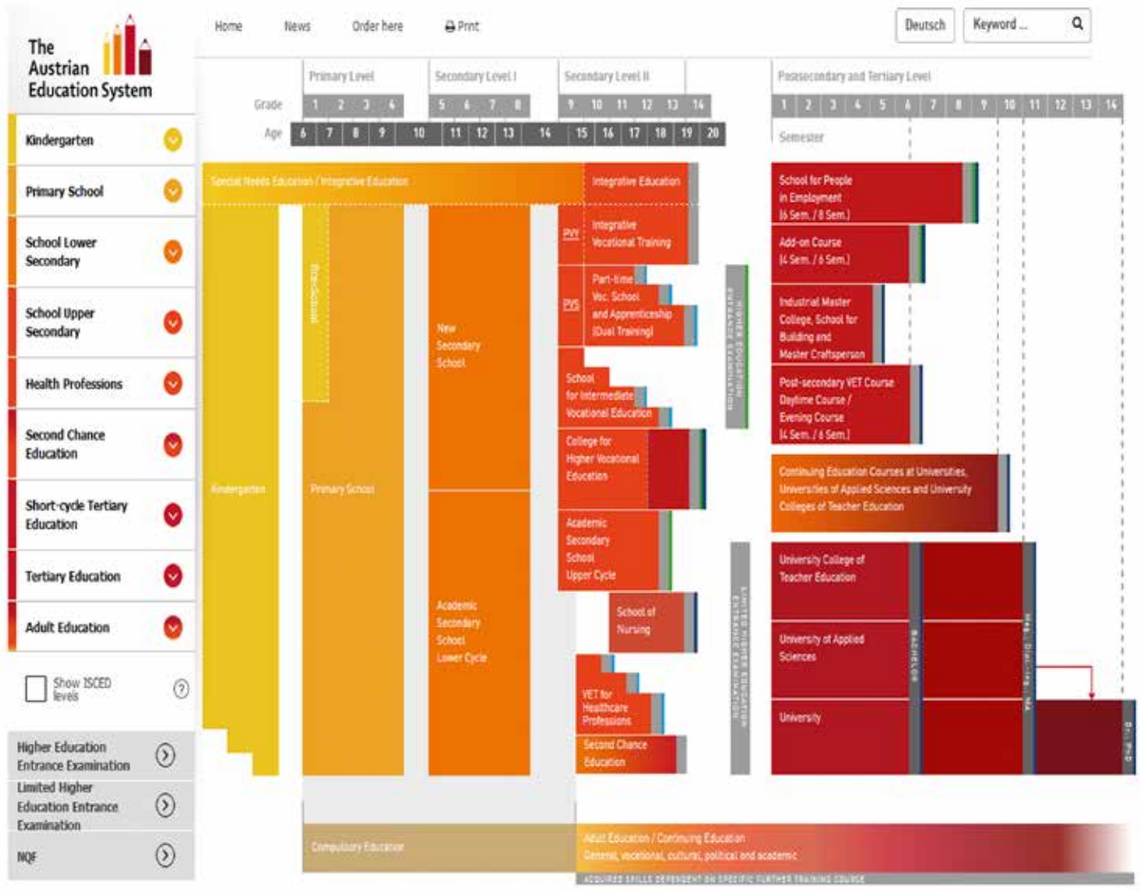


Fig. 1. Austrian Educational System [1]

[1] *The Austrian education system: <https://www.bildungssystem.at/en/>*

4.2. LEGAL FRAMEWORK

Since 2008 Austria has a ***"Strategy for Education for Sustainable Development"*** [2] , initiated by the Austrian Federal Ministry of Agriculture, Forestry, Environment and Water. Management, Austrian Federal Ministry for Education, Arts and Culture and Austrian Federal Ministry of Science and Research.

The Strategy pursues the goal, to **promote a change in awareness towards sustainability among students and teachers**. The strategy intends to use the following elements for this purpose:

- anchoring in the educational system;
- partnerships and networks;
- development of the competences of the teaching staff;
- research and innovation;
- development of scenarios;
- monitoring and evaluation.

For **secondary level** it means especially interdisciplinary learning. Communication and management structures should be strengthened in schools. That needs school development in the sense of sustainable development. Cooperation between schools and communities, companies or NGOs ensure the necessary proximity to life. Transdisciplinary and interdisciplinary pose special challenges for **universities**. In teaching, the universities, universities of applied sciences and teacher training colleges are increasingly called upon to implement sustainable development and develop their didactics accordingly.

4.3. MAIN GOALS AND METHODOLOGY

Main **goals** are of this report are

- to identify the present educational conditions in Austria related to food, circular economy and entrepreneurship;
- to identify and evaluate specific existing training materials an;
- to elaborate a possible integration of the results into the TRAIN-CE-FOOD project.

Methodology

The following 3-steps approach was applied for this report:

- Step 1: Search for secondary schools and studies at higher education institutions (HEIs) that teach food, circular economy and entrepreneurship related topics;
- Step 2: Check the schools and HEIs for online curricula;
- Step 3: Look for details on course level regarding contents, competences gained, literature used and didactics.

[2] *Austrian Strategy for Education for Sustainable Development: <http://www.umweltbildung.at/cms/download/1232.pdf>*

4.4. EDUCATIONAL OFFERS

The following tables give an overview of the chosen secondary schools and higher education institutions (HEIs) and their specific courses that teach food, circular economy and entrepreneurship related topics:

Tab. 2. Secondary Level II

SCHOOL	EMPHASIS	COURSES RELATED TO CE/ENTREPRENEURSHIP	COURSE DESCRIPTION AVAILABLE	COURSE MATERIAL AVAILABLE
Raumberg-Gumpenstein, Styria	Environmental and Resource Management	1 agricultural production[3] 2 business administration and accounting[4]	yes	no

UNIVERSITY	STUDIES	COURSES RELATED TO CE/ENTREPRENEURSHIP	COURSE DESCRIPTION AVAILABLE	COURSE MATERIAL AVAILABLE
JOANNEUM University of Applied Sciences, Styria	Sustainable Food Management	1 sustainability and product life cycle management[5] 2 sustainability and product life cycle[6] 3 applied business studies and economics[7]	yes	no
University of Natural Resources and Life Sciences, Vienna	Agricultural and Food economy	4 food supplied chain management[8] 5 business planning[9] 6 co-operatives[10]		

Competences gained, teaching contents and (partly) literature and didactics in the different courses mentioned above:

[3] *Curriculum: <https://www.abc.berufsbildendeschulen.at/download/2119/HLA-f%C3%BCr-Umwelt-und-Ressourcenmanagement.pdf>*
[4] *Curriculum: <http://www.raumberg.at/Onlinedokumente/Lehrplan/s_LP2016_URM_20160705.pdf>*
[5] *Description: <https://www.fh-joanneum.at/nachhaltiges-lebensmittelmanagement/bachelor/en/course/product-life-cycle-and-international-food-quality/160763501-sustainability-and-product-life-cycle-management-2016/>*
[6] *Description: <https://www.fh-joanneum.at/nachhaltiges-lebensmittelmanagement/bachelor/en/course/elective-module-2/160763609-green-food-technologies-2016/>*
[7] *Description: <https://www.fh-joanneum.at/nachhaltiges-lebensmittelmanagement/bachelor/en/course/applied-business-studies-and-economics/160763208-applied-business-studies-and-economics-2016/>*
[8] *Short description: <https://boku.ac.at/en/lehrveranstaltungen/lva/287817>*
[9] *Short description: <https://boku.ac.at/en/lehrveranstaltungen/lva/285627>*
[10] *Short description: <https://boku.ac.at/en/lehrveranstaltungen/lva/285488>*

Secondary Level II

Course 1

Raumberg-Gumpenstein, Emphasis: Environmental and Resource Management

Agricultural production

The curriculum describes the competences as follows (among others and students are able to):
in the field of crop production - crop rotation:

- explain the importance of crop rotation for soil fertility and plant health; understand and explain the different crop rotation systems.

in the field of crop production - crop measures plant nutrition and fertilisation:

- explain the importance of the various plant nutrients and describe their dynamics in the soil;
- describe and explain the basic measures of fertilization.

in the field of plant cultivation - crop measures plant protection:

- identify the most important diseases, pests and harmful plants and implement strategies for their prevention and regulation, taking into account ecological and economic criteria as well as legal regulations;
- assess the effects of different plant protection measures;
- use plant protection products competently.

in the section basics of organic plant production:

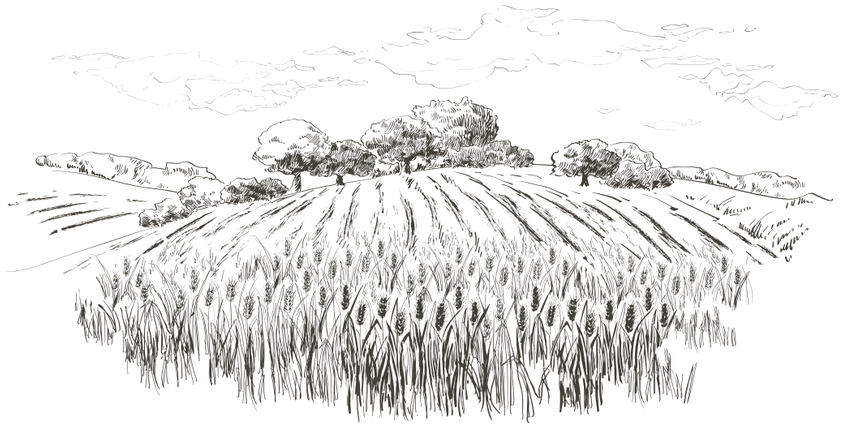
- describe and evaluate the principles of organic farming and apply them to specific situations;
- compare and evaluate production methods economically and ecologically;
- describe and evaluate production measures with regard to sustainable and ecological production.

in the field of agricultural work and production methods - animal production:

- describe different animal production methods;
- assess and plan production processes taking into account animal welfare and the economic and legal framework.

in the section basics of organic animal production:

- describe and evaluate the principles of organic livestock farming and apply them to specific situations;
- compare and evaluate production methods economically and ecologically;
- describe and evaluate production measures with regard to sustainable and ecological production.



in the field of soil and climate:
- display soil properties and functions;
- identify soil components and interpret the factors influencing soil fertility;
- describe and evaluate important soil types and their properties for agricultural production;
- draw conclusions for agricultural production from concrete soil data.

in the area of cultivation measures of biogenic raw and basic materials - soil cultivation:
- describe the advantages and disadvantages of the various tillage systems and equipment;
- select the correct soil tillage system for the particular situation.

in the air and water sector:
- describe quality parameters for air and water;
- draw conclusions about agricultural production and the environment;
- explain and evaluate measures to prevent or reduce pollution of air and water.

in the field of cultivation measures of biogenic raw materials and commodities - crop rotation:
- name and explain the basics of crop rotation;
- plan sustainable crop rotations with special consideration of biogenic raw and basic materials.

in the area of cultivation measures of biogenic raw and basic materials - plant nutrition and fertilisation:
- name and explain the basics of plant nutrition and fertilization;
- describe the most common organic and inorganic fertilizers and biogenic residues, evaluate them ecologically, treat them properly and apply them;
- explain fertilisation measures and evaluate those ecologically using nutrient cycles.

***Teaching content** to the topics mentioned above:*
- crop rotation;
- plant nutrients, fertiliser management;
- diseases, pests and harmful plants, integrated pest management, expert use of plant protection products and measures;
- organic plant production;
- organic livestock farming.

Course 2

Raumberg-Gumpenstein, Emphasis: Environmental and Resource Management

Business administration and accounting

The curriculum describes the **competences** as follows (among others and students are able to):

in the section basics of business administration:
- represent and assess the success of economic activity;
- evaluate the production factors and their influence on the production of goods and services;
- use information from the land register;
- record interactions between economy and ecology;
- explain and evaluate the main factors influencing procurement and sales processes;
- initiate transactions and conclude and process purchase contracts;
- the legal possibilities in case of irregularities in the course of contracts of sale;
- name the advantages and disadvantages of different forms of payment and characterize them;
- describe the essential characteristics of the legal forms of enterprises and assess their advantages and disadvantages;
- use information from the commercial register.

in the field of entrepreneurship and management:
- explain the essential features of insolvency proceedings and their consequences;
- explain and apply basic instruments of corporate management;
- describe the main insurance policies in agriculture and forestry;
- describe the basic structure of the agricultural support system;
- obtain information on funding opportunities relevant to business and draw conclusions from this information;
- derive and critically reflect on conclusions relevant to business management from the interaction of economy and ecology;
- develop a business idea and assess its feasibility;
- prepare and analyse a simple business plan.

Special feature in didactics: Training firm

Students are able to:

In applied business management, personal and social skills:
- process and complete basic business management tasks correctly in terms of content and form, on time, goal-oriented and independently in accordance with their role within the organisation;
- develop a business or product idea and assess its feasibility;
- prepare a simplified business plan;
- describe the possibilities of the organizational structure of enterprises and plan and organize operational processes;
- apply operational methods of quality management;
- procure, evaluate, process in a network and document information relevant to the enterprise in a comprehensible manner;
- organise themselves and their working environment;
- present and argue work results in a situation-related and target group-oriented;
- perform payroll accounting;
- independently post current business transactions in the areas of procurement and sales, payroll accounting and payment transactions using predefined processes;
- carry out financial planning and financial management;
- writing letters of application and preparing for job interviews;
- initiate business transactions and conclude and process sales contracts;
- guiding employees through the social and personnel skills they have acquired and integrating them into operational processes;
- apply their acquired professional, methodological, social and personal skills in a networked manner through the use of case studies.

Teaching content

Fundamentals of business administration:
- entrepreneurial thinking;
- differentiation from other sciences;
- enterprises (economic activity, basic characterisation and assessment, typification);
- production factors;
- basics of assessment;
- land register;
- interactions between economy and ecology.

Entrepreneurship and management:
- management functions;
- management techniques and concepts;
- insurance, risk management;
- compensation payments and subsidies;
- steering effects of government measures;
- interactions between economy and ecology;
- business plan;
- insolvency proceedings.

Also part of the curriculum, but here not discussed in detail:
Accounting and controlling, taxes and duties, personnel management.

Tertiary Level

Course 1

FH JOANNEUM University of Applied Sciences, Studies: Sustainable Food Management

Sustainability and Product Life Cycle Management

Course content
- emissions and waste in food production;
- handling of renewable and non-renewable resources;
- strategies and options for the reduction of energy and water use in food production avoidance and use of residual and by-products;
- sustainability standards: life cycle assessment, material flow analyses, product carbon footprint, cost optimization and others.

Learning outcomes
Upon completion of the module students will be able to assess food production from an economic, ecological and social perspective. They will know international regulation in the field of food production and putting food into circulation.

Recommended or required reading and other learning resources / tools
Steger, U.: Handbuch des Umweltmanagements, Oldenbourg-Verlag; Porter, M.E.: Wettbewerbsstrategie - Methoden zur Analyse von Branchen und Konkurrenten, Campus-Verlag; Brunner K.M.; Schönberger, G.U.: Nachhaltigkeit und Ernährung, Produktion-Handel-Konsum, Campus-Verlag; Scientific journals: n.a.

Mode of delivery
Integrated course

Course 2

FH JOANNEUM University of Applied Sciences, Studies: Sustainable Food Management

Green Food Technologies

Course content
Introduction to energetic optimization and preventive environmental protection in food plant processing.

Learning outcomes
Through elective modules three possible paths of competency development are offered: Specialization in direction of the chosen focus or in a field not covered in detail in the regular curriculum; free choice of a course module from other degree programmes within and outside of the university. This way the overall personal competence profile is sharpened according to the planned field of occupation.

Recommended or required reading and other learning resources / tools
B. Dietzsch, R. Domke, W. Fleischhauer, V. Leven: Taschenbuch der Verfahrenstechnik; W. Hemming, W. Wagner: Verfahrenstechnik; K. Schwister: Taschenbuch der Verfahrenstechnik; M. Stiess: Mechanische Verfahrenstechnik 1 und 2; von A. Schönbucher: Thermische Verfahrenstechnik; D. S. Christen: Praxiswissen der chemischen Verfahrenstechnik: Handbuch für Chemiker und Verfahrensingenieure;

Mode of delivery
Integrated course

Course 3

FH JOANNEUM University of Applied Sciences, Studies: Sustainable Food Management

Applied Business Studies and Economics

Course content
This course aims to provide the students with grounding in the goals and tasks of external and internal financial accounting. Students should deepen their understanding of bookkeeping, balance sheets, cost accounting and financial accounting, as well as economic correlations by discussing practical examples of decision parameters and their importance for companies.

Learning outcomes
This module aims to provide the students with a grounding in financial planning and assessment. Students should acquire grounding in bookkeeping, cost accounting and balance sheets, as well as work on practical examples of an application-oriented understanding of economic connections.

Mode of delivery
Integrated course

Course 4

University of Natural Resources and Life Sciences, Studies: Agricultural and food economy

Environmental management and environmental information systems for businesses

Content

- theoretical basics and developments of supply chain management;
- tasks and aims of supply chain management;
- importance for the success of a company in view of marketing of high quality agricultural products.

Expected results of study and acquired competences

Students understand the supply chain management in the food industry as a business support concept and know different problems and solutions in practice. Students recognize the need to build partnerships between producer - processors - trade and consumer in the food industry (Efficient Consumer-Response concept)

Mode of delivery

Lecture

Course 5

University of Natural Resources and Life Sciences, Studies: Agricultural and food economy

Business planning

Content

- entrepreneurship;
- business planning;
- business creation and - take over.

Expected results of study and acquired competences

Gaining know how in the area of entrepreneurship and business administration - especially in producing a business plan. Special task for the students is to produce a business plan based on an own (innovative) business idea for a concrete enterprise.

Mode of delivery

Lecture

Course 6

University of Natural Resources and Life Sciences, Studies: Agricultural and Food Economy

Co-operatives

Content

Presentation of the 4 groups of cooperatives in Austria including the historical development. The subject matter is ranging from theoretical basic knowledge to very practical examples of cooperatives. The students will have to elaborate selected case studies of agricultural cooperatives in Vienna or Lower Austria to point out the basic cooperative principles as subsidiarity, identity, self help, self administration and self responsibility.

Expected results of study and acquired competences

Introduction to the main terms of the cooperative society, the legal basics and the role of cooperatives in the economy as well as the integration of Austria in the European Union.

Mode of delivery

Seminar

4.5. PROJECT INTEGRATION, IDENTIFYING GAPS

TRAIN-CE-FOOD strongly focuses on the topics of circular economy in the food supply chain and social entrepreneurship in terms of co-operatives. The examined curricular mainly cover the first part of the food supply chain, namely food production. One courses deals with food processing. If it is possible to get access to this teaching material, the good practices would be a valuable contribution to the TRAIN-CE-FOOD project.

Business administration and business planning or economics in general is part of all curricula, whereas the topic of social entrepreneurship plays a minor role. It is discussed in one seminar at University of Natural Resources and Life Sciences in Vienna.

Synergies with COOPilot and ECOOPE and gaps which TRAIN-CE-FOOD will fulfil for the national level

As mentioned above co-operatives do not play a prominent role in the Austrian curricula. COOPilot and especially ECOOPE can be the basis for **TRAIN-CE-FOOD** to fill this gap.
In general co-operatives have a positive image in Austria.

How are co-operatives seen in Austria? [11]

In general co-operatives in Austria are seen as *"traditional"* but at the same time also as *"up-to-date"* for new economic challenges. A majority considers this model as *"good"* or very good. In the book *"The image of co-operatives in Austria"* [12] the authors describe that that large proportions of those surveyed are hardly or not at all familiar with the typical characteristics of co-operatives - such as *"mandate", "solidarity", "subsidiarity", or "principle of identity"* - or do not associate them with co-operatives. In Austria, traditional co-operatives include not only credit cooperatives and agricultural cooperatives but also purchasing, sales, housing co-operatives. The legal form of a cooperative is suitable:

- for young entrepreneurs;
- for companies willing to cooperate, regardless of their size and business model;
- for citizens and communities to ensure and design local and regional services;
- for service providers of all kinds, especially in the health and education sector, in agriculture, trade and craft;
- in the energy, cultural and social sectors.

On the basis of this generally positive basic attitude towards co-operatives and the knowledge deficits that exist at the same time, the overwhelming majority of those surveyed would like significantly more information and reporting on co-operative topics. In terms of education, **TRAIN-CE-FOOD** can make a valuable contribution to fill this gap.

4.6.OTHER INFORMATION

- Austrian Portal for Environmental Education and Education for Sustainable Development (Forum Umweltbildung). Retrieved from: <https://www.umweltbildung.at/publikationen-materialien.html>
- Education for sustainable development, didactics and reports.
- Environmental Education Centre Styria (Umwelt-Bildungs-Zentrum Steiermark). Retrieved from: <https://www.ubz-stmk.at/materialien-service/fachliche-und-didaktische-publikationen/>
- Publications for students on waste / raw materials, energy / radiation, health, climate, sustainability, nature / habitats, spatial planning, environmental information, traffic / mobility, water and others in German.
- Fachnetzwerk Schülerfirmen (Specialist network of student companies). Retrieved from: <https://www.fachnetzwerk.net/files/SFN/Downloads/Unterrichtsmaterialien/Modul_3_SuS+Lehrkraefte.pdf>
- Teaching material for business models for secondary school pupils in German.
- *"Unternehmerin macht Schule"*.
- Schools invite (female) entrepreneurs to inform secondary school pupils about their companies and inspire them for entrepreneurship in German.
- Practice folder: Young people develop food products (Praxismappe: Jugendliche entwickeln Lebensmittelprodukte). Retrieved from: <https://www.umweltbildung.at/uploads/tx_hetopublications/publikationen/pdf/Praxismappe_Jugendliche_entwickeln_Lebensmittelprodukte.pdf>
- Sparkling Science project, funded by the Austrian Federal Ministry of Education, Science and Research. Pupils at two Styrian schools developed food products from young people for young people in German.

Annexes

- Austrian Strategy for Education for Sustainable Development.
- Curriculum: Environmental and Resource Management, Raumberg-Gumpenstein.
- Curriculum: Agricultural and food economy, University of Natural Resources and Life Sciences.

[11] Österreichischer Raiffeisenverband: https://www.raiffeisenverband.at/die-idee-raiffeisen-genossenschaft/g_genossenschaft-heute/
[12] „Das Image von Genossenschaften in Österreich": <https://www.facultas.at/list/9783708911540>

5 CROATIA

5.1. INTRODUCTION

Croatia, officially the Republic of Croatia is a country in Southeast Europe. The capital city is Zagreb and it is divided in 20 counties and population of 4.07 million and official language is Croatian. The economy is mainly provided by service - tourism, industrial sectors and agriculture. Croatia is ranked among the top 20 most popular tourist destinations in the world.

Primary education in Croatia starts at the age of six or seven and consists of eight grades. Secondary education is provided by gymnasiums and vocational schools. As of 2017, there are 2,049 elementary schools and 701 schools providing various forms of secondary education. Primary and secondary education are also available in languages of recognized minorities in Croatia, where classes are held in Italian, Czech, German, Hungarian, and Serbian languages.

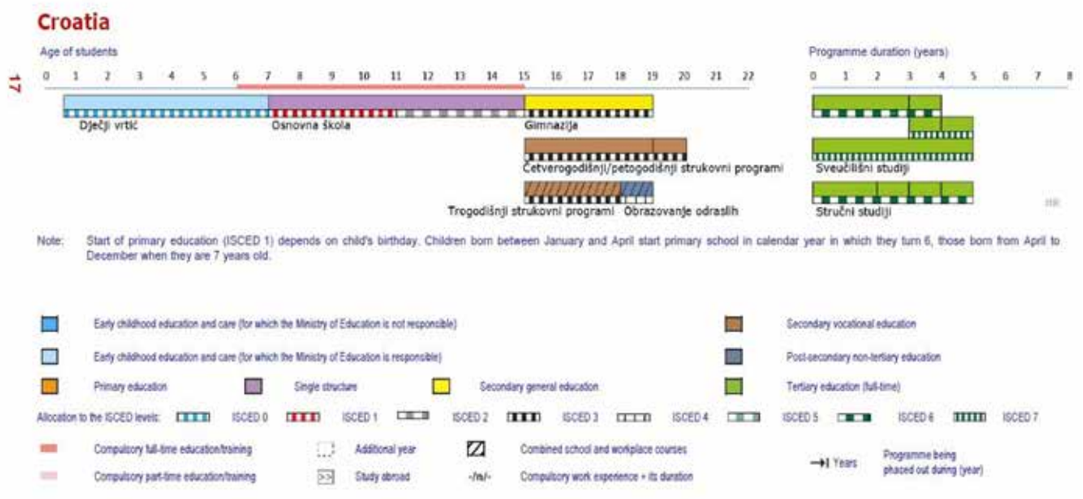


Fig. 2. Croatian educational scheme

Secondary Education

Secondary education is not compulsory, but almost all students do enroll into the gymnasium or vocational schools. The secondary education lasts 4 years for gymnasium and 3 or 4 years for vocational schools. Gymnasium programmes prepare students for higher education. Completing 4-year vocational programmes enables students to either enter the labour market or pursue to higher education. Completion of 3-year vocational programmes leads to the vocational career.

Higher Education

Higher education is provided by the universities, polytechnics and colleges. Universities offer bachelor, master and doctoral programmes. Polytechnics offer professional bachelor and professional master programmes. Colleges offer only professional bachelor programmes. Currently there are 137 higher education institutions in Croatia, respectively: 7 public universities, 3 private universities, 80 constituents of the public universities, 3 private polytechnics, 13 public polytechnics, 28 private colleges and 3 public colleges.

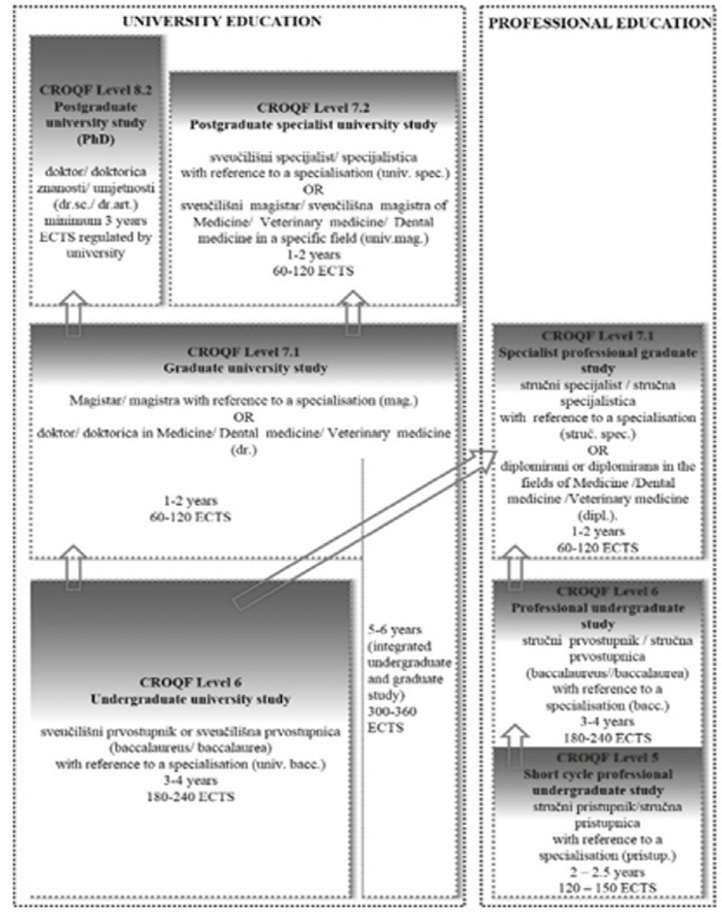


Fig. 3. Higher education system in Croatia

Source: <https://www.azvo.hr/images/stories/shema_vo_u_rh_en.jpg>

The education on sustainable development (ESD) is acquired through regular primary and secondary lessons in nature and society, nature, chemistry, geography, art, as well as in secondary schools, for example in sociology, ethics, economics etc. ESD is also enriched by optional and non-compulsory subjects and extracurricular activities in line with schools “profiles and priorities. At the level of higher education institutions the sustainable development issue is addressed through some compulsory or elective courses i.e., at the University of Zagreb postgraduates courses such as Ecology (within the Biology Department - Faculty of Sciences Zagreb), Social Ecology (Faculty of Philosophy, Faculty of Textile Technology) or Eco-engineering (interdisciplinary specialist study coordinated by the Faculty of Chemical Engineering and Technology [1]

5.2. LEGAL FRAMEWORK

- there is one main document for primary and secondary schools named "Primary and Secondary Education Act" which is in compliance with three directives 2008/11/5 EC; 77/486/EC 2006/123/EC;
- the main regulation for higher education is *"Act on Scientific Activity and Higher Education";*
- there are several acts about environmental protection, waste management on national level which mention involvement of training and education on the field of sustainability as *Action Plan for Education for Sustainable Development,* (April 2011). It was created through a participatory multi-stakeholder process in which representatives of civil society organizations also participated. It is an instrument for the implementation of the Sustainable Development Strategy of the Republic of Croatia (Official Gazette, No. 30/09) and the promotion of sustainable development in formal, non-formal and informal education.
- *Decision on adoption of the curriculum for the cross-curricular topic Sustainable development for primary and secondary schools in the Republic of Croatia OG 7/2019, (152),* (decision, 22 January 2019). Cross-curricular theme Sustainable development develops and spreads knowledge about the functioning and complexity of natural systems and the consequences of human activities. In addition, it develops solidarity towards other people, responsibility towards the environment, one's own and other people's health, as well as responsibility towards the entire living environment and towards future generations. Educational expectations are divided into three domains, namely connectivity, action, and well-being;
- *UNECE Strategy for Education for Sustainable Development, 2005.* The purpose of the Strategy is to incorporate the main issues of sustainable development (environmental protection, management of natural resources, eradication of poverty, ethics);
- *Officiale gazete 30/2009 (9.3.2009.), Strategy of Sustainable Development of Republic of Croatia* Education is a prerequisite for changing behaviour and informing citizens about key competencies for achieving sustainable development because it contributes to greater social cohesion and well-being by investing in social capital, by creating equal opportunities, especially for disadvantaged individuals, and by participating of the public. In accordance with the recommendations of the World Summit held in Johannesburg in 2002, the General Assembly of the United Nations, in December 2002, declared the period 2005-2015 the Decade of Education for Sustainable Development – ESD. United Nations Economic Commission for Europe in its Strategy for education for sustainable development from 2005 emphasizes that education, as a human right and a fundamental tool for good governance. Education for sustainable development should be implemented at three levels:1 through formal education in teaching institutions; 2. outside the usual educational institutions, for example, through the activities of non-governmental organizations (informal education); 3. through the media (newspapers, television, radio) to education for sustainable development either an integral part of everyday life. Topics of education for sustainable development are: poverty alleviation, peace, ethics, responsibility local and global, democracy, justice, security, human rights, health, gender equality, cultural heritage, rural and urban development, sustainable production and consumption, corporate responsibility, protection environment and nature, natural resource management, biological and landscape diversity. Existing teaching curricula at all levels of formal education need to be modified and adapted to include more principles and values of sustainability and interdisciplinary permeation of its three components. Education for sustainable development is lifelong learning. Through education, people's choices and actions are directed in favor of the sustainable development, healthy and productive life in harmony with nature, with care for social values, gender equality and cultural diversity;[2]
- Strategic plan of Ministry of Environmental Protection and Energy for 2020 -2022; One of the ways that ministry plans to achieve its goals is education and strengthening public awareness on climate protection and the ozone layer; promotion and education on environmental protection, sustainable production and consumption, sustainable development and raising environmental awareness; under the section protection and preservation of nature - protection and conservation of biodiversity and geological diversity at regional and local level, education and training, cross-sectoral cooperation and public involvement raises awareness of the need to preserve it in all forms of political, economic and social action; the stated general goal derives from the Strategy and Action Plan for Nature Protection of the Republic of Croatia for the period from 2017 to 2025 (Official Gazette, No. 17/2017) and it is in line with the nature protection priorities defined in the Operational Program Competitiveness and cohesion 2014-2020; first draft of Integrated energy and climate plan for the period from 2021 to 2030;
- *Rural Development Programme of the Republic of Croatia for the Period 2014-2020* under the part Vocational training for farmers states The activities planned under this operation will address the lack of a knowledge basis for farmers to increase their competitiveness. A set of short term training courses will be offered to farmers on sustainable and efficient agricultural practices, modernisation and technological advances, marketing and economic efficiency;
- *Strategic guidelines for the development of the green economy.* Retrieved from:
    1. UNECE: <https://www.unece.org/fileadmin/DAM/env/esd/7thMeetSC/Country_Reports/Croatia.pdf>
    2. NARODNE NOVINE: <https://narodne-novine.nn.hr/clanci/sluzbeni/2009_03_30_658.html>

5.3. MAIN GOALS AND METHODOLOGY

For research, we used mainly web search of official Croatian documents and legislations. Also the search included many of European legislations and research papers and overviews of recent EU Countries', educational systems (source: https://eacea.ec.europa.eu/national-policies/eurydice/home_en), and strategic documents regarding climate change, green policies, green procurement etc. The search also included secondary and tertiary education institution for content and curricula along with projects.

5.4. EDUCATIONAL OFFERS

Within a framework of the curricular reform implemented by the Ministry of Science and Education, a decision to adopt a curriculum on the topic of sustainable development for primary and secondary schools in the Republic of Croatia was made. The topic of sustainable development encompasses all three dimensions of sustainability - environmental, social and economic, and interdependence between them. It prepares students for appropriate action in society in order to achieve personal and general well-being. The cross-curricular topic Sustainable Development provides students with knowledge about the needs of modern times on a global and local level and knowledge about the diversity of nature, the need for sustainable management of natural and human resources, the burden, personal and shared responsibilities and rights. It supports the development of generic skills such as practicality, entrepreneurship, innovation, critical thinking, the ability to adapt to change and the ability to solve problems.

Applying practical work encourages students to the responsible use of natural resources and energy, use of locally produced food, rational waste management, use of used materials, active work and cooperation in the community. The cross-curricular theme Sustainable Development permeates the entire work of the school and is recognizable in the school curriculum. It is accomplished within compulsory and elective courses, classroom lessons, integrated teaching, as part of projects, out-of-the-classroom teaching, field teaching, and out-of curriculum activities, and is related to other cross-curricular topics and areas of the curriculum. Educational expectations aim to encourage creativity and social responsibility and the development of critical and creative thinking in problem solving. They are elaborated through the corresponding knowledge, skills and attitudes for all educational cycles of the three-year and four-year secondary education.

SECONDARY SCHOOL

Compulsory and elective courses on the topic of sustainable development:

In Split, there is a Gymnasium for Sustainable Development, whose programme is designed as a gymnasium programme and it provides students with the opportunity to acquire very broad general education knowledge as well as basic technical and professional knowledge. In this, it is possible to enroll in all higher education institutions, especially in technical faculties. Namely, the programme is intended for students who are interested in science, technology and new technologies. Students have the opportunity to develop specific interests and focus on the faculties they plan to attend, especially in the faculties of electrical energy, mechanical engineering, chemical technology, architecture and construction. In the third grade, students can choose between three different courses: eco sustainability, energy sustainability, and sustainable construction. Professional courses enable students to acquire knowledge and competencies in the field of sustainable water and waste management, economically sustainable production of energy from renewable sources, sustainable use of energy systems and construction of facilities that do not pollute the environment and ensure health for individuals and society.

One of the elective courses is *"Renewable energy sources and sustainable development"* which provides information in the field of renewable energy sources and introduces the students to rational and economical management of energy needs and drinking water guided by the principles of sustainable development.

PROJECTS

Knowledge for Sustainability Action - the project received financial support from the Swiss-Croatian cooperation programme in the field of strengthening the contribution of civil society organizations to education for sustainable development to improve economic and social cohesion. The project is co-financed by the Office for Cooperation with NGOs of the Government of the Republic of Croatia. The project introduces sustainable development into formal education in the partner schools on the project. First, teachers are educated to include sustainable development in teaching, and then school teams in cooperation with NGOs implement education programmes for sustainable development in schools. Participatory learning methods are used that develop competencies and motivate students to act and understand the role of their own engagement in positive social change.

Sustainable development in each school is addressed through regular classes by integrating sustainable development into various courses, through out-of curriculum activities and through school projects. The focus is on student action involving parents and the community, and special attention is paid to student volunteering in the community. In cooperation with teachers, a manual for the practical implementation of teaching in the field of sustainable development is being prepared. In addition to activities in partner schools, the educational module "Sustainable Development" is being developed for the education of teachers who conduct Civil Education as an out-of curriculum activity and other interested teachers from all over Croatia since sustainable development will be implemented in schools as a special interdisciplinary topic from next school year;

The DEAR STUDENT project focuses its activities with pupils and teachers from primary and secondary schools. The project sustains the promotion of development education themes towards young generations especially promoting, in formal education, the inclusion of sustainable human development subject to foster young generation's critical consciousness, so that they can understand better the main challenges of the future for the implementation of sustainable human development processes. The project is implemented by 14 partner organizations in 6 European countries (Bulgaria, Croatia, Italy, Portugal, Romania and Spain), and the secondary school of Economics and Administration Osijek is one of the secondary schools where the project was actively implemented in the school year 2014/2015. The teachers who participated in this project integrated education on sustainable development into their subjects in various ways, thus involving almost 300 students in the project.

Field teaching, out-of-the-classroom teaching, workshops:

- workshops held within the project *"The future begins today: strengthening the knowledge and skills of young people to build sustainable local communities"* in secondary schools of Krapina-Zagorje County. The workshops were co-financed by the Office for Cooperation with NGOs of the Government of the Republic of Croatia within the Swiss-Croatian cooperation programme. The project contributes to the empowerment of young people, especially secondary school students, to build sustainable local communities through the implementation of non-formal education programmes. Educational programmes address three components of education for sustainable development: environmental, voluntary and democratic, and provide young people with a holistic approach to the concept of sustainable development;
- workshop on the theme of Circular Economy in the production of cars held within the project *"Be better - Biti bolji"* in Secondary school of Economics in Đakovo.

TERTIARY EDUCATION

At Croatian universities, programmes and individual courses dealing with sustainable development are being developed. Based on the analysis of existing programmes and universities, polytechnics and colleges that implement them two groups of programmes can be identified: ones that are predominantly socio-humanistic which focus on creating policies for sustainable development, while the others are sustainable development studies that focus on technical (engineering) sustainability solutions. Examples:

- The Polytechnic of Međimurje in Čakovec offers an undergraduate professional study "Sustainable development" that lasts three years and focuses on the technical aspects of sustainable development;
- The Dag Hammarskjöld College of International Relations and Diplomacy launched in academic year 2017/2018 new study programme *"Sustainable Development and International relations"* at the level of undergraduate and graduate specialist study. The study covers the areas of politics, environmental protection, development, economics and energy. Its goal is to educate experts who will know how to analyze and implement sustainable development programmes and who will have acquired knowledge to be able to apply for the development of specific policies and projects in Croatia and abroad. Although they do not offer the entire program *"Sustainable Development"* as the above-mentioned polytechnic and college, some higher education institutions in Croatia offer the possibility of learning on sustainable development through compulsory and elective courses.
- VERN University has included the subject *"Environmental Protection and Sustainable Development"* in elective courses that can be chosen by all full-time and part-time students of the 3rd year of Entrepreneurship Economics.

  VERN summer school program entitled *"Empowerment for Sustainability and Sustainable Tourism Development"* lasts for two weeks and consists of various lecturers, workshops, panels and case studies concerning entrepreneurship, tourism, sustainable development, economics, innovation and competitiveness, all in view of sustainable development. Both the students and professors will participate in workshops organized in cooperation with local entrepreneurs, take a sightseeing tour and get known with the historical and cultural heritage of the island of Vis and the city of Split. The summer school's goal is to encourage the cooperation and exchange of knowledge and ideas among students and lecturers in a multicultural and multidisciplinary environment thus stimulating knowledge and skills acquisition and innovation in the fields of entrepreneurship, competitiveness, sustainable development and environment protection. It is aimed to develop further knowledge and skills from the fields of environment protection, entrepreneurship, competitiveness and innovation among the students and other attendees.

  The summer school is intended for students who are interested in tourism development from the perspective of sustainable development, cultural and historical heritage protection and environment protection;
- at the Faculty of Electrical Engineering and Computing in Zagreb, *"Enviromental Sustainability and Climate Change Mitigation"* is one of the elective courses of undergraduate study, Energy, Environment and Sustainable Development on graduate study;
- the course *"Sustainable Development"* is one of the compulsory courses for first-year undergraduate students of Industrial Ecology at the Faculty of Metallurgy, University of Zagreb;

- in the studies of early and preschool education, the course *"Education for Sustainable Development"* began to gain popularity. At the Faculty of Philosophy in Split, this course is compulsory for all students of the graduate study of early and preschool education;
- at the postgraduate doctoral study of nature and environment protection of the University of Osijek and the Ruđer Bošković Institute, one of the elective courses is *"Sustainable Waste Management";*
- at Geotechnical Faculty in Zagreb the postgraduate doctoral study of Environmental Engineering offers elective module *"Sustainable waste management"* with teaching units like Circular economy in waste management and Recycling and polymer disposal;
- at the postgraduate specialist study Accounting, auditing and analysis of the Faculty of Economics in Osijek, one of the elective courses is *"Circular economy"*. The aim of the course is to transfer to students the theoretical knowledge related to the accounting quantification of green and circular economy. Students will begin to develop basic skills to apply the concept of green and circular economy in real world with special emphasis on accounting monitoring of the product and national accounts because accounting practice is essential for the transformation of society and achieving long-term sustainability;
- University of Zagreb; Faculty of Chemical Engineering and Technology¸ Postgraduate doctoral courses, Ecoengineering. Ecoengineering is the branch of engineering (techniques) which is occupied by: protection of people from the influence of the factors which are harmful for the environment; protection of the environment, local and global one from the potential harmful influences of different human activities. The end goal of ecoengineering is the development and application of "pure" for environment acceptable technologies with the minimal production of waste and with the production of biocompatible secondary products and main products with regard to the strategy of the closed production cycles. Only in this way it is possible to prevent pollution and to keep the quality of the human life and the quality of other living beings. The intention of the interdisciplinary post graduate study ecoengineering is to combine different disciplines and to enable the engineers more effective activity based on more comprehensive education. Ecoengineering offers classical education to the engineers of different professions – to architects, engineers of agriculture, electrical engineers, naval architecture engineers, civil engineering engineers, chemical and bioprocess engineers, and engineers of forestry and the additional necessary cognitions so that they could solve the technical questions in the protection of environment in the factory, in the town in the physical planning on two courses:

  - postgraduate doctoral study;
  - postgraduate scientific special study, which are the continuation of the proposed. Master's course Ecoengineering and of other Masters courses at the technical faculties of the University in Zagreb;
  - Faculty of Tourism and Hospitality Management; Postgraduate University Doctoral Studies; Management of Sustainable Development.

Modules of the doctoral study Management of Sustainable Development:

1. management of sustainable tourism development;
2. regional and local sustainable development;
3. entrepreneurship and sustainable development.

5.5. PROJECT INTEGRATION, IDENTIFYING GAPS

Good practice examples are in correlation with TRAIN-CE-FOOD project as they have same emphasis on subject of circular economy and sustainability.

Also the correlation with – COOPilot and ECOOPE project are that some of the good practice examples involve entrepreneurship and cooperation as they are at vocational schools of economy and faculty of economy. The curriculum at the faculty of economy have a part of curriculum connected with entrepreneurship and economy - Accounting as a basis for the benefits of investing in a circular economy.

Project will fulfill gaps in curriculum as most of the curriculums for HIE and secondary education is based on sustainable development and circular economy in general. The gap is mostly EntreComp as none of it encompass it into their curriculum as well as emphasis on food related circular economy and co-operational entrepreneurship.

5.6. OTHER INFORMATION

- Education and Teacher Training Agency have a handbook titled: Education for sustainable development Handbook for primary and secondary schools.
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- Circular economy _Croatian manual. Retrieved from:

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  <https://www.researchgate.net/publication/327797842_Challenges_of_Circular_Economy_in_Croatia>
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- Strategy for Sustainable Development of the Republic of Croatia 17 Jun 2011. Retrieved from:

  <https://sustainabledevelopment.un.org/index.php?page=view&nr=213&type=504&menu=139>
- Eurydice_National Education Systems. Retrieved from:

  <https://eacea.ec.europa.eu/national-policies/eurydice/national-description_en>

Additional reading:

- University of Zagreb; Faculty of Chemical Engineering and Technology, Postgraduate doctoral courses. Retrieved from:

  <https://www.fkit.unizg.hr/en/curricula/postgraduate_scientific_courses/ecoengineering>

ECOENGINEERING

Technical and biotechnical area, field defined by the parent profession or the field of the second basic technical science – the branch of the environment protection.

Educational institution in charge

The University in Zagreb is the proposer of the course and 13 Faculties of the University in Zagreb are the performers. They are the Faculty of Agriculture, Faculty of Architecture, Faculty of Electronics and Computer Sciences, Faculty of Chemical Engineering and Technology, Faculty of Organization and Informatics, Faculty of Mechanical Engineering and Naval Architecture, Faculty of Geotechnics, Faculty of Civil Engineering, Faculty of Metallurgy, Faculty of Food Science and Biotechnology, Faculty of Science, Faculty of Mining, Geology and Petroleum and Faculty of Forestry. They are the subscribers of the Agreement about the structure, organization and the teaching performance of the university interdisciplinary postgraduate scientific and professional study Ecoengineering of the University in Zagreb, signed on 8th March 2004. The coordinator of the course is the Faculty of Chemical Engineering and Technology.

Innovativeness of the doctoral programme

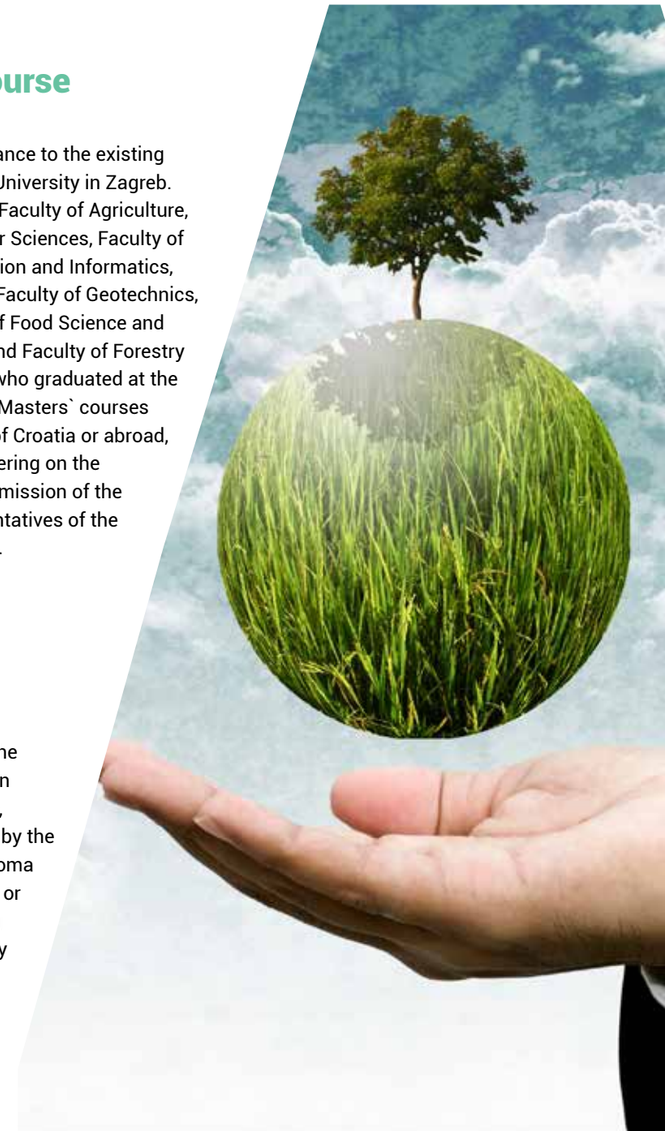
On the basis of the pollution problems of environment, its causes and influences, the courses offered on doctoral study of ecoengineering contain:

- basic knowledge from ecology, chemistry, biology and microbiology in regad to the environment; special knowledge about management with waste, waste waters and air pollution; special knowledge about pure technologies, about the decrease of sources and control of air, water and soil pollution, technologies wit small quantity of waste and recycling techniques; special knowledge from the economy and law.

The systematic approach which takes into consideration the mutually depending relationships man – economy – environment is built in the understanding of the environment protection by the combination of those relevant cognitions from several disciplines. Such interdisciplinary approach to the scientific doctoral study which is according to the constitution and crediting similar to PhD studies in USA (Drexel University, Georgia Institute of Technology, University of California, Riverside) as well as to Vertiefungsfach Umwelttechnik, Universität Dortmund, S R Germany is the new one in education of environment at the University in Zagreb, where the multidiscipline approach to education prevails in which the questions concerning the protection of environment are bond to the particular basic scientific discipline of the profession.

Registration conditions for the course

The basic conditions for the registration must be in accordance to the existing laws in the Republic of Croatia, and with the Statute of the University in Zagreb. The students who have finished the Master's course at the Faculty of Agriculture, Faculty of Architecture, Faculty of Electronics and Computer Sciences, Faculty of Chemical Engineering and Technology, Faculty of Organization and Informatics, Faculty of Mechanical Engineering and Naval Architecture, Faculty of Geotechnics, Faculty of Civil Engineering, Faculty of Metallurgy, Faculty of Food Science and Biotechnology, Faculty of Mining, Geology and Petroleum and Faculty of Forestry can register for the study Ecoengineering. The attendance who graduated at the Faculty of Science and other corresponding Universities at Masters` courses and other specialist postgraduate courses in the Republic of Croatia or abroad, can register for the postgraduate doctoral study Ecoengineering on the suggestion of the leader of the study and according the permission of the Professional Council of the study composed of the representatives of the lecturers of the Faculties, the subscribers of the Agreement.



Criteria of the attendance choice

The attendances who had finished the Masters` course of the technical or biotechnical profile and who have good bases in mathematics, information sciences and computer sciences, physics, chemistry, biology and mechanics which is proved by the determined number of credits and the mark at the final diploma thesis at the University in Zagreb, in the Republic of Croatia or abroad, or who finished the specialist study Ecoengineering with the average mark 4 can register for the interdisciplinary scientific postgraduate doctoral study Ecoengineering. For registration for the scientific study the candidates must have the average mark 3,5 at the Masters study.

Competences, continuation of the scientific – research work, possibility of further upgrading, employment possibilities

After finishing the postgraduate study Ecoengineering, the doctors of science must understand the basic principles of mathematics, physics, chemistry, biological sciences and engineering. They must be able to connect information from different disciplines and to formulate the new and more successful approach to the special problems of environment protection as well as to obtain the abilities of planning and performing the creative research program which enables the obtaining of new knowledge. Doctor of the technical or biotechnical sciences in the field determined by the parent profession gives in dissertation the original contribution, from the technical point of view, to the chosen problems from the improvement and protection of environment.

Link to Curriculum:

<https://www.fkit.unizg.hr/_download/repository/post_eco_curriculum.pdf>

Link to Courses: <https://www.fkit.unizg.hr/_download/repository/post_eco_courses.pdf>

Faculty of Tourism and Hospitality Management; Postgraduate University Doctoral Studies

(Link to Courses: <https://www.fthm.uniri.hr/en/phd-mor-about>)

Management of Sustainable Development

Upon completion of the study Business Economics in Tourism and Hospitality Industry skills and competences needed to carry out independent scientific research in the scientific area of social sciences, scientific field of economics are acquired. Based on the study programme, attendees will be able to acquire the following learning outcomes: apply advanced concepts in scientific research in the area of social sciences, field of economics with special emphasis on economic aspect of sustainable development while accepting the interdisciplinarity and multidisciplinarity of the research area; create and evaluate new facts, procedures and theories, that based on the research results, shift boundaries of knowledge in the field of scientific research; as author or co-author write and successfully publish an original scientific paper in a peer-reviewed journal; prepare and present a public statement on the results and scientific concept at the international conference; give reasons for certain viewpoints and defend the position in the discussion with other scientists in the field of research; create and conduct scientific research in the field of economics (drafting scientific research, organization of conducting research, timely detect potential problems, identify the necessary funds, lead the research team); analyze and evaluate new and specialized knowledge, methods, tools and instruments in the field of scientific research; collect and analyze various pieces of information (search literature and databases); present and explain the results of scientific research to other scientists and general public; accept ethical and social responsibility for the success of research and possible effects on the wider community; writing and reporting skills; implement the results of scientific research in the business and social environment; face the new challenges of society and the economy and the application of scientific research to contribute to social and economic development.

Upon completion of the study the academic degree Doctor of Science (Ph.D.) in the area of social sciences, field of economics is acquired.

Modules of the doctoral study Management of Sustainable Development:

1. management of sustainable tourism development;
2. regional and local sustainable development;
3. entrepreneurship and sustainable development.

Literature:

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- The Faculty of Humanities and Social Sciences of the University of Split.
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- Round Table: Cultural Diversity and Sustainable Development.
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<http://www.efos.unios.hr/specijalisticki-studij-racunovodstvo-revizija-analiza/wp-content/uploads/sites/417/2015/12/Cirkularna-ekonomija.pdf>

GENERAL INFORMATION

Module coordinator	doc.dr.sc.Anita FrajmanIvković	
Module name	Circular economy	
Study programme	Postgraduate specialist study *"Accounting, Auditing and Analysis"*	
Module status	Elective	
Year of studies	1. year; 2. semestars	
Credit and teaching	ECTS	4
	Number of hours (L+E+S)	10+5+0

1. DESCRIPTION OF MODULE

1. Module aim

The aim of the course is to transfer to students the theoretical knowledge related to the accounting quantification of green and circular economics. Students will begin to develop basic skills to apply the concept of green and circular economy in the real world with special emphasis on accounting monitoring of the product life cycle and national accounts because accounting practice is essential for transforming society and achieving long-term sustainability.

2. Terms of admission

Student enrolled in the first year of postgraduate specialist study "Accounting, Auditing and Analysis" at the Faculty of Economics in Osijek.

3. Expected learning outcomes

After completing the course the student will be able to:

- define sustainable development, green economy, circular economy;
- recognize the provision of conditions for greening the national economy; give examples of integration of green and circular economy through investments, initiatives and projects;
- analyze internal and external reports and the potential of its sustainability on the example of a business entity. Accounting to analyze the product life cycle within the circular economy;
- course content.

Linear economy and sustainable development

- international institutional support for sustainable development;
- accounting as a basis for the benefits of investing in sustainable development 2. green and CE;
- green consumers, environmental protection and waste management 2. green economy in Croatia until 2050
- the EU and the CE: Europe 2020 and the Environment Action Program (EAP) 4. Accounting as a basis for the benefits of investing in the CE;
- measuring green economies (The Global Green Economy Index);
- case studies: The British-style green economy and the lessons of Scandinavia 7. alternative indicators of national accounts;
- eco-account system - SEEA;
- product life cycle accounting in a circular economy.

6 CYPRUS

6.1. INTRODUCTION

Cyprus, (officially called the Republic of Cyprus) is an island country in the Eastern Mediterranean. The third-largest and also the third most populated island in the Mediterranean. The population of Cyprus is estimated at 870,068, according to Eurostat[13] The main languages of Cyprus are Greek (Southern Cyprus) and Turkish (Northern Cyprus) with a mix of the Cypriot dialect. However, from the days of the British colonization of the island, the English language was also widely known, and continues until today, with its study beginning from junior and ending in high school. According to the preferences of the population, the preferable languages are estimated at 98,22% speaking in Greek, 43,07% in English and 2,02% in Turkish[14] .

The educational system of Cyprus is composed mainly of 3 stages, which vary among (pre-)primary education, secondary education and tertiary education.

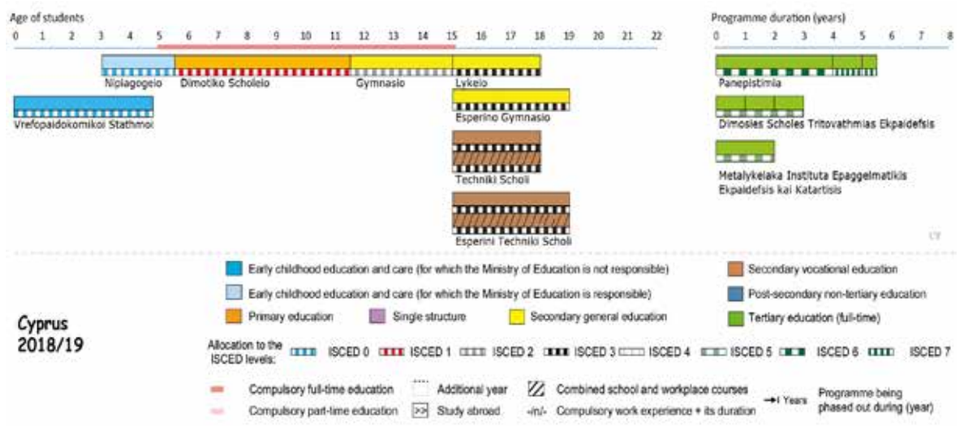

Fig. 4. Educational scheme for Cyprus

Source: <https://eacea.ec.europa.eu/national-policies/eurydice/sites/eurydice/files/the_structure_of_the_european_education_systems_201819_schematic_diagrams_-_final_report.pdf>

The primary education is free and also compulsory for all children over the age of 6 and lasts for six years. Secondary school is offered to children among the ages of 12 to 18 years old. It is free for its duration (6 years) and compulsory up to the age of 15. Then, there is secondary general and secondary technical and vocational education in Cyprus. Secondary general education offers two three-year cycles of education – the Gymnasium, which constitutes the lower secondary education cycle, and the Lyceum, which represents the upper secondary general education. The technical and vocational education offers a three-year cycle of upper secondary education. There are both public and private schools of secondary education. Higher education is provided both in public and private institutions, at university and non-university level. At the higher education, the number of universities, colleges, vocational schools, and other higher education institutions is estimated at 30. Higher education in Cyprus is also provided by a number of Public Higher Education Institutions, none of which has university status[15].

[13] Retrieved from: <https://appsso.eurostat.ec.europa.eu/nui/submitViewTableAction.do>
[14] Retrieved from: <https://languageknowledge.eu/countries/cyprus>
[15] Retrieved from:

The last years the topics of the circular economy, food cooperatives and entrepreneurship are issues that many European and non-European countries are trying to formally and non-formally include in their educational system. One of them is also Cyprus. Accordingly, these topics can be mostly found to the higher education and rather than the secondary. More specifically, in higher education, there are some universities that developed faculties on these sectors. For example, in the Cyprus University of Technology, there is a department of agricultural sciences, biotechnology and food science, that offers to the attendants' related courses the topics of circular economy and food cooperatives[16]. In the same university, there is also the Faculty of Management and Economics, with the department Program in Management, that provides courses related to entrepreneurship[17]. Apart from the Cyprus University of Technology, the University of Nicosia is also offering bachelor studies with a duration of 4 years, at the department called Business Administration: Entrepreneurship and Innovation[18]. Additionally, the University of Central Lancashire is offering different bachelor studies related to Entrepreneurship, such as the Business Administration programme through different modules, e.g. Start a Business, Creativity & Innovation in Organizations[19].

As for the secondary education, currently, there isn't a course focused clearly on entrepreneurship in Cyprus, but there are courses, that mention the term of entrepreneurship and different aspects of it, during the semester. As for topics related to the circular economy and food cooperatives, in the secondary education in Cyprus, there isn't a formal structure of courses that provides learners with the chance to develop their knowledge on those topics. However, according to the Green Economy Action Plan that was approved by the Council of Ministers, will include measures for all key sectors, such as agriculture, water resources, biodiversity and green infrastructure, forests, energy, transport, industry, waste management, tourism, climate change and adaptation. It will address matters of resource efficiency and environmental.

To sum up, despite the significant improvement that Cyprus had the last years in terms of environmental issues (e.g. circular economy, food cooperatives) and the provision of formal courses to secondary and higher education, it continues to perform poorly in eco-innovation. This is also confirmed also, by the low ranking that she owns at the countries with eco-innovative practices. Cyprus is holding a low rank among the EU28 average in eco-innovation inputs and activities, socio-economic outputs and resource efficiency outcomes.

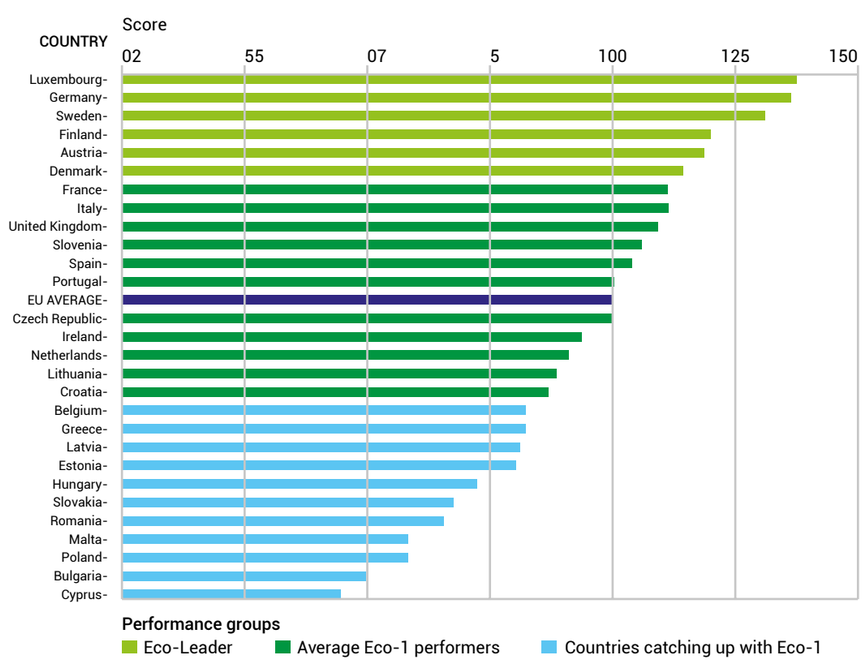

Fig. 5. Eco-Innovation Index from 2018
Source: <https://ec.europa.eu/environment/ecoap/indicators/index_en>

[16] *Retrieved from: <https://www.cut.ac.cy/faculties/gem/abf/intro/>*
[17] *Retrieved from: <https://www.cut.ac.cy/faculties/fme/program-in-management/>*
[18] *Retrieved from: <https://www.unic.ac.cy/business-administration-entrepreneurship-and-innovation-bba-4-years/>*
[19] *Retrieved from: <http://www.uclancyprus.ac.cy/undergraduate-course/bahons-business-administration/>*

So far, the eco-activities in Cyprus are mostly implemented by individual actors, such as research institutes or enterprises. Actions are being implemented in different sectors among them, also from the agricultural and food industries, that are contributing to eco-innovative solutions. The informal training and information provided to students so far in Cyprus are also done through a large number of EU funded research and innovation projects in these fields.

6.2. LEGAL FRAMEWORK

Taking into consideration the unemployment issues and the new skill sectors that are emerging nowadays, one of Cyprus's primary objectives today is the move towards a more competitive, resource-efficient, low-carbon green economy that will sustain growth, create new financial opportunities, improve productivity, boost competitiveness and create new green jobs. Accordingly, Cyprus implements the transition towards a more resource-efficient, low carbon, circular economy. This transition relies on the appropriate combination of regulatory measures, economic market instruments and voluntary tools, educational and capacity building programmes, awareness campaigns as well as other initiatives and incentives. Cyprus also targets production and consumption patterns and the provision of services through the active promotion of voluntary environmental tools and product labelling schemes, coupled with an enhanced green public procurement, as a means of boosting the market for green products and services. In this respect, specific actions include the promotion of voluntary systems of sustainable production and consumption through the implementation of the European Ecolabel and the Ecomanagement and Audit Scheme (EMAS), as well as the Green Public Procurement Action (GPPA) Plan. The National Action Plan for a Green Economy of Cyprus aims to exploit and enhance synergies between the environmental and other economic sectors, includes measures in all key sectors, such as agriculture, water resources, biodiversity and green infrastructure, forests, energy, transport, industry, waste management, tourism, climate change and adaptation. Cyprus provides an accessible education to everyone at all education levels without discrimination.

The Agenda 2030 for Sustainable Development in Cyprus outlines the main priorities and planning in the process of incorporation of the sustainable development goals in national policies and the activities of government and non-government sectors towards this direction. The document provides an analysis of Cyprus' current level, progress, identification of the challenges faced and the action plan for the next steps. During the past years, Cyprus was affected by the economic crisis arisen in 2008 and in Cyprus reached its peak in 2013. Therefore, there was a need to focus on short-run goals and focus mostly on the economic and social dimension of policies. Among the Goals and targets of the Agenda 2030, that will stimulate action over the next fifteen years, are mostly among humanity and the planet. For example, protecting the planet from degradation include sustainable consumption and production to the overall areas etc. The Goals, as described in the Agenda, are as follow:

Sustainable Development Goals

- Goal 1. End poverty in all its forms everywhere;
- Goal 2. End hunger, achieve food security and improved nutrition and promote sustainable agriculture;
- Goal 3. Ensure healthy lives and promote well-being for all at all ages;
- Goal 4. Ensure inclusive and equitable quality education and promote lifelong learning opportunities for all;
- Goal 5. Achieve gender equality and empower all women and girls;
- Goal 6. Ensure availability and sustainable management of water and sanitation for all;
- Goal 7. Ensure access to affordable, reliable, sustainable and modern energy for all;
- Goal 8. Promote sustained, inclusive and sustainable economic growth, full and productive employment and decent work for all;
- Goal 9. Build resilient infrastructure, promote inclusive and sustainable industrialization and foster innovation;
- Goal 10. Reduce inequality within and among countries;
- Goal 11. Make cities and human settlements inclusive, safe, resilient and sustainable;
- Goal 12. Ensure sustainable consumption and production patterns;
- Goal 13. Take urgent action to combat climate change and its impacts;
- Goal 14. Conserve and sustainably use the oceans, seas and marine resources for sustainable development;
- Goal 15. Protect, restore and promote sustainable use of terrestrial ecosystems, sustainably manage forests, combat desertification, and halt and reverse land degradation and halt biodiversity loss;
- Goal 16. Promote peaceful and inclusive societies for sustainable development, provide access to justice for all and build effective, accountable and inclusive institutions at all levels;
- Goal 17. Strengthen the means of implementation and revitalize the global partnership for sustainable development.

The Agenda, started been implemented from 2016, and so far, progress has been observed in all the SDGs, and the action plan has been set for all the SDGs, to fully implemented by 2030, as there is more work to be done in order to fully achieve all goals. In this **link**, you may see the Agenda 2030 and all the action plan defined by Cyprus.

In order for, the goals of the Agenda, to be adapted to the education framework of Cyprus, the Ministry of Education and Culture has a **Global Education Unit**, through which it promotes the Sustainable Development Goals, formally in the education system.

According to the **EACEA National Policies Platform** regarding the development of entrepreneurship competences as stated on 18/12/2019, currently, in Cyprus, entrepreneurship education is not officially included in the secondary education. However, since 2010, new curricula for primary and secondary education have been developed and implemented focusing on key competences, including creativity and innovation. Through them, students are able to develop competences related to entrepreneurship, innovation and creativity. According to the **annual report** published by the Ministry of Energy, Commerce and Industry regarding the new curricula of the Cyprus Ministry of Education aim at cultivating students with certain skills related to entrepreneurship and more specifically:

- creativity;
- critical thinking;
- theoretical thinking and the ability to translate theory into practice;
- analytical skills and abilities;
- the ability to collaborate and exchange information;
- the ability to solve problems and, at the same time, to find alternatives;
- excellent and prudent use of information and communication technologies;
- consciousness and interpersonal communication skills.

Tab. 5. Useful links for Cyprus data

Document	Introduced
Eco-innovation in Cyprus	2016-2017
Circular economy strategies and roadmaps in Europe	2019
Organization of the Education System and of its Structure	2019
World Data on Education	2010/2011
National Education Systems	2019
EU Environmental Implementation Review	2017
Sustainable Development Strategy	2007
Cyprus- Education for All	2015

6.3. MAIL GOALS AND METHODOLOGY

As also highlighted through the previous two chapters, the present conditions in Cyprus related to food, circular economy, entrepreneurship can be evaluated at an initial stage, as not many actions have been implemented so far, especially in the integration into HEIs and secondary schools. The methodology used for the identification of the curriculums and the information provided through this report was mainly by desk reach through the Internet and also by consulting several stakeholders in Cyprus. Currently, in Cyprus, the curriculum of secondary education is available through the report of CEDEFOP regarding the Structures of Education and Training Systems in Europe, where there isn't available a clear focus on the topics of circular economy, food value chains, cooperatives and entrepreneurship. However, there are many schools that include informally in their curriculum projects based on those topics and encourage their students to take part in competitions. For example, in the vocational school of Nicosia, the students took part in the Junior Achievement Program, where students were asked to transfer their entrepreneurial idea into reality. The students took part in a national competition, and the prize was the development of a logo for an already existed enterprise. During the overall procedure, students were supervised by the teachers, mentors and entrepreneurs. Regarding the tertiary education in Cyprus, currently, there are Public Universities, Private Universities, Public Institutions of Tertiary Education and Private Institutions offering courses on the topics of the circular economy, sustainability, food-related issues, entrepreneurship etc. Additionally, there are also many European projects, that organize seminars and events in the venues of the universities in Cyprus, in order to inform students regarding these topics. This can be also implemented into the framework of the TRAIN CE FOOD project, as the exploitation of the universities and schools will be highly evaluated by students. To sum up, the main goal of this study was the identification of the present conditions in Cyprus related to food, circular economy, entrepreneurship and also to review the existed curriculum and legislation that exists in Cyprus related to those topics. In the next chapter, you will see some good practices of HEIs and secondary schools that have integrated the topics in their curriculums, either formally or non-formally.

6.4. EDUCATIONAL OFFERS

In the national curriculum of Cyprus, in the general secondary education, there are no specialist courses for Agriculture, Food and Catering, Tourism and catering, Environmental related, Entrepreneurship, but there are many courses that include them during the lecture. However, in the **Secondary Technical and Vocational Education in Cyprus**, there are in total 14 Technical Schools, which operate in different cities of Cyprus, where they provide information related to those courses. The current structure of the Technical and Vocational Education in Cyprus is based upon an instructional approach that aims to prepare school graduates to face new situations and new opportunities broadmindedly. The structure that those schools follow provide the ability to students, to receive both theoretical courses and practical specialization on the sectors that they will choose. Through this structure, students receive general education, via a wide range of educational programmes in order to adapt constructively and responsively to the rapidly changing environment and thus to be able to develop critical thinking. The basic **sectors** that students can choose through those schools are:

- mechanical engineering;
- civil engineering;
- architecture;
- arts;
- hospitality management;
- hospitality and food-service;
- industrial engineering;
- hairdressing & aesthetics;
- electrical and electronics engineering.

Among those sectors, there are courses that provide information regarding Agriculture, Food and Catering, Tourism and catering, Environmental related, Entrepreneurship. Below, you may find some good practices from the secondary and tertiary education in Cyprus, offering courses on those topics.

Good practice from secondary vocational education:

The sector of hospitality management includes the departments of **Management of Touristic Areas, Food Production, Entrepreneurship and Innovation** in the hospitality sector. This sector has been designed with the aim to prepare students for employment, studies and development at a managerial level in a variety of hotel and tourism professions. The main purpose of the department is to provide the necessary knowledge on the topics of the hotel industry and Nutritional Issues, and the Specialty Operation and Management of Hotel and Food Units is the supply of hotel and food biotechnology to well-trained and specialized staff and the general development of the wider tourist biotechnology. The program starts with general preparation in hotel and tourist facilities. According to the directions that each student desires to follow, during the second and third year, the programmes allow specialization in those of the Reception, Food and Beverage Management, Hotel Operations as well as Tourism. Within this department also, there is a specialized course on Entrepreneurship and innovation in the hospitality sector. This course provides the students of the speciality with the necessary specialized knowledge regarding entrepreneurship, creativity, innovation and competitiveness. Emphasis is placed on the characteristics of an innovative individual, on different forms of entrepreneurship and the main techniques of producing innovative ideas. Apart from that, it allows the creation of a business idea until its development, evaluation and implementation in the environment of the Hotel and tourism sector.

Good practices from tertiary education:

Regarding the tertiary education, the curriculum offers are broader, as there are more courses specialized in the sector of the circular economy, food supply chain and entrepreneurship. Apart from the formal educational system, in higher education is also often the provision of training seminars specialized in these topics. Some good practices from higher education that provides knowledge to students on those topics can be found below:

In the **Mesarya Technical University**, there is the **Agricultural- Science, Biotechnology and Food Technology** 4-year department, that offers knowledge on three basic areas:

- crop science and technology;
- animal and dairy science;
- food science and technology.

The mission of this faculty is to provide advanced education and training to students, regarding the health and welfare of plants, people and environment, food hygiene etc. A major objective of the department is sustainable rural development with respect to natural and biological resources, socio-economic development of the rural population and preservation of the environmental and cultural characteristics of Cyprus.

During the 4 studying years, the students, that choose one of the above areas, are additionally required to take courses in Agricultural Economics and Management and complete in general 240 Credit Units. More specifically, the requirements of the Agricultural- Science, Biotechnology and Food Technology department, are as follows:

A. Courses common to all students:
- general foundation in natural sciences: 27 credits;
- basic education in agricultural biosciences: 62 credits;
- foreign language: 8 credits.

B. Specialization options
- specialized scientific training: 96-102 credits;
- courses in economics and management: 10 credit;
- elective courses: 18-24 credits;
- practical training: 5 credits;
- BSc thesis: 10 credits.

Through implementing this educational methodology, the university verifies the practical experience of animal husbandry, farm management and machinery operation. The general philosophy of the department is to combine crop and animal production with business management and marketing.

Among others, some of the key learning outcomes that students will obtain through this department are:

- identify the challenges involved in growing, harvesting and processing in food security;
- debate the opportunities and limitations of new technologies;
- reflect on consumer trust in the science and technology involved in bringing food from the field to the supermarket;
- work independently and rapidly enter the food and beverage production and distribution sectors as well as other related sectors in all areas from the production to consumption;
- perform technical tasks in the field of management and control of production preservation and distribution of food and beverages;
- enter a career in the food industry or employment in other sectors of the food chain;
- learn technical skills as well as how to use managerial, economic, social and environmental principles to respond to a wide variety of agricultural challenges;
- move forward in a wide range of plant and farm-based careers;
- learn reproduction and fertility in livestock and bioethics;
- learn agricultural and food marketing;
- learn rural business management;
- discover how agriculture works around the world;
- be able to define and apply key quality concepts.

Another good practice from the tertiary education in Cyprus, that students in Cyprus have, is the possibility to obtain a Professional Diploma in **Agriculture and Agribusiness** by attending two years courses at the Institute of Professional Studies at **UCLan Cyprus**. This institute is supported by the Cyprus Ministry of Agriculture, Natural Resources and Environment and has direct cooperation with the Cyprus Agriculture Research Institute. Students, have the chance to obtain hands-on practical experience in private and public farms and get in touch with experts on contemporary integrated agriculture.

The Professional Diploma in Agriculture/Agribusiness aims to provide students with the technical knowledge and practical skills required for a career in the Agriculture sector. Through this diploma, the Institute of Professional Studies aims to supply the sector with graduates who can lead and develop good agricultural practices with an ecological mind-set.

During the implementation of the studies, students will take courses in the following areas:

- horticulture;
- hydroponics;
- viticulture and oenology;
- landscaping;
- forestry;
- animal husbandry;
- dairy processing;
- integrated agriculture;
- aquaculture;
- veterinary nursing and pet grooming.

Among others, some of the key learning outcomes that students will obtain through this department are:

- develop a good understanding of the cellular biology of life as well as to provide an understanding of the evolution of life on earth, and the basic structures and functions of animal and plant cells;
- health and safety practises to understand the dangers in the industry of agriculture, take appropriate precautions and measures;
- develop a broad understanding of the farm business management and the agribusiness industry in general and with the sustainable agricultural method;
- understand the past, current and future EU policies concerning the Common Agricultural Policy (CAP);
- understand the life in marine and freshwater environments through an ecological approach, the aquatic plant biology and taxonomy;

6.5. PROJECT INTEGRATION, IDENTIFYING GAPS

Among the good practices presented above, synchronization among the **TRAIN-CE-FOOD** project and the current educational offers on these topics can be found on the competences gained after the completion of the courses. More specifically, students in the tertiary education by attending the faculties mentioned above will obtain skills related to Entrepreneurial mind-set and attitude, Creativity & Innovation, Communication and interpersonal relationships management, Economic and business management which are some skills aimed to be covered more detailed through the **TRAIN-CE-FOOD** project. However, there is a shortage on the skills obtained regarding the CE, food value chains and cooperatives, so the **TRAIN-CE-FOOD** project will offer to Cyprus, the chance to upgrade the educational offers and skills to students. Accordingly, there is a necessity, to offer to students' courses that aim to highlight the importance of CE and the benefits that it can have, the dimensions of circular economy and how they can exploit it, in order to foster their employability/entrepreneurial activity. Apart from that, in the national good case studies indicated above, synchronization can also be found on the results provided from the **COOPilot** project. More specifically, as also indicated through the **national report** of the COOPilot project, regarding the educational offers in Cyprus in the topics of cooperatives, students are able to attend some courses and gain similar skills as above. The dissemination of the results of the **COOPilot** project in addition with the **TRAIN-CE-FOOD** future results will provide to students of secondary and tertiary education the chance to receive training and knowledge on the topics of the circular economy, food value chain, cooperatives and entrepreneurship through a detailed analysis and gain skills.

However, as mentioned in chapter section 62, the legal framework of Cyprus, regarding the integration of those topics formally in the curriculum is still in an initial phase, so the provision of those training will be provided to students, through non-formal training. To sum up, in Cyprus, the educational system so far hasn't included in the secondary education training curricula the topics of circular economy, entrepreneurship, cooperatives and food value chain. In higher education, there are departments that offer courses on them, but as part of other courses. Through the dissemination of the **TRAIN-CE-FOOD** project in Cyprus, it will be a good chance, to include the training curriculum during the lectures and through the provision of formal and non-formal training.

6.6. OTHER INFORMATION

External links for further reading:

- List of the Universities in Cyprus.
- The Faculty of Geotechnical Sciences and Environmental Management (Department of Agricultural Sciences, Biotechnology and Food Science) Curriculum:
- The Faculty of Management and Economics Curriculum.
- Bachelor on Business Administration: Entrepreneurship and Innovation (the curriculum).
- School Of Business And Management / BA (Hons) Business Administration Curriculum.
- The Sustainable Development Goals.
- Cyprus Ministry of Education and Culture (The Cyprus Educational System).
- Development of entrepreneurship competence in Cyprus.
- Report on the implementation of the 2030 Agenda in Cyprus.
- Department of the Secondary Technical and Vocational Education and Training.
- The curriculum of the BSc projram of the department Agricultural sciences, biotechnology and food sciences.
- The curriculum of the Professional Diploma in Agriculture and Agribusiness
- The University of Nicosia and related departments.
- The Structure of the European Education Systems (2018/19).
- The Eco-Innovation Scoreboard (Eco-IS).
- EACEA National Policies Platform.
- Global Education Unit.
- Junior Achievement Programme.
- Sectors of the Secondary Vocational Education.

Course Name	Directions	Description
Agronomy (Field Crops)	Animal and Dairy Science	This course covers the most important groups of field crops, including cereals (wheat, barley, oats rye, maize), legumes, tobacco, cotton, alternative crops (biofuel, medicinal, aromatic plants). For each of the above crops or group of crops, the following topics will be discussed: Botanical classification, utilization of the crop, plant morphology, adaptation, growth, climatic requirements. Cropping sequence and cultivation. Nutrient management and manuring. Varieties. Plant spacing, row width and seed preparation. Sowing and transplanting. Irrigation and Pest Management. Harvest, storage, yield and crop quality. Productivity and Production Economics. The course includes lectures, field trips and lab practical.
Food Quality Management	Animal and Dairy Science	The course covers the following topics: Introductory concepts and definitions. Food products and food quality. Quality attributes. Influencing quality attributes in the agri-food chain. History of Quality Management. Principles of the techno-managerial approach. Concepts, systems and methods of quality design, quality control and quality improvement. Food quality systems: ISO 22000 (HACCP), BRC, GMP. Quality policy and strategy. Total Quality Management. Evaluation quality management, quality costs and auditing. The course includes lectures and laboratory exercises. Industrial visits could also be arranged.
Greenhouse Technology and Hydroponics	Crop Science and Technology	The course covers the greenhouse structures, types as well as the interaction with the environment, greenhouse energy and mass balances, evapotranspiration undercover. Equipment for climate control: Heating systems, ventilation, cooling and shading systems. Climate control and decision making in greenhouses. Energy-saving technologies: Thermal screens, windbreaks, thermal insulation. Renewable energy sources for heating greenhouses. Emerging technologies for sustainable agriculture in greenhouses: Insect proof, photoselective and anti-drop cover materials. The second part of the course will deal with Hydroponic systems. It will discuss the substrates used for soilless greenhouse cultures and their chemical properties. Equipment, water and nutrient management in hydroponics. Composition of nutrient solution. Calculation of nutrient solutions for open systems. Calculation of nutrient solutions for closed systems. Horizontal and vertical systems. Disinfection in hydroponics. Hydroponics, product quality and integrated crop management in greenhouses. The course includes lectures and field practicals.
Food Safety and Quality	Animal and Dairy Science	This course provides an overview of the most important bacterial toxins, mycotoxins and phycotoxins, their presence and mechanisms of toxic action, and detoxification mechanisms. Bacterial virulence mechanisms and host responses will be discussed, including interference of pathogen-host interaction with food components. The effect of processing (e.g. heating) on food safety, including survival of pathogens, the formation of Maillard products, heterocyclic amines, PAK's, and oxidation products are reviewed. Microbiological and toxicological risk assessment will be discussed, including genetic polymorphisms for detoxification in humans.
Sustainable Agriculture / Animal Husbandry	Animal and Dairy Science	This course discusses the development of sustainable agriculture, as applied to both crop and animal production. The present state of conventional agriculture, and the impact of intensive agricultural production systems: an irreversible trend. Principles of sustainable agriculture, alternative sustainable agricultural production systems (organic, integrated and precision agriculture). Soil fertility and improvements. Principles of biological and integrated control of insects, diseases and weeds. Agro-biodiversity assessment and management. Implementing organic fruit and vegetable production. Sustainable management in post-harvest preservation methods.

Floriculture and Landscape Architecture	Crop Science and Technology	The course aims to provide advanced training in ornamental horticulture and landscape architecture, two closely related and interdependent fields with continuously increasing economic potential. Topics t covered include field and greenhouse commercial culture of cut flowers and potted plants. Specific information is given on environmental conditions, propagation methods, culture techniques, plant growth regulation, harvesting, grading, storage, packing and shipping. Morphological characteristics and culture conditions of nursery plants (annuals, perennials, shrubs, trees, climbers, bulbous plants). In Landscape Design analysis: landscape type, factors affecting the design, factors affecting the function and use of the landscape, budget, maintenance. Landscape design: Introduction to design, methodology, design principles. The course includes lectures and field practicals.
Plant-origin Food Science and Technology	Crop Science and Technology	The course focuses on the following topics of cereal olive and vegetable/fruit products: (1) Cereals: species and varieties of cereal. Composition and properties of the granules. gelatinization starch. Measurement of viscosity properties of starch suspensions. Production and packaging of bread and pastries. Yeasts and enzymes in a bakery. (2) Olive: traditional and modern ways of olive oil production. Centrifugation: Two and three phases. Table olives. Plant origin oils. Phenolic compounds. Use of olive mill wastes and plant residues. (3) Fruit and Vegetables: properties and nutritional value OF fruit and vegetables. Specifications of fresh produce during packaging. Maintenance in a modified/controlled atmosphere. Fresh cut salads and edible coating membrane. New technologies.
Agriculture Economics and Policy	Animal and Dairy Science	This course is a follow up of ABF 470 Principles of Economics and Management. Economic functions of an agricultural enterprise. Basic principles of agricultural production functions with one variable input. Cost of production. Economic results of agricultural enterprises. Marketing institutions and distribution networks. Competition, types, structure and organization of the markets of agricultural products. Consumer behaviour. Introduction to the international marketing of agricultural and food products. Decision making and marketing strategy. Marketing management in agricultural enterprises and industries. Cost, efficiency and evaluation of marketing systems. Case study: Preparation of an example of a marketing plan.
Principles of Economics and Management	Crop Science and Technology	This and the following two courses provide the necessary economic and management background required by all agricultural scientists. It covers the basic topics, terms and concepts of Economics and Management with special reference to agricultural economics. Economic functions of an agricultural enterprise. Basic principles of agricultural production. Production inputs. Cost of production. Economic results of agricultural enterprises. Demand, supply and marketing of agricultural products.

Tab. 7. Cyprus University of Technology Course Description

Cyprus University of Technology – Faculty of Management and Economics Programme in Management		
Course Name	**Directions**	**Description**
Innovation Management	Entre-preneurship and Innovations	The course aims to familiarize students with innovation management at both a strategic and operational level. Innovation is a key pillar of competitiveness. However, innovation is difficult and involves risks, and it is, therefore, necessary for students to learn techniques and tools for their effective management such as the evaluation of new ideas, the involvement of partners and customers in the innovation process, and the creation of partnerships for the implementation new products. These techniques are different from the techniques used to manage the day-to-day operations of the company.
Principles of new Business Models		Students will learn how to create new and innovative business models based on Internet technologies. This includes the process of identifying the idea, evaluating it and implementing it. The course includes the study of the culture of such organizations, the study of various successful business models, the creation of applications with internet technologies as well as ways of promoting and financing about the new business.
Principles of Creative New Businesses		The transformation of innovative ideas to successful businesses requires creativity and a proper understanding of the business field, careful planning, risk management and knowledge of a company's management. This course will provide the student with the knowledge needed to achieve the above effectively. Specifically, students will learn how to identify and evaluate opportunities, build sustainability studies, marketing plans, finance plans, recruit staff, and build an effective team. Students will learn how to include all this in a business plan.
Finance and Entre-preneurship		The course will cover two learning objectives: 1) funding sources and techniques to identify the value of small business and 2) financial techniques for managing the company. Students will learn about venture capital, business angels and the funding process. They will also learn how to prepare budgets, manage cash, invoice products, pay taxes and loans.
Energy Policy and Environment	Energy Resources Management	The aim of the course is to examine, through a critical approach, the key global challenges related to energy policy and the environment. This course evaluates existing energy policy models, both at the European and global level, as well as the strategic positions of the energy sector in relation to global challenges and government initiatives. In addition, students are exposed to the public debate processes on alternative energy sources and the protection of the natural environment.
Economics of Energy Resources		The course aims to familiarize students with the key economic elements and concepts related to decision making in the energy industry. Issues such as the basics of the energy market, economic modelling and forecasting techniques in this area, inventory management, and evaluation of the development, production and exploitation of energy resources will be explored.
Principles for the Development of Startups and SMEs	Entre-preneurship and Innovations	The course explores the processes and techniques of development in small businesses and Startups. These companies are under constant pressure to show that their model is efficient and that they can compete successfully with their competitors. Students will learn how to create and maintain a productive environment in the company by exploring models of organizational processes and strategies that will help them develop.

Innovation Management	Entre-preneurship and Innovations	This course examines companies which are created to compete in the global market, that they derive resources from different geographic areas, compete in international markets and face risks from many sources. The course focuses on the strategies and techniques for creating and managing these companies.
Human Resources Management		Human Resources Management and Development practices in the Hospitality and Tourism industry from the perspective of strategy. They analyze the role and importance of human resources management and development, forms of motivation and product development, leadership and interpersonal skills, strategic planning, structure and basic functions of the human resources management department, job analysis, department staffing, executive evaluation, payroll systems, and current and future challenges.
Introduction to Entre-preneurship		The course will help students acquire the knowledge to increase their chances of becoming successful entrepreneurs. This also includes avoiding common mistakes in the process of creating a business. By studying entrepreneurship, students will acquire the basic knowledge that will enable them to continue in this direction. Students will learn about the entrepreneur's thinking and mentality, and the characteristics that help them to make decisions and deal with the various challenges. They will also learn the process of creating a new business.
Business Ethics		In the context of business theory and practice, ethics will be studied in this course. In particular, students will study how companies and businesses operate in a social and ethical environment based on their obligations to their business partners. The challenges and effects of globalization on business ethics as well as the social and moral behaviour of multinational corporations will also be studied. The course will be completed by examining corporate governance issues, codes of conduct, financial crimes and corporate social responsibility.

Tab. 8. Cyprus University of Nicosia Course Description

The University of Nicosia - Faculty of Business Administration
Entrepreneurship and Innovation

Course Name	Directions	Description
Introduction to Entre-preneurship	Management & MIS	The main objectives of the course are to: • to analyze the theories and tools of creative thinking; • to evaluate and implement the various market research methods and tools; • to inform students and provide information on Intellectual property protection; • to analyze and understand relevant economics; • to implement various methods for the students' personal development. The content of the course: • it is developing people and competencies; • the economics of entrepreneurship and innovation; • promoting creativity; • gaining strategic advantage; • the marketing plan; • the business plan; • intellectual capital; • knowledge management; • presentation technique; • self confidence and personal development; • technical innovation; • green and social entrepreneurship.
Introduction to Entre-preneurship	Management & MIS	The main objectives of the course are to: • to provide students with an understanding of fundamental management and marketing principles as they apply to small businesses; • to provide students with an understanding of managerial planning and decision-making, organizational structures and environments, the small business legal environment, and the dynamics of operating in small businesses; • to introduce students to management concepts specific to entrepreneurial and small businesses in domestic and global environments; • to foster the development self-directed, life-longer learners with critical-thinking skills. The content of the course: • introductions and overview entrepreneurs recognize opportunities; • researching your market – overview & tips introduction of the business plan summary; • the business plan: Road Map to Success; • creating business from opportunity; • exploring your market; • developing the right marketing mix & plan; • selling & customer service; • understanding costs; • financing strategy; • addressing legal issues & managing risk; • operating for success; • management, leadership and ethical practices; • cashing in your brand.

Change Management	Management & MIS	The main objectives of the course are to: • present a picture of the constant change in the business and social environment; • discuss the impact of this change on individuals and organizations; • analyze the ways in which organizations and individuals can deal more effectively with the change process; • improve skills in analyzing data for the purpose of resolving issues directly related to Change Management; • develop a range of core (transferable) skills, including communication, problem-solving, researching and writing. The content of the course: • introduction to change: Life, A story of change; • why organizations change; • the external and internal organizational environment; • different kind of change, change diagnosis, resistance to change; • effective change implementation, effective leadership of change; • strategies and skills for communicating change; • culture and cultural change; • sustainability Issues for the planet.
Introduction to Entre-preneurship	Management & MIS	In the early 21st century, our lives are being affected by a series of societal and environmental problems. In this course, they examine some of the most pressured issues the world faces today, with a focus on the relationship between human societies and the natural environment. Subjects include issues such as sustainable development, globalization and demographic extension, energy maintenance, maintenance of biodiversity and climate change. The content of the course: • introduction; • environmental issues, causes and Sustainability; • environmental history; • scientific term; • improvement and biodiversity; • globalization and demographic extension; • performance of energy and sustainable energy sources; • atmospheric pollution; • climate change; • hydro resources; • EU and environment.

Tab. 9. UCLan Cyprus Course Descriptions

UCLan Cyprus - Institute of Professional Studies
Professional Diploma in Agriculture and Agribusiness

Course Name	Description
Cell Biology	This module aims to develop a good understanding of the cellular biology of life as well as to provide an understanding of the evolution of life on earth, and the basic structures and functions of animal and plant cells. The module will help students develop the basic scientific knowledge for the continuing acquisition of information in all other subjects involving plants and animals in agricultural sciences.
Agricultural Engineering, Health and safety	The aim of this module is to provide students with basic knowledge of the technology, the machinery and the engineering used in agriculture. Additionally, health and safety practises are also emphasized to allow students to understand the dangers in the industry of agriculture, take appropriate precautions and measures, and it allows the general under-standing of electrical connections and knowledge for the safe use.
Sustainable Agriculture and good agricultural practises	This module aims to develop a broad understanding of the farm business management and the agribusiness industry in general and specifically with sustainable agricultural methods as well as to identify other forms of production such as super-intensive systems as well as permaculture practises.
Soil and water science	This module aims to explore the principles of soil and water science with a specific focus on the relationship between soil properties and plant growth and development. The module will examine the significance of the soil as a finite resource and appreciate its' role in the global ecosystem, as well as practical and analytical skills, will be developed to technical reports.
Common Agricultural Policy and EU Funding	This module aims to fully understand the past, current and future EU policies concerning the Common Agricultural Policy (CAP) and to evaluate the need for funding in your proposed business as well as how to obtain it. Additionally, students will be able to understand the documents required for EU funding.

7 MALTA

7.1. INTRODUCTION

The Republic of Malta (henceforth referred to as Malta) is an archipelago situated in the Mediterranean Sea, the capital city is Valletta and it is the smallest European capital city at 0.8km. It has been a member of the European Union since 2004, joining the monetary union in 2008 and has a population of 493,559 [20].

The Maltese education system is structured into four stages: pre-primary (3-5yrs), primary (5-11yrs), secondary (11-18yrs), and tertiary (18+). Education is compulsory in Malta until the age of 16 and following secondary education 60% of students go on to attend tertiary education [21].

The secondary education system is heavily influenced by the British model of education [22], additionally, according to the Maltese government[23] 60% of schools in the country are run by the state, 30% are religious schools and 10% are independent institutions (See Fig 6) [24].

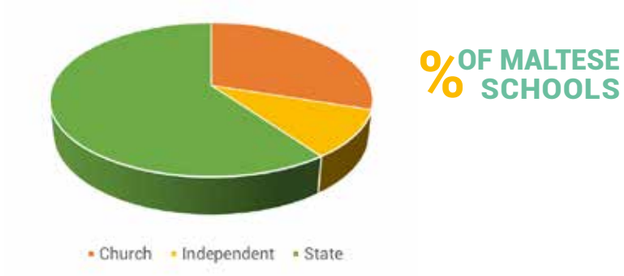

Fig. 6. Governance of Malthese Schools [%][25]

The education system offers core subjects (Mathematics, Science, and Literacy) and also places a lot of importance on languages, with almost 30% of options available to students being language options (See Figure 2). Although the National Curriculum Framework[26] addresses issues of sustainability, indeed it is included in the study of subjects such as health, science and technology, and is used as an example of competencies sought for students in a variety of areas. The Maltese approach at secondary level is often to main stream environmental issues into other subjects, rather than directly addressing the environment in itself.

[20] National Office of Statistics, Malta. (2019) World Population Day: 2019. Population, Migration and Crime Statistics Unit. Available at: <https://nso.gov.mt/en/News_Releases/View_by_Unit/Unit_C5/Population_and_Migration_Statistics/Documents/2019/News2019_108.pdf>

[21] State University.com (n.a) Malta - Educational System—overview - Students, Schools, Vocational, and Training - StateUniversity.com <https://education.stateuniversity.com/pages/955/Malta-EDUCATIONAL-SYSTEM-OVERVIEW.html#ixzz6QSMZTMNv>

[22] The British model of education is based upon core and peripheral subjects. At secondary level, students receive a list of core subjects (Maths, English, Science) as well as additional subjects which they are able to choose: humanities, art, sport, etc.

[23] For a comprehensive list of schools in Malta, divided by type, see: <https://education.gov.mt/en/education/quality-assurance/Pages/Non-State-Schools-List.aspx>

[25] Learning Outcomes Framework.(2012) [online] Available at: <http://www.schoolslearningoutcomes.edu.mt/en/pages/about-the-framework> [Accessed 8 July 2020].

[26] Ministry of Education and Employment (2012) National Curriculum for All. Salesian Press – Malta. Retrieved from: <https://curriculum.gov.mt/en/Resources/The-NCF/Documents/NCF.pdf>

LEARNING AREAS % DISTRIBUTION SENIOR SECONDARY YEARS CYCLE

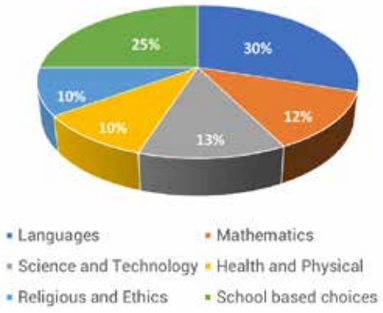

Fig. 7. Learning areas distribution in Malthese senior secondary

Due to the size of the country, the tertiary education sector offers a limited choice of institutions[28] but a wide variety of courses. There is one main university, and one college which provides diplomas and a smaller range of Bachelor's degrees. The offer relating to environmental issues is quite varied, environmental science degrees relating to the ocean are particularly prominent given the local environment.[29] Issues of sustainability are integrated into other courses, notably the home economics curriculum which places a high value on sustainable principles, and acknowledging the impact of different industries (fashion and food) on the environment.

In general, principles of sustainability and the circular economy are rarely overtly addressed in the curricula, they tend to be addressed through extra-curricular activities such as projects and competitions. Although there is a postgraduate degree in Entrepreneurship, it is a concept more directly addressed through Business courses at previous stages of the education system, particularly for students studying the International Baccalaureate at secondary level. There is a great potential for **TRAIN CE FOOD** to offer educational opportunities which directly address the circular economy and provide students with a chance to engage with this critically.

[27] Learning Outcomes Framework.(2012) [online] Available at: <http://www.schoolslearningoutcomes.edu.mt/en/pages/about-the-framework> [Accessed 8 July 2020].

[28] There are 3 institutions available: University of Malta, Malta College of Arts, Science and Technology, and American University. Other international universities have also established franchises in the country.

[29] The Univ. of Malta offers specific degrees and courses in marine biology and the study of marine environment.

7.2. LEGAL FRAMEWORK

The National Minimum Curriculum was introduced into law in Malta in 1995 and updated again in 2000 before being reviewed in 2009 and replaced with the National Curriculum Framework in 2012. It set out to establish a minimum level of education that must be achieved and the principles and subjects which guide the education system. Moreover, the document is an indication of the readiness of Malta to accept the importance of climate change to their state – given the threat that this poses to the future of the country. In 2005 a proposal was tabled to decentralise the education system, creating 10 colleges and a series of directorates which receive "administrative, managerial, financial and ultimately curricular autonomy" whilst being monitored by a quality assurance framework – this system was implemented incrementally over the subsequent 3 years.

Tab. 10. Documents on Maltese Education

DOCUMENT	INTRODUCED
Minimum National Curriculum	2000
For All Children To Succeed Proposal	2005
EDUCATION ACT - Institution of Tourism Studies Regulations	2005
National Curriculum Framework For All	2012
Learning Outcomes Framework	2012
Education Act	2014
National Curriculum Framework Regulations	2013
Framework for the education strategy for Malta 2014-2024: sustaining foundations, creating alternatives, increasing employability	2014

7.3. MAIN GOALS AND METHODOLOGY

Tab. 11. Project goals, Malta

GOAL	DESCRIPTION
To identify the present conditions in your country related to food, circular economy, entrepreneurship	Identifying the current conditions with regards to circular economy, food sustainability and entrepreneurship will identify the weaknesses which should be exploited by the **TRAIN CE FOOD** project. It requires an analysis of the perception of citizens
To review integration into HEIs and secondary schools related to food supply chain issues and CE	To identify different educational institutions that offer education in sustainability, identify the curricula used to structure the learning environment and to develop a relationship with potential partners for future areas of the project.
To evaluate existing training materials	Contact education institutions to obtain the relevant materials for courses which explore issues of sustainability, the environment, and food or consumption behaviours. Once materials are collected they will be analysed to identify the extent to which circular economy is present in the current education system being offered.

Methodology

The curricula identified in this report were found through an existing academic network within Malta. As the offer for higher education is limited to three major institutions in Malta, the search was conducted through the websites of the individual universities. The University of Malta has a number of courses which offer elements of sustainability, however, given the scope of the **TRAIN CE FOOD** project and its focus on developing capacities for entrepreneurs, the search was focused on courses which offered practical and project-based skills (for example the 3 community based projects in the UOM BSc Home Economics course). For the secondary education curricula, the Maltese government provides a **list** of sanctioned schools – this list provided a basis for researching the schools which were involved in environmental projects or had environmental aspects to the curriculum, whether this information was available online and who was responsible for the implementation of this aspect of the curricula. Further to this the schools were contacted to provide as many materials (literature, presentations, assessments) as possible to help with the analysis.

7.4. EDUCATIONAL OFFERS

For a full exploration of the curricula, aims, and literature lists please see the study **individual programmes and courses offered** outlined in Tables 12-15.

Secondary Education

As covered in the introduction, environmental education was introduced as a core skill in the curriculum in 2012, it became a key element of the "*Education for Democracy*" principle guiding the new curriculum.

- Verdala International School – **International Baccalaureate**
  Here there is one indirect offering of environmental education, one direct offering, and an additional business management class. All of the classes in the subsequent analysis are from the International Baccalaureate education track at the school. The biology course covers all a large array of topics, however, it highlights the relevance of studying biology given the strain being placed on natural resources as a result of the growing population, describing studies of biology as *"sorely needed at a time when the growing human population is placing ever greater pressure on food supplies and on the habitats of other species, and is threatening the very planet we occupy"*[30] . The environmental systems and society course is aimed at developing students' relationships between themselves, society, and the environment. This focus on the individual level is aimed towards developing critical thinking, enabling students to view all decisions through the environmental lens – there is, however, no alignment with the circular economy. Developing critical thinking through an environmental lens is a vital skill for innovation in the circular economy – it encourages students to develop new approaches to circular business models. Finally, the Business Management course offers the greatest potential for students to learn about the circular economy, the following concepts guide what is taught: change, culture, ethics, globalization, innovation, and strategy. Although there is no mention of the circular economy in any available materials – the potential for integration is high. The secondary level of education has a limited capacity to engage with students in-depth on specific elements of environmental studies due to the breadth of content which needs to be covered, and the nuance of the issues discussed. Developing critical thinking is an important foundation for building the technical competencies later in the education system. What is evident, however, is that there is an opportunity for mainstreaming cooperative and circular business models into the business management curriculum – this would help students to engage with these ideas over a longer period of time and increase their presence in the marketplace.

[30] Retrieved from: < https://www.ibo.org/en/school/000832>

- De la Salle College – **Diploma in Home Economics**

  De la Salle College offers further education courses, in addition to primary and secondary education routes. The courses offered at diploma level are: Home Economics; Hospitality; and History. The diploma in home economics aims to give students a comprehensive understanding of how individual and familial relationships impact: diet; health; family; resources; home; and the physical, economic, social and aesthetic needs of the individual. The focus on the relationship between the individual and the environment provides students with an understand of their own impact, and how the choices they make can influence their environment. Although there is currently no alignment or recognition of circular economy in this course there is room for integration within core competencies such as: product design; environmental awareness; and the use of food choices to promote health and well-being. Each of these competencies shows the potential for alignment between principles of circular economy and cooperation that underpin the **TRAIN CE FOOD** project.

Higher Education Institutes

- University of Malta – **BSc in Home Economics**

  The overall goal of this degree is to utilise a focus on responsible resource management and consumer behaviour change strategies to improve the quality and sustainability of life on an individual and societal level. The employment opportunities for the course are: care; consumer information; agriculture; environment; sustainability; and retail. There is a particular focus on management, communication and project planning/implementation and as such there is an entrepreneurial nature to the course. In the following section the focus will be on the integration of sustainability and entrepreneurial principles into relevant classes offered throughout the three-year bachelors programme. Each year of the course students must complete a community project, students define and manage projects to develop an understanding of key aspects of project management. Each year the lectures become more detailed, focusing on resource management, communications, and leadership. This identifies a strong link to entrepreneurship and the relevant capacities, yet, in all available materials there is no mention of circular economy. Similarly, two units are offered to students in food preparation, aiming to instil healthy attitudes and behaviours towards food and drink and support students to become skilled in management of time, organisation, safety, hygiene, planning and food choices in relation to basic preparation of food. This is a practical course which offers expertise in menu preparation – although there is a reference to attitudes and behaviours towards food, there is no material which suggests that this extends beyond the health sector. In Year 1, a class on Consumer Trends and Behaviour for Wellbeing and Sustainability is offered, aiming to: familiarise students with sustainable consumption and production issues pertaining to the world's resources; present consumer behaviour and trends that may pose a threat to the world's resources; explore alternative methods to sustainable resource management by individuals and families in different settings. An explorative unit on socio-cultural factors in health and nutrition focuses on historical aspects of national cuisines and food choices, however, it does not bridge the gap between personal health and the impact of food production methods on the ambient health and pollution. There is a 'topical food choices' consideration, however, there is no information available as to whether this extends beyond different dietary requirements. In the final year, students are expected to study 'Perspectives in Health, Consumer and Sustainability Policies and Research' which aims give students an overview of developments in the field of dietary guidance, health behaviour promotion, consumer protection and sustainable living throughout the past few decades; help them become familiar with policies and research on Food and Nutrition, Consumer Protection and Education and Education for Sustainable Development; and provide an analytical perspective to national and international guidelines and policies that aim to assist society adopt a healthier, sustainable lifestyle particularly through responsible and ethical consumer practices. Overall the course tends to be focused on the relationship of each individual student with sustainability and encouraging them to make sustainable choices, there is little alignment with the TRAIN CE FOOD project, although, there is significant potential to include an education in the circular economy and the benefits of this within a number of different courses.

7.5. PROJECT INTEGRATION, IDENTIFYING GAPS

The Maltese education system and in particular those courses outlined in previous chapters are not currently aligned with objectives of the TRAIN CE FOOD project. What they do highlight are certain good practices in education in the various fields which touch on disciplines that are necessarily involved in the project. In the **list of competencies** the competencies of students who complete these courses are underlined, what can be seen is a progression throughout the stages of the education system (secondary --> further --> higher) which transforms students understanding from their own relationship with the environment and how they can make choices as a consumer which promote sustainable business models, to a more fundamental understand of how businesses can be established to promote sustainable development.

The curriculum and modules developed through the TRAIN CE FOOD project have the potential to enhance students' capacities and to build a strong knowledge base for transitioning to circular or cooperative business models as a more mainstream options for young entrepreneurs

Source: <https://ec.europa.eu/education/sites/education/files/document-library-docs/et-monitor-report-2019-malta_en.pdf>.

Tab. 12. Study Programmes and Course Content, Malta

Verdala International School - Secondary Education		
Course Name	**Course Description**	**Assessments**
Biology	Biology is the study of life. The first organisms appeared on the planet over 3 billion years ago and, through reproduction and natural selection, have given rise to the 8 million or so different species alive today. Estimates vary, but over the course of evolution 4 billion species could have been produced. There have been at least five periods when very large numbers of species became extinct and biologists are concerned that another mass extinction is under way, caused this time by human activity. Nonetheless, there are more species alive on Earth today than ever before. This diversity makes biology both an endless source of fascination and a considerable challenge. An interest in life is natural for humans; not only are we living organisms ourselves, but we depend on many species for our survival, are threatened by some and co-exist with many more. From the earliest cave paintings to the modern wildlife documentary, this interest is as obvious as it is ubiquitous, as biology continues to fascinate young and old all over the world. The word “biology” was coined by German naturalist Gottfried Reinhold in 1802 but our understanding of living organisms only started to grow rapidly with the advent of techniques and technologies developed in the 18th and 19th centuries, not least the invention of the microscope and the realization that natural selection is the process that has driven the evolution of life. Biologists attempt to understand the living world at all levels using many different approaches and techniques. At one end of the scale is the cell, its molecular construction and complex metabolic reactions. At the other end of the scale biologists investigate the interactions that make whole ecosystems function. Biology is still a young science and great progress is expected in the 21st century. This progress is sorely needed at a time when the growing human population is placing ever greater pressure on food supplies and on the habitats.	**Standard Level:** External Assessment: 80% Paper 1: Multiple-choice questions: 20% Paper 2: Data-based; short-answer: 40% Paper 3: Short-answer; extended response: 20% Internal Practical Assessment: 20% **Higher Level:** External Assessment: 80% Paper 1: Multiple-choice questions: 20% Paper 2: Data-based; short-answer: 36% Paper 3: Short-answer; extended response: 24% Internal Practical Assessment: 20%
Environmental systems and societies	As a transdisciplinary subject, environmental systems and societies is designed to combine the techniques and knowledge associated with group 4 (the experimental sciences) with those associated with group 3 (individuals and societies). By choosing to study a transdisciplinary course such as this as part of their diploma, students are able to satisfy the requirements for both groups 3 and 4 of the hexagon, thus allowing them to choose another subject from any hexagon group. The environmental systems and societies course is offered at SL only. The prime intent of this course is to provide students with a coherent perspective of the interrelationships between environmental systems and societies; one that enables them to adopt an informed personal response to the wide range of pressing environmental issues that they will inevitably come to face. Students' attention will be constantly drawn to their own relationship with their environment and the significance of choices and decisions that they make in their own lives. It is intended that students develop a sound understanding of the interrelationships between environmental systems and societies, rather than a purely journalistic appreciation of environmental issues.	**Standard Level** External Assessment: 80% Paper 1: Case Study: 25% Paper 2: Short answers and structured essays: 50% Internal Practical Assessment (Individual Investigation): 25%

Business Management	Business management is a rigorous, challenging and dynamic discipline in the individuals and societies subject group. The role of businesses, as distinct from other organizations and actors in a society, is to produce and sell goods and services that meet human needs and wants by organizing resources. Profit-making, risk-taking and operating in a competitive environment characterize most business organizations. Business management examines the use of information technology in business contexts, whereas information technology in a global society (ITGS) critically examines its impact on other fields, such as health and government. Business management studies business functions, management processes and decision-making in contemporary contexts of strategic uncertainty. It examines how business decisions are influenced by factors internal and external to an organization, and how these decisions impact upon its stakeholders, both internally and externally. Business management also explores how individuals and groups interact within an organization, how they may be successfully managed and how they can ethically optimize the use of resources in a world with increasing scarcity and concern for sustainability. Business management is, therefore, perfectly placed within the individuals and societies subject area: aiming to develop in students an appreciation both for our individuality and our collective purposes. The Diploma Programme business management course is designed to develop students' knowledge and understanding of business management theories, as well as their ability to apply a range of tools and techniques. Students learn to analyze, discuss and evaluate business activities at local, national and international levels. The course covers a range of organizations from all sectors, as well as the socio-cultural and economic contexts in which those organizations operate. Emphasis is placed on strategic decision-making and the operational business functions of human resource management, finance and accounts, marketing and operations management. Links between the topics are central to the course, as this integration promotes a holistic overview of business and management. Through the exploration of six concepts underpinning the subject (change, culture, ethics, globalization, innovation and strategy), the business management course allows students to develop their understanding of interdisciplinary concepts from a business management perspective. The course encourages the appreciation of ethical concerns, as well as issues of corporate social responsibility (CSR), at both a local and global level. Through the study of topics such as human resource management, organizational growth and business strategy, the course aims to develop transferable skills relevant to today's students. These include the ability to: think critically; make ethically sound and well-informed decisions; appreciate the pace, nature and significance of change; think strategically. The course also develops subject-specific skills, such as financial analysis.	External Assessment: 75% Paper 1: Case study: 35% Paper 2: Syllabus units 1-5: 40% Internal Assessment: 25% Written commentary: 25% External Assessment: 75% Paper 1: Case study: 35% Paper 2: Syllabus unit 1-5 & HL extension: 40% Internal Assessment: 25% Written commentary: 25%

Tab. 13. Study Programmes and Course Content, Malta

University of Malta – BSc (Hons) Home Economics
(courses relevant to sustainability, entrepreneurship, or food preparation)

Course Name	Study Method	Description	Aims | Competencies
Consumer Trends and Behaviour for Wellbeing and Sustainability	Lecture and Independent Study	The study-unit provides an introduction to the world's resources, (such as water, air, energy sources, soil, agriculture and food production, forests) by highlighting their importance for the health of our planet and of humanity. It tackles the challenges that modern society faces as a result of consumer trends. The study unit presents the inequitable distribution of the world's resources and raises points for students to reflect upon and address through their own individual actions. The unit gives students the opportunity to explore routes to behavioural change that would lead to a more sustainable lifestyle taking into consideration the different settings in which individuals and families function.	• to familiarise students with sustainable consumption and production issues pertaining to the world's resources; • to present consumer behaviour and trends that may pose a threat to the world's resources; • to explore alternative methods to sustainable resource management by individuals and families in different settings; • list the advantages and disadvantages of global resource use, after group discussion; • discuss the concerns about the world's resources and their impact on our wellbeing; • identify and explore feasibility of traditional and new sustainable resource management practices as applicable in different settings • use methods such as thinking skills that would assist in attaining behavioural change; • reflect upon consumer trends and apply problem-solving skills to the sustainability issues most likely to be impacted by consumer production and consumption behaviours.
Literature: • DE BONO, E., 1991. Teaching thinking. London, UK: Penguin Books. • ROBINSON, Z., 2009, in STIBBE, A., 2009. The handbook of sustainability literacy: Skills for a changing world. Devon, UK: Green Books Ltd. • UNESCO, 2014. Shaping the future we want. Paris, France: United Nations Educational, Scientific and Cultural Organization. Available at: http://unesdoc.unesco.org/images/0023/002301/230171e.pdf • ZIBARRAS, L.D. and COAN, P., 2015. HRM practices used to promote pro-environmental behaviour: A UK survey. The International Journal of Human Resource Management. vol. 26 (16), UK: Routledge.			
Community and Entre-preneurial Project (1,2,3)	Lecture and Fieldwork	This study-unit takes a project-based learning approach where students are introduced to basic project planning and teamwork. They are linked to a setting where they will be given a task or tasks to complete under guided supervision to utilise both their Home Economics and their project and teamworking skills. Students will evaluate their experience looking at personal development and quality and impact of their project work.	• outline basic principles of good project planning and teamwork through analysis of different case studies; • discuss in groups the link between good communication and effective project planning and teamwork; • acknowledge, through critical reflection, the importance of needs assessment, resource audits, prioritisation and post-evaluation in effective project planning and implementation. • outline basic principles of good project planning and teamwork through analysis of different case studies; • discuss in groups the link between good communication and effective project planning and teamwork; • acknowledge the importance of needs assess-ment, resource audits, prioritisation and post-evaluation in effective project planning and implementation;

			• apply Home Economics knowledge and practical skills, as well as their communication, organisational and teamwork skills in a setting which promotes aspects of wellbeing; • develop simple communication tools to deliver Home Economics-related messages suitable for specific audiences; • evaluate processes and outcomes of their project work individually and as a team, and set targets for self development.

Literature

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- Trodd, L; Chivers, L (eds). (2011) Interprofessional working in practice: learning and working together for children and families. McGraw-Hill/Open University Press.

Consumer Behaviour	Lecture, Seminar and Workshop	This study-unit will help the participants to obtain a usable Managerial understanding of Consumer Behaviour.	• to develop an understanding of consumer behavior from a variety of perspectives such as multicultural, interdisciplinary, etc.; • highlight meanings in consumption and identify consumption behavior patterns and motives; • to develop and appreciation for and understanding of how marketing research, marketing strategy, and basic research on intra- and interpersonal processes play multiple roles in the discipline of marketing; • to develop an understanding of peoples' consumption-related behaviors and to develop and evaluate marketing strategies intended to influence those behaviors; • demonstrate both intellectual and cognitive and research skills for use in the employment; • develop measures to elicit customer satisfaction for participant's own business or employment; • develop the analytical, creative, and organizational skills necessary to do a small scale consumer research to help solve a management problem; • analyze recent CB studies and examine how they can be applied to one's own business or employment.

Literature

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- Solomon, M.R. (2006). Consumer Behaviour - Buying, Having and Being 7th edition New Jersey: Pearson Prentice Hall.

Socio-Cultural Issues in Health and Nutrition	Lecture, Fieldwork, Independent Study & Seminar	This study-unit begins by looking at the theory of food and culture and gives an overview of the social functions and symbolic meanings of foods and their implications on the micro and macro levels. The various cultural factors that influence the choice of	This unit aims at introducing students to a socio-ecological approach to food choices and behaviours, through tackling different relevant theories and historical, cultural and social factors. Students will reflect on aspects of the traditional Mediterranean diet and Maltese cuisine, and also become more familiar with the basics of other popular cuisines. They will also update their knowledge on topical health and nutrition issues and thus strengthen their arguments for

		foodstuffs, meal patterns and eating habits of different population groups are discussed. The study-unit also describes the socio-historical background to traditional Maltese cuisine and explores the impact of technology, tourism and changing lifestyles on current food choices and eating practices of the Maltese population. The study-unit then continues by focusing on topical concerns regarding the food-health link. Students are exposed to various sources of information in order to familiarise themselves with the latest controversial research and 'news' in the fields of health and nutrition, as well as to evaluate the issues discussed so that they can effectively inform others in order to modify food-related behaviours, improve their quality of life.	evidenced-based knowledge and health promotion messages. • describe the various factors involved in the discussion of nutrition and culture; • outline historical and socio-economic changes in the Maltese cuisine; • compare and contrast the current Maltese diet and the traditional Mediterranean diet; • discuss the influence of technology and changing lifestyles on Maltese eating habits; • outline the social functions of food (religion, occasion, gifts etc.); • discuss the symbolic meanings of food as they relate to current attitudes in Malta; • explain the key features of a number of popular cuisines from around the world, with a focus on links to religious and ecological factors; • outline the current scientific knowledge in relation to a number of food and health-related topics; • apply different strategies to assess the reliability of health and nutrition research reports appearing in the different media; • identify and access reliable websites for the latest information on nutrition and health concerns; • investigate local lay knowledge and attitudes regarding 'trendy' health and nutrition topics; • present health promoting messaging using evidence-based arguments.

Literature

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Perspectives in Health, Consumer and Sustainability Policies and Research		The unit sets out the policies and guidelines that shape consumer trends and behaviour in relation to health and sustainability. It presents international, national and other professional entity or NGO reports, strategies or action plans focusing on food,	• to present an overview of developments in the field of dietary guidance, health behaviour promotion, consumer protection and sustainable living throughout the past few decades; • to become familiar with policies and research on Food and Nutrition, Consumer Protection and Education and Education for Sustainable Development; • to provide an analytical perspective to national

		health and sustainable development. Reports on food, nutrition and health education, as well as education for sustainable development, particularly those stemming from the UN decade on Education for Sustainable Development and the UN Sustainable Development Goals will be given particular attention. Research, projects and case studies highlighting examples of good practice will be examined and critiqued.	and international guidelines and policies that aim to assist society adopt a healthier, sustainable lifestyle particularly through responsible and ethical consumer practices. • outline the various key reports and strategies one should be aware of in order to knowledgeably discuss food, health, consumer and sustainability issues of concern and plans of action; • discuss the main concerns highlighted in key reports and strategies and the implementation of evidence-based action plans; • identify the role of different stakeholders in developing, implementing and evaluating research and policy in the areas of food, health, consumer and sustainability; • summarise the salient key findings from research reports and explore potential application in different settings to promote societal wellbeing; • produce a plan for application of research to develop a policy which will promote wellbeing for individuals, families or communities.

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Food Preparation Skills for Health and Wellness (1,2)	Practical	This study-unit will look at health, wellness and society and impart knowledge and skills on relevant food preparation and practical procedures. The study-unit will initially address basic skills of food preparation, time management and	The aim of this unit will be to instil healthy attitudes and behaviours towards food and drink and support students to become skilled in management of time, organisation, safety, hygiene, planning and food choices in relation to basic preparation of food. It will showcase novel ingredients and foods available on the market and help students gain skills in preparing diets or meals for people with different needs as per their stage in the

		organisation, and also address other aspects such as food preparation of the commodities, budgeting, hygiene and a practical approach. The unit will then address novel ingredients and menu planning, and cooking for different dietary needs, different emerging diets. A hands on approach will be used throughout.	lifecycle. Students will prepare, cook and serve different menus economically, practically and with skill, appropriately using staple and novel ingredients whilst also being aware of the many allergens found in food, food intolerances and how to deal with them in food preparation. • prepare various ingredients according to the appropriate method; • demonstrate the skills required to carry out different methods of food preparation; • demonstrate safe, hygienic working practices for each method of cookery; • produce menu items suitable for special diets and different needs; • evaluate the differences between each method of food preparation using different ingredients; • practise analysing basic recipes for nutritional value. • plan meals, menus and diets suitable for different individuals and occasions; • prepare food in a practical, economical, organised way and according to the nutrition guidelines; • discuss different diets, allergens, needs, and ingredients based on online research; • explain the importance of good health and use this knowledge in the different food choices used in food preparation according to sample individual and family profiles; • explain the health and safety procedures to be followed when using each method of food preparation; • list the sources where the nutritional values of food items can be found.

Literature
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Tab. 14. Study Programmes and Course Content, Malta

Malta College for Arts, Science, and Technology – Undergraduate Diploma in Hospitality and Tourism	
	National Qualification Framework: Level 5 Duration: 1 year Mode of attendance: Full-time Total ECTS credits: 60 ECTS Awarding body: MCAST
List of Study Units Covered During the Course	• the business of tourism and hospitality; • soft skills within hospitality; • academic English writing; • fundamentals of consumer behaviour and marketing in tourism; • finance for the non-financial manager; • operations management for hospitality; • leadership and management principles for hospitality; • human resources management; • introduction to cruise operations; • contemporary issues in hospitality management.
Course Overview	This programme provides students who aim to work in the hotel and hospitality field with the knowledge and skills required to understand various aspects of the industry. The programme will introduce learners to tourism and hospitality in order to understand the context, the impact and the key characteristics of the field. In view of the people oriented nature of hospitality learners will also be prepared in relation to the soft skills required to successfully work in this industry. Critical Thinking is a vital skill, much in demand in all walks of vocational and academic life; indeed it is one of the most sought after skills in the workplace. This key skill will undoubtedly make students more competitive in the employment arena. This programme also gives the opportunity to understand factors that influence the behaviour of tourists as consumers together with key aspects in tourism marketing. A prospective manager in the hospitality industry requires a good understanding of finance. Hence this programme will also expose learners to financial aspects. Operations management is also covered, however with a focus on hospitality and service operations. Considering the business nature of hospitality organisations, leadership and management principles and human resources management will also be introduced. The programme also provides a background to the cruise industry whilst also looking at pertinent management issues. Lastly students will explore contemporary issues within the hospitality industry.
Learning Outcomes	At the end of the programme the learner will be able to: • understand the nature, impacts and characteristics of tourism and hospitality; • examine the key concepts and principles of marketing as applied to tourism; • analyse hotel and hospitality operations; • apply leadership and management principles within hospitality organisations; • discuss various contemporary issues affecting the hospitality industry;

Tab. 15. Study Programmes and Course Content, Malta

De La Salle College - Diploma in Home Economics	
Course	Aims
Food, Nutrition and Health	• understand the importance of nutritional recommendations and to be able to choose food and methods of preparing food which promote health and wellbeing; • develop the knowledge, understanding and skills necessary to provide healthy diets. Recognize that family members have different dietary needs and that food choice is affected by social, economic, environmental and psychological needs; • promote an understanding of the main technological developments in the food industry.
Family Well-Being	• develop knowledge of the family as a social institution and the contribution of family life to the personal and social development of its members; • recognize the importance of strengthening family relationships and the interdependence and interaction among individuals and families; • acknowledge the different and changing needs of family members and how these needs could be met throughout the life-cycle; • increase the awareness of the emotional, physical, social and environmental factors that affect the development of the child; • encourage a caring attitudes to others, particularly towards children, the elderly and people with special needs.
Choice and Management of Resources	• develop knowledge and skills necessary to enable students to become discerning consumers and effective managers of resources in relation to the home and family; • develop competence for safe and healthy living; • foster aesthetic appreciation of product design and understand the implications of rapid technological change and marketing techniques on the consumers; • to learn to control basic skills pertaining to food selection, preparation and presentation, home management, clothing and textile care; • to investigate the implications and applications of technology and to develop competence in their use.

Tab. 16. List of competencies at University of Malta

University of Malta - BSc in Home Economics	
Course	Relevant competencies gained
Consumer Trends and Behaviour for Wellbeing and Sustainability	• identify and explore feasibility of traditional and new sustainable resource management practices as applicable in different settings; • reflect upon consumer trends and apply problem-solving skills to the sustainability issues most likely to be impacted by consumer production and consumption behaviours.
Community and Entrepreneurial Project (1, 2, 3)	• discuss in groups the link between good communication and effective project planning and teamwork.
Consumer Behaviour	• develop the analytical, creative, and organizational skills necessary to do a small scale consumer research to help solve a management problem.
Socio-Cultural Issues in Health and Nutrition	• explain the key features of a number of popular cuisines from around the world, with a focus on links to religious and ecological factors.
Perspectives in Health, Consumer and Sustainability Policies and Research	• to become familiar with policies and research on Food and Nutrition, Consumer Protection and Education and Education for Sustainable Development; • outline the various key reports and strategies one should be aware of in order to knowledgeably discuss food, health, consumer and sustainability issues of concern and plans of action.

Tab. 17. List of competencies at De La Salle College, Malta

De La Salle College	
Course	Relevant competencies gained
Choice and Management of Resources	• develop competence for safe and healthy living; • foster aesthetic appreciation of product design and understand the implications of rapid technological change and marketing techniques on the consumers; • to learn to control basic skills pertaining to food selection, preparation and presentation, home management , clothing and textile care; • environmental awareness.
Food, Nutrition and Health	• understand the importance of nutritional recommendations and to be able to choose food and methods of preparing food which promote health and wellbeing.

Tab. 18. List of competencies at Verdala International School, Malta

Verdala International Schhol - Secondary Education	
Course	Relevant competencies gained
Environmental Studies	• students' attention will be constantly drawn to their own relationship with their environment and the significance of choices and decisions that they make in their own lives; • sound understanding of the interrelationships between environmental systems and societies.

SUBJECTS		LEARNING AREA
OTHER CURRICULAR ENTITLEMENT	CORE ENTITLEMENT	
• Accounting • Agribusiness • Arabic • Artisanship • Business Studies • Chinese • Computing • Construction • Design & Technology • Economics • Engineering Technology • Environmental Studies • European Studies • French • Geography • German • Graphical Communication • Hairdressing & Beauty • Health & Social Care • History • Home Economics • Hospitality • Information Technology • Italian • Life Science • Materials Science • Performing Arts • Physical Science • Retail • Russian • Spanish	• English • English Literature • Maltese • Maltese as a Foreign Language	LANGUAGED
	• Mathematics • Core Mathematics	MATHEMATICS
	• ICT • Core Science	SCIENCE AND TECHNOLOGY
	• Religion • Ethics	RELIGIOUS AND ETHICS EDUCATION
	• Physical Education • Home Economics • Personal, Social and Career Development	HEALTH AND PHYSICAL EDUCATION
	• Social Studies • History • Geography	HUMANITIES
	• Art • Music • Drama	VISUAL AND PERFORMING ARTS
	• Personal, Social and Career Development • Social Studies	EDUCATION FOR DEMOCRACY

Fig. 8. Learning Outcome Framework[31]

[31] Learning Outcomes Framework (2012) [online] Retrieved from: <http://www.schoolslearningoutcomes.edu.mt/en/pages/about-the-frameworks> [Accessed 8 July 2020].

8 SLOVENIA

8.1. INTRODUCTION

Slovenia is a small European country covering an area of 20 273 km^2 between the Alps, Adriatic Sea and Pannonia Plain. Slovenia shares land borders with Austria, Italy, Hungary, and Croatia. The capital of Slovenia is Ljubljana. At the beginning of 2019, Slovenia had a population of 2 080 908 and a population density of 102.7 people per square kilometer[32]. Slovenia is one of the European countries with the most pronounced ageing of the population, which is due to a low birth rate and increasing life expectancy[33] . The main language is Slovene. Due to the influence of past historical ties, Croatian (37%) is the most widely used second language, followed by English (34%), German (27%) and Italian (7%)[34]. The Slovenian education system consists of basic, secondary, and tertiary education. School leaving qualifications are classified by the Slovenian Qualifications Framework (SQF)[35].

Primary education is provided by public and private kindergartens, basic schools, basic schools with an adapted education programme, music schools and educational institutions for children with special educational needs. **Secondary education** is provided by upper secondary schools and secondary schools. **It is classified as general or vocational technical and secondary professional or technical education. The third segment of education,** tertiary education, is provided by both public and private institutions. It consists of higher post-secondary vocational education and higher education. Higher post-secondary vocational education is provided by higher vocational colleges, while higher education is provided by faculties, academies, and independent higher education institutions.

The right to free education is enshrined in the Constitution of the Republic of Slovenia. Basic education is compulsory and is financed by public funds. The state is obliged to provide citizens with opportunities to receive an adequate education. The universities and colleges are autonomous. The Constitution also guarantees physically or mentally disabled children and other severely disabled persons the right to education and training for an active life in society, provided and financed by the state[36].

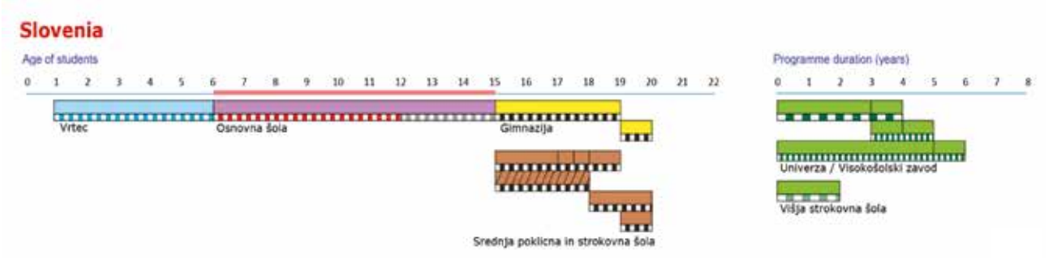

Fig. 9. Slovenian educational scheme
Source: <http://www.eurydice.si/publikacije/The-Education-System-in-the-Republic-of-Slovenia-2018-19.pdf

32 Retrieved from: <http://www.eurydice.si/publikacije/The-Education-System-in-the-Republic-of-Slovenia-2018-19.pdf>
33 Zupanič, Milena (20 June 2011). "Demografski preobrat: tiha revolucija med nami". Delo.si (in Slovenian). Delo, d. d. ISSN 1854-6544
34 Retrieved from: <https://languageknowledge.eu/countries/slovenia>
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36 Retrieved from: <http://www.eurydice.si/publikacije/The-Education-System-in-the-Republic-of-Slovenia-2018-19.pdf>

Among other objectives, the basic school education aims to educate people to sustainable development, to take responsibility for their own actions, their own health, other people, and the environment. The development of entrepreneurial skills, innovation and creativity is also one of the main objectives of basic education. Many Slovenian schools have joined the Eco-Schools program, an international award scheme that accompanies schools on their path to sustainability and provides a simple framework for making sustainability an integral part of school life [37].

Many European countries are concentrating on integrating the topics of the circular economy, food cooperatives and entrepreneurship into their formal and non-formal education systems. Their involvement seems to be more intensive at the tertiary level of education, whereas it is not yet so intensive at the secondary level of education. There are a few universities in higher education that are developing these programmes.

The University of Ljubljana and the University of Maribor, for example, have a department of biotechnology, agricultural and food sciences, which currently offer educational content in the form of non-formal education on recycling and food cooperatives. The field of circular economy and corporate initiatives is even more pronounced due to various international research and innovation projects.

At the level of secondary education in Slovenia there is currently no course that is clearly focused on entrepreneurship and nutrition, but there are courses that mention the concept of entrepreneurship and its various aspects. As far as topics related to the circular economy and food cooperatives are concerned, there is no formal structure of courses at secondary level in Slovenia that would enable students to develop their knowledge of these topics. Despite significant improvements in environmental issues (e.g. circular economy, food cooperatives) and the provision of formal courses for secondary and higher education, Slovenia continues to score poorly on eco-innovation. This is also confirmed by its low ranking among countries with eco-innovative practices.

8.2. LEGAL FRAMEWORK

Public upper secondary schools, short-cycle higher vocational schools, higher education institutions, educational institutions for SEN children and dormitories for students of upper secondary and tertiary education, as well as supporting specialised institutes in the field of education are established and financed by the state. Public kindergartens, basic schools, dormitories for primary school pupils, music schools and adult education organisations are established by the municipalities. Pre-school education programmes are financed by the municipalities, payments from parents and other sources. Basic education is financed by the municipality, the state, and other sources. The same applies to adult education.

37 Retrieved from: <http://ekosola.si/>

The main objectives of upper secondary education in Slovenia try to [38]:

- to enable the whole population to obtain a general education and a profession;
- the largest possible proportion of the population to achieve the highest possible level of creativity;
- the largest possible proportion of the population to achieve the highest level of education and facilitate their inclusion in the processes of European integration processes.

The Slovenian Qualifications Framework (SQF) [39] is a uniform system of qualifications in the Republic of Slovenia, which aims to outline the educational and other qualifications available in Slovenia and the mutual comparability of different qualifications. Its basic function is to clarify the horizontal and vertical relationships between different types of qualifications, certificates, and degrees/diplomas. They consist of level descriptors; each level descriptor being defined by learning outcomes.

Learning outcomes are thus the central basis, concept, approach and criterion of the national qualification's framework, on which the effectiveness and transparency of national frameworks and the implementation of the European Qualifications Framework in the EU Member States depend. The purpose of the SQF is to achieve transparency and recognition of qualifications in Slovenia and the EU, while its basic objectives are to support lifelong learning, to integrate and harmonise the Slovenian qualifications subsystems and to improve the transparency, accessibility and quality of qualifications in relation to the labour market and civil society.

At the higher education level Slovenia is actively involved in the Bologna Process and as a member of European Union is committed to the objectives of Lisbon Strategy. It strives for a high-quality, diverse, and accessible tertiary education system that is internationally comparable. The most important goals of tertiary education include quality, employability and mobility in Europe and the world, fair access and the diversity of institutions and study programmes. Tertiary education in Slovenia consists of short-cycle higher vocational training and higher education. Both subsystems of tertiary education are interlinked in that they are linked by a system of quality assurance [40].

Higher education is organised in three cycles of study. The first cycle comprises professional and academic undergraduate study programmes; the second cycle comprises postgraduate master's study programmes (master's or integrated master's), and the third- cycle postgraduate doctoral study programmes. Study programmes are offered on a full-time, part-time or distance learning basis. The Slovenian Quality Assurance Agency for Higher Education ensures the development and operation of the quality assurance system in Slovenian higher education. It works with responsibility for content and form and provides guidance to all actors and participants in higher education in accordance with European and global development orientations.

[38] Retrieved from: <http://www.eurydice.si/publikacije/The-Education-System-in-the-Republic-of-Slovenia-2018-19.pdf>
[39] Retrieved from: <https://www.gov.si/en/topics/slovenski-solski-sistem-in-slovensko-ogrodje-kvalifikacij/>
[40] Retrieved from: <http://www.eurydice.si/publikacije/The-Education-System-in-the-Republic-of-Slovenia-2018-19.pdf>
[41] Retrieved from: <https://www.nakvis.si/?lang=en>

Slovenian National Programme for Youth 2013-2022 [42] is mainly concerned with structured dialogue to ensure a timely and effective contribution of young people to the formulation of public policies that affect them. Article 8 of the Act on Public Interest in the Youth Sector designates the Council of the Government of the Republic of Slovenia for Youth as a consultative body to support decision-making on youth and youth sector issues. UN Youth Delegate is a voice of young people from Slovenia in the UN. The annual participation of a youth delegate in UN enables a delegate (and the youth) to exchange views with other youth delegates and with representatives of states and decision-makers at international level. The human rights sector of the Ministry of Foreign Affairs meets with a delegate several times as part of the preparations for participation in international forums. The Ministry of the Republic of Slovenia (Foreign Affairs) also participates in events where it seeks to promote knowledge and understanding of global issues among young people.

The European Union (EU), which aims to achieve economic dominance in the global market, has drawn up a comprehensive development programme, which was first Lisbon Strategy and then Strategy Europe 2020. Achieving the strategic objectives contained in the prospective development programmes is intended to make the EU the most competitive knowledge-based economy in the world. Europe 2020 is the EU's ten-year growth strategy, which sets out three mutually reinforcing priorities:

- smart growth: developing an economy based on knowledge and innovation;
- sustainable growth: promoting a more resource-efficient, greener, and more competitive economy;
- inclusive growth: promoting an economy with high employment and social and territorial cohesion.

These three mutually reinforcing priorities should help the EU and Member States to achieve high levels of employment, productivity, and social cohesion [43].

The roadmap to Circular Economy in Slovenia sets out the path for Slovenia [44] to become a leader in the recycling industry in the region. Designed using an inclusive, multi-stakeholder approach, it identifies four priority sectors, makes recommendations to the government, and identifies best practices. The roadmap presents Circular Triangle, a model that combines three inseparable elements - Circular Economy (business models), Circular Change (government policy) and Circular Culture (citizens), three interdependent aspects that form the core of the systemic change from a linear to a circular economy in Slovenia.

The sustainable development goals and COVID -19 - Sustainable Development Report 2020 for achieving the goals of the sustainable development agenda by 2030 put Slovenia in 12th place out of 162 countries [45]. Slovenia has been most effective in eradicating extreme forms of poverty and providing access to cleaner energy resources.

[42] Retrieved from: <http://www.pisrs.si/Pis.web/pregledPredpisa?id=RESO93#>
[43] Retrieved from: <https://ec.europa.eu/eu2020/pdf/COMPLET%20EN%20BARROSO%20%20%20007%20-%20Europe%202020%20-%20EN%20version.pdf>
[44] Retrieved from: <https://static1.squarespace.com/static/5b97bfa236099baf64b1a627/t/5beabb62f950b773950d1ce7/1542110257669/ROADMAP+TOWARDS+THE+CIRCULAR+ECONOMY+IN+SLOVENIA.pdf>
[45] Retrieved from: <https://s3.amazonaws.com/sustainabledevelopment.report/2020/2020_sustainable_development_report.pdf>

The Circular Economy is one of Slovenia's strategic development priorities, which is closely linked to Sustainable Development Goals (SDG's).

Among the most important national documents such as *"A Vision for Slovenia in 2050"* [46] and *"Slovenian Development Strategy 2030"* [47] CE is one of the important sustainability drivers for Slovenia.

As regards cooperatives, Slovenia has a well-developed system. Cooperative Union of Slovenia is a non-governmental organisation with voluntary membership that supports the development of the cooperative movement and represents the interests of its members. Its mission is to promote and represent the sustainable development of cooperatives by working together for the benefit of our members and consumers. The members of Cooperative Union of Slovenia unite 71 agricultural, forestry and fishery cooperatives. The cooperatives have more than 15.500 members and employ 3.000 people [48].

[46] Retrieved from: <https://www.slovenija2050.si/>
[47] Retrieved from: <https://www.gov.si/assets/vladne-sluzbe/SVRK/Strategija-razvoja-Slovenije-2030/Strategija_razvoja_Slovenije_2030.pdf>
[48] Retrieved from: <http://www.zadruzna-zveza.si/english/cooperative_union_of_slovenia.html>

8.3. MAIN GOALS AND METHODOLOGY

The challenge for society is to manage the food system within the planetary boundaries. Considering that 60% of the land is already degraded or is not sustainably managed; especially when evaluating an existing system that is strongly linked to the management of artificial manure management, there are opportunities for new approaches both in land management and in the linking of the cycle and bio-economy, in food production methods and the integration of digitization, taking into account the conservation of water bodies and other areas related to food supply Food supply is a fundamental social function that aims to produce food of the highest quality in an efficient and sustainable way on available farmland. Within food systems, the concepts of self-sufficiency, sustainable and organic farming, intensive agriculture, livestock production and fisheries are interlinked. These include transport logistics, trade, regulation of exports and imports, food preparation and the issue of food waste, collection and treatment of organic matter, maintenance of soil and water quality, etc. While general upper secondary education is intended to prepare for further education at university, vocational and technical secondary education is intended either to acquire qualifications for a particular profession in order to enter the labour market, or to continue education at tertiary level. Slovenia has general and technical secondary school programmes. The latter include gymnasia of technics, gymnasia of economics gymnasia of arts, while the former comprise general gymnasia and classical gymnasia. All programmes have a basic structure with compulsory and optional parts. In all gymnasia programmes, pupils learn at least two foreign languages. The current situation in Slovenia with regard to initiatives for sustainable food use, the circular economy and entrepreneurship could be described as an initial phase, as not many measures have been taken so far to integrate these contents more intensively in secondary and higher education. Curricula for the information for this report were identified through internet sources and consultations with stakeholders in Slovenia. In our further research we have focused on degrees, subjects or titles related to the environment, economics, agriculture, food industry, waste management, tourism and sustainability, also using the keywords: circular economy, food chain, by-products and entrepreneurship to facilitate our search. A review of the current situation shows that there is no clear focus on the topics of circular economy, food chain, cooperatives and entrepreneurship that would include these contents in the curricula. However, only a few schools and universities take up this content informally and encourage their students to participate in competitions. For example, there is a program National Meeting of young Slovenian researchers organized by the Association for Technical Culture of Slovenia. The aim of the national meeting is to introduce young people to science at an early age, to popularize science and technology.

In summary, the main objective of this study is to identify the current situation in Slovenia regarding food, the circular economy, entrepreneurship, and to review the existing curriculum and legislation in Slovenia on these issues. In the next section we present some good practices of higher education institutions that have formally or informally included topics in their curriculum.

8.4. EDUCATIONAL OFFERS

As far as tertiary education is concerned, the curriculum is broader, with more courses specializing in the sector of the circular economy, food supply chain and entrepreneurship. In addition to the formal education system, the higher education sector often offers training seminars specializing in these subjects. Some good practices from higher education that provide students with knowledge on these topics are listed below. Today, more and more young people are choosing to study courses that impart knowledge about nature, natural processes and materials, life sciences and nature. At the Faculty of Biotechnology at the University of Ljubljana, the main topics are climate change, protection of natural resources, the importance of quality food production for health, related areas such as agriculture, forestry and fisheries, production technologies and landscape architecture. Individual programmes at the Biotechnical Faculty of the University of Ljubljana are focused on these areas, but the range of electives is extremely broad and allows the areas to be interlinked.

Good Slovenian practices from the tertiary education sector:

At the **Biotechnical Faculty of the University of Ljubljana**, it is possible to acquire basic knowledge in the fields of agronomy, biology, microbiology, biotechnology, forestry and renewable forest resources, woodworking, landscape architecture, zootechnics, food, as well as more practically oriented higher education programmes such as forestry, agronomy and horticulture, agriculture and animal husbandry and wood engineering. In the continuation of the study at the master's level, the spectrum is extended to 16 scientific fields. The fundamental mission of the Biotechnical Faculty is to provide university level, advanced professional, and postgraduate education, as well as to carry out scientific research and technical and consulting work concerning the sciences of living nature (biology, microbiology) as well as agriculture, forestry and fisheries (forestry, animal husbandry, agronomy) and the related production technologies (wood technology, food technology, biotechnology). The common denominator of all academic and scientific disciplines at the Biotechnical Faculty are natural resources (soil, physical space, flora, fauna, and water) [49].

In the opinion of the students who presented the programmes at the Informativa education fair, the special feature of studying at Biotechnical Faculty lies in conducting classes in a green environment, a pleasant atmosphere, personal contact between professors and assistants, practical exercises and participation in professional tasks and research projects. In addition to the theoretical knowledge acquired, students also gain practical experience and important skills for the working world. Researchers and professors promote innovation, and students can advance in business opportunities in cooperation with the University of Ljubljana Incubator and other incubators.

[49] Retrieved from: <http://www.bf.uni-lj.si/en/deans-office/about/>

There are nine core areas at the **master's level**:

- biology;
- biotechnology;
- forestry and renewable forest resources;
- agriculture - agronomy;
- agriculture - animal production;
- landscape architecture;
- wood science and technology;
- microbiology;
- food science and nutrition.

At the **Professional Study Programmes** there are the following courses available:

- forestry;
- agriculture - agronomy and horticulture;
- agriculture - animal husbandry;
- wood engineering.

Food Science and Technology [50]

Food science is an economically fast growing branch in Slovenia with a strong interdisciplinary focus and vertical links between producers of high quality, safe raw materials and food processing facilities that produce and ensure a high quality food supply for the population based on contemporary knowledge, principles and technologies. The study of food science enables students to extend knowledge already acquired and to gain additional scientific knowledge for the development of food science and technology. The market demand for professional and scientific personnel, whose work can ensure the development of technology for the common economic growth of Slovenia in a particularly important segment, is increasing in both the public and private sectors. The basic aim of the study program Nutrition is to provide in-depth theoretical knowledge from the natural science basics and specific contents of food science.[51]

The main goal of Study Programme in Wood Science is the training of experts who can establish an interdisciplinary connection between scientific, technical, economic and social subjects, with the aim of sustainable development of the profession - wood science. In accordance with the challenges of the modern world, graduates will be able to correctly assess wood as a sustainable resource, to recognize the structure and properties of wood and other lignocellulosic materials and, knowing these properties, to seek the optimal use of wood, lignocellulosic materials and wood products, to manage and plan the wood processing and woodworking technologies applied to wood and wood composites, and to organize and manage companies dealing with wood and wood products.

[50] Retrieved from: <http://www.bf.uni-lj.si/en/deans-office/study-programmes/academic-study-programmes/wood-science/>
[51] Retrieved from: <http://www.bf.uni-lj.si/en/department-of-food-science-and-technology/about/presentation/>

Agronomy [52]

The basic aim of the Agronomy course at Biotechnical Faculty of the University of Ljubljana is to deepen knowledge and methods in the field of natural foundations and technological processes of plant production, which are inseparably connected with the integral management of agricultural land and the preservation of the environment. The Masters acquire in-depth knowledge of the natural sciences that form the basis of modern technologies of agricultural production and environmental protection, professional skills in the field of field and fodder crops, as well as professional and methodological knowledge for the management of agricultural land and environmental protection. The topic most closely related to circular economy and sustainability in this study program seems to be "Introduction to Sustainable Agriculture". It deals with basic principles and concepts, components, and their relations in sustainable agriculture (agro-environment, crops, livestock, farmer, consumer), (conventional and sustainable agriculture), organic agriculture (principles, standards, control, practice), etc.

Economics of Natural Resources [53]

The Faculty of Biotechnology offers a new programme and professional profile based on international standards: Economist of Natural Resources. The programme is aimed at graduates of the first cycle of studies in life sciences and other sciences who wish to combine natural and social sciences in order to obtain a broad educational profile for new challenges and employment opportunities. The programme aims to provide general and specific economic knowledge in the broad field of natural resource management. Students will be able to understand the economic and legal-political aspects at the level of farms, enterprises, non-governmental groups and state administration. They also acquire basic skills for management and administration in agriculture and related sciences. The programme is planned to be multidisciplinary and project-based, and builds new development profiles of graduates who will take on responsible key positions in business and public administration in the field of natural resource management.

[52] Retrieved from: <http://www.bf.uni-lj.si/en/deans-office/study-programmes/master-study-programs-second-cycle/agronomy/>

[53] Retrieved from: <http://www.bf.uni-lj.si/en/deans-office/study-programmes/master-study-programs-second-cycle/economics-of-natural-resources/#c5230>

Food Science [54]

The fundamental aim of Study Programse in Food Science is to impart in-depth theoretical knowledge in the fields of the fundamentals of natural science, food science and analysis of food, food safety, nutritional technology and development and research methods. The masters are qualified for work in planning, organization, control and management of food production, for the creation and development of new technological processes and new products, for work in control and analysis laboratories and inspection services, and for research work.

Non-formal education, courses and conferences related to circular economy, food chain, by-products and entrepreneurship are often offered: Alumni Club - Association of Alumni of the Faculty of Agronomy, Biotechnical Faculty, University of Ljubljana (AK AOBF) organized a thematic conference entitled Green Technologies and the Circular Economy (March 2019).

Another good practise from the tertiary education sector in Slovenia is the **Faculty of Agriculture and Life Sciences (FALS)**[55] **at the University of Maribor.**

The mission of FALS UM is research, education, and transfer of knowledge into practise in order to meet the needs of agriculture, the food industry and areas related to agriculture. It is to help shape public opinion and policy in the field of food safety, to create self-sufficiency through environmentally friendly food, to preserve agricultural land, to increase biodiversity, to reduce greenhouse gas emissions and other environmentally harmful contaminants. The Faculty is located in the centre of Slovenia's most important agricultural region, enabling a good combination of theory and practice. The Faculty of Agriculture and Life Sciences has numerous accredited undergraduate and postgraduate study programmes. They offer 8 basic and postgraduate courses of Vocational College: Agriculture and Environment, Agronomy-Ornamentals, Vegetables and Field Crops, Biosystems Engineering, Organic Farming, Agricultural Economics and Rural Development, Viticulture, Oenology and Fruit Growing and Animal Science. The first one is more academically oriented, while all the others are professionally oriented. The FASL offers three post-graduate courses among the master's courses:

- agricultural economics;
- agriculture;
- food safety.

The FALS UM offers several elective courses that focus on food safety in the food chain, such as Production Systems and Sustainable Development, Natural Resource Management and Environment, Food and Production Systems. These courses are closely linked to sustainable production and management, although they are not directly related to the circular economy.

Agriculture and Agribusiness is a master's programme ***Agricultural Economics*** by FALS UM[56] , which is an interdisciplinary programme in which students broaden their knowledge of agricultural economics. Students learn to recognise and distinguish co-dependent microeconomic concepts, they learn to conduct independent research with quantitative values of economic evaluation, they learn methods of decision support in management and computer science and become familiar with different methods of rural development and agricultural policy. The contents of the programme also include the most important elements of microeconomic theory, the application of different quantitative methods for the assessment of economic efficiency in agriculture and the competitiveness of local producers and the food industry, as well as general insights into problems of agricultural management. In the first semester, students take 5 compulsory methodological courses which enable them to understand some of the basic concepts of agricultural economics and prepare them to carry out research in the fields of agricultural economics, agricultural management, marketing management and rural development. In the second semester, students must decide in which of the areas they want to specialise (Management and Marketing in Agriculture or Agricultural Policy and Rural Development). Both semesters include seminar papers, which are evaluated with 5 ECTS points, which enable students to conduct independent research and can be included in the master's thesis.

[54] Retrieved from: <http://www.bf.uni-lj.si/en/deans-office/study-programmes/master-study-programs-second-cycle/food-science/>

[55] Retrieved from: <http://www.fkbv.um.si/index.php/en/>

[56] Retrieved from: <http://www.fkbv.um.si/images/stories/zlozenke/fkbv-zlozenka-2015-002-ang.pdf>

Another master's degree study programme offered by **FALS UM** is the **agriculture course**, which is intended to train future experts and provide them with professional knowledge in various areas of environmentally friendly agriculture: Biomolecular Techniques and Phytomedicine, Biosystems Engineering, Organic Farming, Food production in the field and in the garden, Fruit and Wine Growing, Grassland Management and Feed Production, Animal Sciences. The organisation of the Bologna courses takes into account the fact that agricultural production is increasing in its complexity, and is therefore aware that all positions in agriculture with higher responsibilities require a trained expert in agriculture. The course enables students to deepen their agricultural knowledge through numerous elective modules and subjects specifically tailored to their educational needs.

The Master's programme **Food Safety** at FALS UM is interdisciplinary and internationally oriented and is unique in its kind in Slovenia. It is a combined study programme of the Faculty of Agriculture and Life Sciences and the Faculty of Medicine of the University of Maribor. The aim is to create a Master's degree programme on food safety of food within the food chain, covering areas such as biotechnology and medicine. The programme will enable students to acquire the knowledge and skills necessary to work in the fields of food production, public health and cooperation with the public.

Secondary level education

The Secondary School of Hospitality and Tourism [57] offers a 4-year training course with a special module entitled Entrepreneurship and Legislation. Within this module, students learn about the basic concepts, the role and the advantages and disadvantages of entrepreneurship. Upon completion of the module, students will understand the general concepts of economics, but the circular economy will not be covered in this or any other module.

Biotehnical Centre Naklo [58] was originally founded as a dairy school in Vrhnika, but over the years it has changed to Biotechnical Centre Naklo. It is a major development factor in the Gorenjska region with impacts on sectors such as education, agriculture, and employment. It offers a wide range of educational programmes, such as agriculture, horticulture, dairy farming, organic farming, rural development, renewable energy, nature preservation and urban gardening.

Biotechnical School Maribor [59] offers several educational programmes. In the nature protection program (nature protection technician) students learn to recognise the effects of human activities on nature, the environment and space and to care for the natural and cultural landscape. The programme focuses on environmental protection, information about the importance of natural values, protection of natural resources and protected areas in Slovenia. In the 4-year programme of Agricultural Entrepreneurial Technician, students are trained in the fields of agriculture, which require a broader professional and general knowledge in planning, managing, supervising and performing work in plant and animal production and complementary activities in accordance with the principles of sustainable development, quality assurance and protection at work. Students plan agricultural production, the production of crops and vegetables, fruit and grapes and animal feed. They are trained for professional work in agricultural, livestock, fruit and viticultural processing, production, and sales. They handle harmful and hazardous substances and waste from agricultural production and breeding safely and prevent environmental pollution. They give advice on the sale of agricultural products and services and materials for the needs of agricultural production and breeding. They prepare for successful integration into the European market and develop ecological awareness, economic efficiency, personal responsibility, independent work, and initiative.

[57] Retrieved from: <https://www.ssgt-mb.si/>
[58] Retrieved from: <http://www.bc-naklo.si/>
[59] Retrieved from: <http://www.bts.si/index.php>

Initiatives to encourage young people to engage in sustainable development and entrepreneurship.

Despite the fact that there are no curricula that would directly address students with the contents of the CE, food security or cooperatives, there are still some initiatives to encourage young people to engage in sustainable development and entrepreneurship on an informal level. The public agency SPIRIT Slovenia has launched a Youth and Entrepreneurship programme[60] aimed at developing the competences of creativity, innovation and entrepreneurship of pupils and students and creating conditions for a comprehensive entrepreneurial development of youth. This agency provides training for teachers and professors and offers incentives for schools to carry out activities with young people. It promotes the development of young people's business ideas with mentoring support and funds for the further development of business ideas in cooperation with funding bodies at national, regional and local level. They have prepared materials to promote creativity, innovation, and entrepreneurship for young people with the elective curriculum *"With creativity and innovation to entrepreneurship"* and the handbook for mentors. There is also *"Entrepreneurship Education Handbook for teachers"*, which contains recommendations on developing entrepreneurship as a lifelong competence, creative tasks for primary school pupils from the fifth grade onwards and for secondary school pupils. In addition to the 10 tasks, students will find in the annex an introduction to the exercises, which includes an index and key areas of the exercises, and an online tool for creating a business plan[61]. Another example of promoting entrepreneurship among young people is the Young Entrepreneur Institute[62] , which acts as an entry point into the world of entrepreneurship. This institution helps youth to develop an entrepreneurial idea, finds a suitable form of business, examines the cost aspect and taxes, and, if necessary, provides a virtual office or coworking for work. Once the company has been set up, it educates youth about online marketing and takes care of the legal part and trademark registration. The portal offers information in the phase of brainstorming and checking ideas, the founding of a company and after the company has been founded. The support of information through the portal is the entrepreneurial education. It is addressed to beginners in the phase of finding and testing an idea, to those who are in the phase of founding a company, as well as to those who need knowledge in the field of law, marketing, sales and similar topics that appear urgent in the growth of the company. Each year, Gea College, which focuses on entrepreneurship and management, organizes the Youth Entrepreneur National Competition [63], which is specifically aimed at high school students who want to develop their knowledge of entrepreneurship and business. Tasks include developing their own business ideas, making performance analyses, and presenting their own arguments in public presentations.

[60] Retrieved from: <https://www.podjetniski-portal.si/mladi-in-podjetnistvo>
[61] Retrieved from: <https://www.podjetniski-portal.si/mladi-in-podjetnistvo/gradiva>
[62] Retrieved from: <https://mladipodjetnik.si/vizitka/o-projektu>
[63] Retrieved from: <https://gea-college.si/en/o-gea-college-2/youth-entrepreneur-national-competition/>

8.5. PROJECT INTEGRATION, IDENTIFYING GAPS

After reviewing courses, training, and good practices, it is found that the approaches of the circular economy and safe food and supply chains are not yet widely used in Slovenia. The current educational offer on these topics is relatively sparse. Therefore, by promoting and disseminating these practices through the project **TRAIN-CE-FOOD**, additional skills are acquired in terms of entrepreneurial thinking and attitudes, creativity and innovation, communication and interpersonal management, and business management. In Slovenia, educational programmes really do deal with sustainable development and circular economy in its infancy, while few initiatives to introduce entrepreneurship among young people in Slovenia have been identified. Nevertheless, these are only optional elective courses, which are usually not included in the compulsory study programmes. There is nothing in the curriculum that directly addresses the business models of the circular economy at national level. Except for the Eco-School Programme and Spirit Slovenia, there is still plenty of scope for a more intensive introduction to the contents of the CE, entrepreneurship, and food management at the primary and secondary school level. There is a lack of skills acquired in the field of the CE, food chains and cooperatives, so the project **TRAIN-CE-FOOD** will provide an opportunity to improve the educational offer and skills in Slovenia. Accordingly, students should be offered courses aimed at highlighting the importance, benefits and dimensions of environmental services. In Slovenia, students can only attend few courses on cooperatives and acquire informal skills. The dissemination of the results of the COOPilot project together with the future results of **TRAIN-CE-FOOD** will enable secondary and higher education students to train for education and knowledge on the topics of circular economy, food value chain, cooperatives and entrepreneurship. The formal inclusion of these topics in the curriculum is still in its infancy in Slovenia, so students need to be taught this through informal education.

8.6. OTHER INFORMATION

The agricultural and food system is under unprecedented pressure due to a growing population, global demography and changing dietary habits. Despite this urgent need to transform the agricultural and food system towards sustainability, we currently lack the truly integrated understanding that would enable us to meet these challenges. Therefore, more study programmes on innovation in Sustainable Food and agriculture, circular economy and related areas should be designed in cooperation with industry partners and stakeholders. Such programmes should reflect the reality of business and policy challenges, focus on food and agricultural and circular economy and promote practical innovation. To understand the challenges facing farmers, it is important to understand the entire food supply chain and consumer requirements. Therefore, more educational courses and training should be offered in Slovenia, covering the circular economy, entrepreneurship, cooperatives, and the food value chain. Training on these topics should be provided not only in the form of non-formal education, but also as formal education at all levels of the educational system. These opportunities also arise from the **TRAIN CE FOOD** project to provide the training curriculum.

External links for further reading:

- Ministry of Education, Science and Sport.
- Education System in Slovenia.
- Roadmap Towards the Circular Economy in Slovenia.
- Statistical Office of the Republic of Slovenia (SURS).
- OECD country profile; Education Policy Outlook Country Profile Slovenia (pdf).
- Eco-schools (in Slovene).
- EUROPE 2020.
- Slovenia 2050.
- The Sustainable Development Report 2020.
- Business portal.
- Gea-college.
- Slovenian Quality Assurance Agency for Higher Education.

Tab. 19. University programme descriptions, Slovenia

Biotechnical Faculty at University of Ljubljana		
Course Name	**Directions**	**Description**
Academic Study Programme in Food Science and Nutrition	Food and Nutrition	The main aim of the Academic Study Programme in Food Science and Nutrition is to qualify a professional who is capable of wide comprehension of food science and nutrition, with an emphasis on knowledge connected to food science, production, processing, quality and food marketing and nutrition as a natural continuation of food science for balanced, safe nutrition and the normal development and maintenance of human health. Graduates can be employed in large and small food processing plants, microbiological, physical, chemical and sensory laboratories for the food industry and in laboratories for food quality control, in consumer education, food quality and safety inspection services, in institutional nutrition in factories, health resorts with specific nutrition programmes, services connected to nutrition in public health institutions, centres for the promotion of healthy nutrition, selling food and/or nutritional additives for preservation of health.
Academic Study Programme in Forestry and Renewable Forest Resources	Forestry	The study programme qualifies students for complete ecosystem forest work in accordance with modern principles of close-to-nature, multipurpose and sustainable management. Such a scheme requires linkage among ecological, economic, and technical sciences. It requires knowledge of forest ecosystems, social aspects of forest management, the various techniques and technologies used in forest management and familiarity with modern methodological tools. Due to the abundance of forests and their importance in Slovenia, the demand for forestry professionals in administration, and in nature conservation governmental and non-governmental organizations is increasing.
Academic Study Programme in Agriculture - Agronomy	Agronomy	The basic aim of the Academic Study Programme in Agriculture - Agronomy is to educate professionals who understand the interdisciplinary nature of the profession, who master the basic research methods of natural science, technology, economics and social science and are able to apply them in sustainable agricultural development, with an emphasis on plant production. Graduates are qualified for basic planning, organization, management and implementation of technological processes and maintenance services in plant production.
Master Study - Agronomy	Agronomy	The basic aim of the study program is to deepen knowledge and methods from the area of the natural foundations and technological procedures of crop production, inseparably linked with integral management of the agricultural space and environmental conservation. Masters obtain in depth knowledge of natural sciences, which is the basis of modern technologies of agricultural production and environmental conservation, professional competences in the sphere of field and forage crops, and professional and methodological knowledge for managing the agricultural space and protection of the environment.
Master Study - Ecology and Biodiversity	Ecology and Biodiversity	Basic aim of the programme is to educate masters with fundamental knowledge of ecological science, which is the basis for recognising the role of organisms on various levels of an ecosystem, for understanding processes and recognising changes in nature and in our immediate environment and for preventing and alleviating these changes.
Master Study - Forest Ecosystem Management	Forest Managment	The basic aim of the study program is to provide students with integral knowledge about forests and to train them for management in accordance with three contemporary principles of forest management – co-natural, multi-purpose and sustainable. This requires knowledge of forest ecosystems, social science aspects of forest management, technologies that can be used in dealing with forests and familiarity with contemporary methodological tools. The program follows contemporary European trends and places to the fore integral eco-system forest management. Students deepen basic knowledge about forests and their management and, depending on their interests, also obtain wider knowledge from special or fringe fields of forestry and managing forest ecosystems.
Master Study - Nutrition	Nutrition	The basic aim of the Study Program in Nutrition is to communicate in depth theoretical knowledge from basic natural science subjects, from specific contents of nutritional science, contamination, toxicology, or food safety, nutritional planning, nutritional education, nutritional engineering, analysis of food, development, scientific communication and research.
Master Study - Food Science	Food	The basic aim of the Study Program in Food Science is to communicate in-depth theoretical knowledge from basic natural science, food science and analysis of food, food safety, nutritional engineering and methods of development and research. Masters will be qualified for the most demanding and most responsible work in planning, organising, control and leading the production of food, for creating and developing new technological processes and new products, for work in control and analytical laboratories and inspection services and for research work.

Tab. 20. University programme descriptions, Slovenia

Faculty of Agriculture and Life Sciences (FALS) at University of Maribor		
Course Name	**Directions**	**Description**
Vocational College Programme - Organic Agriculture	Agriculture	The study program will enable students to acquire professional knowledge in the field of organic farming and also train them to use scientific methods in solving complex professional and work problems. As part of the elective module, in the 3rd semester they will delve into one of the agricultural industries (livestock, viticulture, fruit growing, horticulture and field plants). Practical education that is an integral part of the study program, provides students with insight into work and practice in various fields - from organic farms, through organic food processing, to promotion, marketing, control, certification, including familiarity with the situation and trends in other countries. As part of the study of organic farming, staff will be educated and trained for more demanding professional work in the field of organic farming, in connection with environmental issues and rural development.
Vocational College Programme - Agronomy	Agronomy	The program enables students to acquire all the necessary professional and some basic knowledge in the field of environmental protection, modern production techniques, marketing and the basics of food safety, grown in fields and sheltered areas, and the production and marketing of ornamental plants. The study also enables the ability to use scientific methods in solving complex professional and work problems, developing the ability to communicate in the profession and between professions, professional criticism and responsibility, initiative and independence in decision-making and management.
Vocational College Programme - Viticulture, Winemaking and Fruit-Growing	Wine and Fruit-Growing	The study program enables students to acquire professional knowledge and skills to use scientific methods in solving complex professional and work problems, developing the ability to communicate in the profession and between professions, professional criticism and responsibility, initiative and independence in decision-making and leadership. It provides the knowledge that a graduate need for maximum employability on the labour market of the Republic of Slovenia and the European Union. A mandatory part of this study program is practical training in a work environment. The student is able to acquire work skills through practice at the University Centre for Viticulture in Meranovo and fruit growing at the location of the University Agricultural Centre and agricultural institutes, the state administration in the field of agriculture and abroad.
Vocational College Programme - Management in Agriculture and Rural Development	Agriculture	The basic goal of the program is to train professionals who will successfully combine technological knowledge acquired through elective modules in the field of agronomic and animal husbandry technology, with knowledge of management and economics, while the program provides key knowledge in the developing field of rural development.

Master's Degree Programme - Agricultural Economics	Agricultural Economics	The main goal of the programme is to produce experts with an insight into the economic facets of agriculture and related sciences. The subjects within the programme ensure that the students obtain fundamental theoretical knowledge in agricultural economics closely connected to microeconomic principles for analysing the production and price ratios on the market. At this level students learn how to determine and differentiate microeconomic concepts and learn how to conduct research independently using quantitative methods for economic assessment. The programme strives towards producing to different expert profiles and does so through the following two systems of teaching modules: (I) Agricultural management and marketing, and (II) Rural development.
Master's Degree Programme - Agriculture	Agriculture	The main goals to be pointed out are the following: increased in depth knowledge in specific and carefully elected fields which are then organised into modules; training in independent scientific and expert research; training in modern scientific research methods, including the latest biometric and analytical procedures; training in leading complex systems connected to agriculture; developing independent critical opinions on contemporary problems in agriculture connected to the globalisation and specialization of modern healthy food production trends, environmental conservation and the enhancement of biodiversity.
Master's Degree Programme - Food Safety	Food Safety	The study programme is the only one of its kind in Slovenia and is designed to comply with interdisciplinary and international measures. It is a combined study programme of the Faculty of Agriculture and Life Sciences and the Medical faculty at the University of Maribor and strives to provide a master's degree programme on the safety of food within the food chain that includes fields such as biotechnology and medicine. It contains optional subjects, which enable the students to complement their curriculum according to their future career ambitions, scholarship grants and employers' needs.

9 SPAIN

9.1. INTRODUCTION

In Spain, pre-primary education is up to 6 years of age. Although it is not a compulsory stage, the second cycle is free in all publicly-funded schools (public schools and publicly-funded private schools). **Basic education** is compulsory and free in publicly-funded schools. It lasts ten years and it is divided into:

- **Primary education**, provided in primary schools. It covers six academic years, between the ages of 6 and 12;
- **Compulsory secondary education**, studied in secondary schools, between the ages of 12 and 16. At the end of this stage, students receive the first official certificate, which allows them to have access to upper secondary education or the world of work.
- **Upper secondary education** is also provided in secondary schools. It lasts two academic years, between the ages of 16 and 18. It offers two possibilities:
- **Bachillerato** (general branch);
- **Intermediate vocational training** (professional branch).

Higher education comprises university and professional studies. **University education** is provided in universities and **Advanced vocational training** is provided in the same institutions as those offering intermediate vocational training.

Adult education and training covers different types of provision offered by the education and employment authorities, provided by institutions from different nature.

The Spanish education system also offers specialised education: Language education; Artistic education and Sports education. The **basic curriculum** for the compulsory secondary education and Bachillerato mentions entrepreneurship, sustainable development and environment as cross-cutting elements. In addition, some Spanish Schools joined the **Eco-Schools programme**, so they carry out some sustainable practices, including circular economy in many cases.

Regarding higher education, circular economy and entrepreneurship subjects are taught in some university degrees or advanced vocational training. In addition, several universities provide specific Masters in Circular Economy.

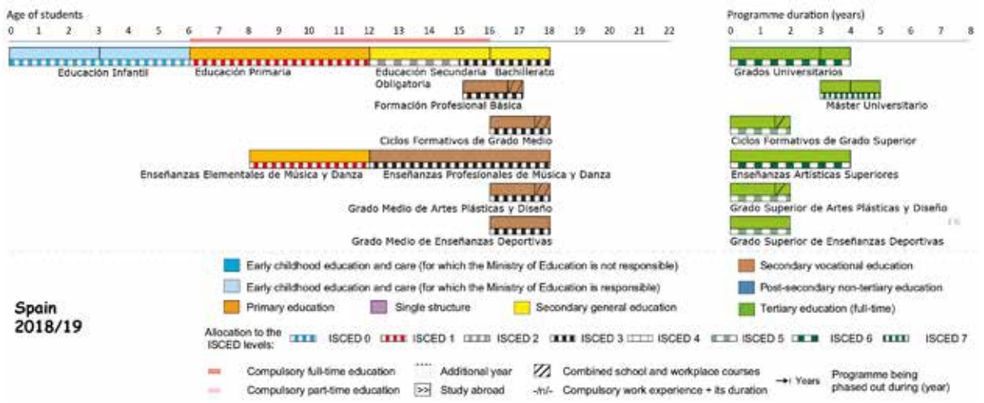

Fig. 10. Spanish educational scheme

9.2. LEGAL FRAMEWORK

Europe 2020 emphasizes smart, sustainable and inclusive growth. It includes environmentally-friendly production methods and land management.

ET 2020 emphasizes that education and training are essential for Europe's strategy for a sustainable, knowledge-based growth. It includes Entrepreneurship education.

At national level, the right to education is included in the 1978 Spanish Constitution. This right, for **secondary education**, is implemented through national educational laws, that can slightly change at regional level. Thus, educational competences are shared between the General State Administration (Ministry of Education and Vocational Training) that executes the general guidelines on education policy and regulates the basic elements or aspects of the system, and the authorities of the autonomous communities (Departments for Education) that develop the State regulations and have executive and administrative competencies for managing the education system in their own territory.

National educational laws are frequently changing due to political instability. The educational community through **different movements complain** about their scarce participation in the successive educational reforms. The 2006 Education Act (LOE) was modified by The Act on the Improvement of the Quality of Education (LOMCE), that was passed in 2013. After the latest Government Change (11/2019), a new modification was launched (**LOMLOE)**. The new law is still being discussed in the Spanish Parliament, so this report will focus on the LOMCE, which is still in force.

The reform of 2013 recognises the need to combine quality and equity in the training provision. School enrollment is not enough to meet the right to education. With a high early **school leaving rate** (19% in 2016), the reform tried to reduce it, while improving educational results, employability and the entrepreneurial spirit of students.

Regarding universities, the national legislation is a bit more stable. The University Law of 1983 was replaced by the current **Educational Law** (LOU, 2001) with **social opposition**, and was updated through an **organic law** (2007) to European requirements, such as the **European Higher Education Area and Bologna process**. Some autonomous regions also have their own **regional laws** to regulate universities. University studies are divided into 3 cycles:

STRUCTURE UNDER *LOU*			**EHEA STRUCTURE**		
Cycle	Length	Length	Cycle	Length	Length
1º	2-3 years	*Diplomado/a* *Ingeniero Técnico* *Artquitecto Técnico*	**1º**	2-3 years	Bachelor's
2º	2 years	*Licenciado/a* Engineer Architect	**2º**	2 years	Master's
3º	2 years 3-4 years	Diploma in Advanced Studies (DEA) Doctor	**3º**	3-4 years	Doctor

Fig. 11. Structure of University education, Spain

Source: Drawn up by the Institute for Teacher Training, Educational Research and Innovation *(IFIIE)* on the basis of the information from the webpage of the europena Higher Education Area.

There are other national legislation affecting the university education, as the **Law of Sustainable Economy** (2011), that in the Article 61 states: *"To guarantee its contribution to the sustainable economy, university education must respond to the following principle: The incorporation in their study plans of skills and abilities oriented to innovation, the improvement of creativity and entrepreneurship, integrated in subjects, concepts, transversal competences, learning and examination methods, in all levels of education [...]".*

The Spanish Circular Economy Strategy called **España Circular 2030**, includes educational objectives such as the adaptation of the Vocational Training system to the needs of the future workers in relation to circular economy or the implementation of specific R+D+I programmes, focused on entrepreneurial leadership and sustainability.

Some autonomous regions also implemented their own regional strategies. The Community of Madrid has developed the strategy Madrid 7R Economía Circular, **Educate todayfor a more sustainable Madrid** and an **Environmental Educational Programme** with activities on circular economy.

9.3. MAIN GOALS AND METHODOLOGY

Since Spain is the second biggest country in Europe, with plenty of **universities distributed along the country**, we decided to focus our research in only one region. Permacultura Cantabria implements their activities at national level, having higher impact in the Autonomous Communities of Cantabria and Madrid. Cantabria has a reduced **University system**, where the main public university (University of Cantabria) has no Bachelor's programmes connected with the project topics. For this reason, only Madrid Region will be analysed in this study.

In order to systematise the search, we first checked the official website of the **Autonomous Community of Madrid**. According to this source, a total of 15 universities are located in its territory: 6 of them are public universities **(Alcalá, Autónoma, Carlos III, Complutense, Politécnica y Rey Juan Carlos)** and 9 are private universities. We have prefered to focus our research on public ones, and although the Politécnica has a specific **Master** and a **research group** or the Complutense, that has given a summer courseon circular economy, we have chosen the **Universidad Autónoma de Madrid** (UAM) as they often offer **conferences, events, summer courses** and **congresses** out of the ordinary courses indicating a bigger implication with the topic of our project.

Regarding advanced vocational training, Madrid offers 65 different titles classified in 21 professional families. We have focus our study in the family of Agrarian Studies (*"Landscaping and Rural Environment"* and *"Forestry and Environmental Management"*) and the family of Food Industries (*"Viticulture"* and *"Processes and Quality in the Food Industry"*) as the two more related to the topic of our project. We have used the webpage of the **Community of Madrid** to access the study programmes of each of the selected studies.

We have decided not to focus on secondary vocational education in our research and do a deeper search on the **Compulsory Secondary Education** and **Bachillerato** (general branch) programmes (LOMCE law for the community of Madrid).

We have paid special attention to degrees, subjects or titles related to environment, economy, agriculture, food industry, waste management, tourism and sustainability also using the key words: circular economy, food chain, by-products and entrepreneurship to facilitate our search.

9.4. EDUCATIONAL OFFERS

Educational curricula in Madrid:

It is worth mentioning that every educational centre has pedagogical autonomy, so the methodology to develop the topics varies greatly between centres.

Secondary General Education*

In Madrid, the LOMCE study plan includes objectives oriented towards *"the development and strengthening of the entrepreneurial spirit, the acquisition of skills for the creation and development of the various business models and to the promotion of equal opportunities and respect for the entrepreneur and the businessman, as well as for business ethics. The Region of Madrid will promote measures so that students participate in activities that allow them to strengthen the entrepreneurial spirit and business initiative based on skills such as creativity, autonomy, initiative, teamwork, self-confidence and critical sense".*

In the 3rd and 4th year of **Compulsory Secondary Education**, ***"Introduction to Entrepreneurial and Business Activity"*** is an optional subject offered, and In the 4th year there are other optional subjects related to our research topic:

"Biology & Geology" has the module *"Ecology & Environment"* with the learning outputs *"Express how the transfer of matter and energy occurs along a food chain or network and deduce the practical consequences for the sustainable management of certain resources by humans. Compare the practical consequences on the sustainable management of some resources by human beings, critically assessing their importance. Relate the energy losses produced at each trophic level to the sustainable use of the planet's food resources".*

"Economy" has the module *"International Economy"* where one of the learning outputs is *"Reflect on environmental problems and their relationship with the international economic impact by analyzing the possibilities of sustainable development."*

*"**Sciences applied to the professional activity**"* with the module *"Applications of science in environmental conservation"* includes *"waste management"* and *"sustainable development"* topics.

"Technology" has the module *"Technology and Society"* where there are two topics *"Harnessing raw materials and natural resources"* and *"Acquiring habits that promote sustainable development"* related to this project.

"Scientific Culture" has the module *"Technological advances and their environmental impact"* which includes *"Principles for a sustainable management of the planet: Main international treaties and protocol".*

* The programmes **Educate today for a more sustainable Madrid** and **Eco-Schools** offer a broad range of initiatives and resources for schools and high schools that are further explained in *"Other information"* section.

Regarding Upper Secondary Education: In the 2nd year of Bachillerato there is an optional subject called *"Earth and Environmental Sciences"* where the module *"Sustainable development and management"* develops the *"Waste management"* topic and students learn *"Main environmental problems. Indicators of the state of the planet. Conservationist model and sustainability. Environmental impact assessment. Environmental management (water, landscape, waste). [...]"*

National Evaluation criteria and Assessable learning standards are detailed **here**.

The Community of Madrid in collaboration with the ACS Foundation have developed an **Environmental Educational Programme** for 1st year of Bachillerato and Secondary Vocational Education. The Programme consists of three complementary activities:

•**Previous activity: What is the circular economy?**: Informative presentation about circular economy and basic principles of a SWOT analysis;

•**Activity 1: The perfect circle**: Preparation of a SWOT analysis of an hypothetical company that is considering becoming a circular economy company;

•**Activity 2: Building in balance**: Role-playing game carried out on a case where a traditional construction company is going to switch to building with recycled elements, but it is located in a region where there is a quarry and a cement factory that have this company as their main client;

The specific learning objectives of the programme are:

- to acquire a responsible civic conscience, inspired by the values of the Spanish Constitution, as well as for human rights, which promotes co-responsibility in the construction of a just society, equitable and environmentally sustainable;
- recognize the environmental problems caused by our economic model;
- relate environmental pollution to environmental deterioration, proposing actions and habits that contribute to their solution;
- investigate and gather information on current environmental pollution problems and their impact, and develop attitudes that contribute to their solution;

More online educational material about Circular Economy in Spanish is available **here.**

- **Tertiary Education: Advanced Vocational Training****

In the studies **Landscaping and Rural Environment,** the modules ***"Plant nursery management and organization"*** and ***"Crop planning"*** include basic content and evaluation criteria concerning *"Technical-economic, quality and sustainability criteria"*.

In the studies of ***Forestry and Environmental Management*** the evaluation criteria also includes to have applied *"technical-economic, quality and sustainability criteria"* in some of the modules. For instance, the module *"Management of the use of the forest environment"* includes sustainability assessment. Measures to reduce negative environmental impact at each stage, in the module ***"Hunting management"*** they include *"Evaluation of the hunting potential of an habitat: Maximum sustainable productivity, [...]"* and in the module ***"Environmental education techniques"*** students learn *"Basic principles of environmental education. Conceptual bases: Environment, balance of systems, natural, modified and urban ecosystems, environmental impact, sustainable development, [...]."*

In the studies ***Viticulture***, the module ***"Organic wine production and related techniques"*** has as evaluation criteria: "*The commercial interest that these wines represent in meeting the demand of new consumers who are aware of the need for sustainable and environmentally friendly production has been assessed and the marketing problems they pose have been identified.*" In the module ***"Derivative industries"*** one of the learning output is *"Assesses wine by-products, justifying their economic and environmental impact"* which also includes *"Adequate management of waste and spills generated."*

Finally, in the studies ***Processes and Quality in the Food Industry***, module ***"Food technology"*** they study *"Use of by-products of dairy, meat, fish, fruit, cereals and vegetable processing"* and in the module ***"Integrated processes in the food industry"*** they learn by-products obtained. Destination. Residues and waste products. Selective collection for each food group.

** All Advanced Vocational Training studies also have a module called ***"Enterprise and entrepreneurial initiative"*** (65h) adapted to the sector of the studies.

- **Tertiary Education: University studies**

The **Universidad Autónoma de Madrid** often offers conferences out of the ordinary courses such as the ***"I International Forum on Circular Economy, Eco-Innovations and Tourism"***, the conference ***"Innovations for the revaluation and reuse of waste or industrial by-products"***, the conference ***"Circular Economy and Waste Treatment in the Framework of Sustainable Development Objectives"*** or the summer course ***"New disruptive economic processes: the circular economy and the collaborative economy".*** It offers the following studies:

Economics Degree includes the subject ***"Economic Transformation and Sustainability"*** which mentions *"New production and consumption models: from green economy to circular economy"* and *"The economic policy objectives of transformation towards sustainability: inclusive growth, decarbonized economy, sustainable and circular businesses"*. In this degree they make a special emphasis on the following competences: *"Capacity to generate new ideas, Leadership, Working initiative and entrepreneurial spirit"*.

Environmental Science Degree has the subject ***"Society and the environment"*** which includes the topic *"Society and conservationism: From conservation to sustainable development"* with the specific competence: *"Analysis of resource exploitation in the context of sustainable development"*. Another subject, ***"Human behaviour and the environment"*** has the objective of "*Awareness of the role of people's involvement in sustainability and the conditions for social learning about sustainability"* and includes the topic *"Environmental Participation: Scenarios and Scope of Social Involvement in Sustainability"*. The methodology includes 4 practices, one of them is a visit to the National Center for Environmental Education.

The Degree in **Food Science and Technology** includes the subject ***"Food industry management"*** that trains students on *"Entrepreneurial action and creation of agri-food companies"*. There is also the subject ***"Sustainable exploitation of agri-food by-products"*** which delves into *"By-products in the agro-food industry. Introduction. Definitions, by-product/residue. Dimensions of the problem. Business, technological and economic strategies in the treatment of raw materials, by-products and waste: integral use, minimisation of waste, profitability of by-products. [...]"* One of the learning outputs and evaluation criteria is *"selecting the most appropriate food processing processes based on sustainability and environmental protection objectives"*.

The UAM University Master's Degree in **Agri-Environmental Sciences and Agrifoods** in collaboration with the National University of Distance Education (UNED) teaches the subjects ***"Agri-environmental diagnosis and consultancy", "Sustainable farming systems, organic agriculture and food"*** and ***"Recovery of waste and by-products: agri-environmental applications"*** where students acquire the general competence: *"Acquire advanced theoretical and experimental skills in the area of sustainable agricultural production, food safety and quality, and the efficient use of resources and raw materials of agri-food origin compatible with the protection of the environment"*. In the first subject there are worldwide real-life case studies from a local company to be evaluated. The second subject mentioned also teaches the specific competence of *"Acquire specialized knowledge of the different cultivation systems and their environmental impact, with special emphasis on new trends in ecological production."* They teach *"Types of Agriculture: traditional and advanced. Extensive and intensive crops. Integrated or sustainable production. Ecological agricultural production. Impacts of agriculture on the environment." The third subject cited has as learning outputs to know "The main by-products from the agro-food industry."* and *"The potential value of waste from the processing and marketing of agri-food raw materials."* Although it is a semi presencial master, in this subject there is an optional organized visit to agri-food production centres, that will add points to the final score of subject.

The objective of the University Master's Degree in **Waste and Wastewater Management for Resource Recovery** is *"to promote the concepts that will allow progress towards a circular economy: reuse, recovery, recycling, valorization; giving importance to the prevention and control of pollution"*. It has a mandatory subject called *"Tools for Circular Economy"* where:

The content is:
- introduction to Circular Economy (CE);
- end of waste and by-product condition;
- life cycle analysis. Socioeconomic analysis of waste management based on input-output and externalities analysis methodologies;
- standardisation and certification;
- seminar CE Cases.

The objectives are:
- analyzing waste management and its role in CE;
- carry out an environmental and socio-economic analysis of the use of waste;
- to use the Life Cycle Assessment (LCA) methodology to analyse the impact of waste man agement and recovery;
- apply concepts of standardisation, certification to management of waste and by-products;
- study case studies in the context of CE;
- develop the LCA in a waste treatment plant.

And the specific competences that students acquire are:
- to be able to propose improvements for the reduction of waste, avoiding its final disposal and establishing lines of work to achieve the end of the waste condition;
- to develop waste management and treatment projects, focusing on the application of the concepts of life cycle analysis and CE.

At this University there are also research groups, where students can do their research projects to obtain a PhD on circular economy topics such as: **Economy and sustainable development**, which has the following research lines:
- sustainable development goals;
- climate change and emissions trading, CE;
- financial and social inclusion for sustainable development;
- growth, poverty and inequality.

Research in tourism business management is focused on:
- collaborative tourism;
- circular tourism;
- tourism sustainability.

Study of the Transformations of the World Economy researches on:
- development and cooperation;
- natural resource economics, environment and sustainability.

The UAM has an **Institutional Commitment with the Global Goals for Sustainable Development**. Between the commitments undertaken there is the manifest **COP25** climate action, towards a more sustainable planet. The UAM also counts on a **Ecocampus office** whose main aims are to improve the environmental situation of the campus, and to make the university community aware to solve environmental conflicts. Between the specific objectives they have *"Increase of the processes of reduction, recycling and reuse of waste"* or *"Application of environmental criteria in the evaluation of suppliers and service companies"*. There is also an entrepreneurship service to help students develop their business ideas.

9.5. PROJECT INTEGRATION, IDENTIFYING GAPS

We have identified several study opportunities in Madrid related to **TRAIN-CE-FOOD** objectives in the field of circular economy, food supply chains, and entrepreneurship for youth. Mainly in-person regular classes (with exceptional visits), but also semi-presential studies with online courses associated to the **UNED**, and non-formal workshops offered by specialized trainers through the **Environmental Educational Programme**. We have also identified personalized opportunities through the **UAM Emprende** service or the services of the **Region of Madrid** for fostering employment through entrepreneurship.

Secondary education is already addressing sustainable development and entrepreneurship in Spain. Although we have identified some hints related to **TRAIN-CE-FOOD** distributed in different optional subjects, there is nothing on the curriculum directly addressing circular economy business models at national level. If it wasn't for the **Environmental Educational Programme**, the **Educate today for a more sustainable Madrid** or the **Eco-Schools** options offered in some educational centres of the Region of Madrid there would be a big gap to cover with this project. And this is the case in most autonomous regions of Spain.

At **Advanced Vocational Training**, the study programmes in the family of Food Industries integrate the main pillars of **TRAIN-CE-FOOD,** as students learn about derivative products from the food industry, how to take advantage of by-products and manage waste, in addition to a specific subject addressing enterprise and entrepreneurial initiative. This type of education is eminently practical, and thus, it is oriented towards preparing students to directly enter the work market.

Something similar can be found in the **University Degree** in Food Science and Technology, where both entrepreneurial and by-products uses are considered, and thus, curriculum is aligned with **TRAIN-CE-FOOD** for preparing high-skilled professionals in the circular economy related to the food supply chain field.

Finally, at **Master and Doctoral level**, studies are more specific and closer to circular economy and food related topics however, they lack this entrepreneurial side that **TRAIN-CE-FOOD** aims to fuse in the triangle integration towards sustainability and youth employment. Regarding synergies with COOPilot and ECOOPE, we observe that although entrepreneurship is learned at an optional subject according to the study plan at general secondary education, and mandatory at tertiary vocational education, cooperatives are not introduced in the curriculums at these stages of education, and it is not until University stage, when students can learn about the cooperatives business model, but not so easily at regular official Degrees or Masters. For instance, the UAM, one of our study cases, only celebrates the **International Day of Cooperatives**, and offers a **coffee break** organized by **UNCUMA**, one of the main entities that represents cooperatives in Madrid and who offers free courses about Social Economy and Cooperativism. Other entities offering advice on cooperatives topic in Madrid are **Cooperama** and **Fecoma**. The Complutense University of Madrid does have a **School of Cooperative Studies** associated to the Faculty of Economics and Business to train in this topic. The Community of Madrid also offers advice and ***"Courses on cooperatives: typology and regime"*** in order to foster employment in the Region of Madrid. The course content includes: What is a Cooperative. Types of cooperatives, applicable regulations, characteristics of the cooperative, social bodies, and partners and responsibility and taxation; distributed in 16h of theoretical clases and 2h of individual mentoring.

There is a gap to be filled with **TRAIN-CE-FOOD** regarding cooperative skill sets and mindsets, and it would be of great interest to develop and design curricula and educational material for secondary/higher education level on this type of business model to complement studies on entrepreneurship, circular economy, food technology, and related studies. Spanish agri-food cooperatives play a preponderant role in some Spanish sectors, especially in fruit and vegetables, olive oil, wine, dairy products, sheep and goats, cereals and animal feed. In a country like Spain, considered the *"fruits and vegetables garden of Europe"*, where agri-food production is one of the pillars of the Spanish economy growth, cooperatives are essential to offer job opportunities for youth, specially in these peripheral regions of the country where most of the countryside is found. This could be the reason why we have hardly found cooperatives' topic included in the study plans of Region of Madrid.

We consider that **TRAIN-CE-FOOD** will be greatly benefited by ECOOPE and COOPilot outcomes offering relevant resources to fill the gap in our educational system, where no regular education regarding cooperatives has been identified in the region of Madrid. Secondary education curriculum in the Region of Madrid still lacks to address the attention to the importance of the creation of business implementing circular economy principles in the food industry. Due to government changes in our country, educational curriculums will probably change soon. Students are concerned about environmental issues, and climate change, however, national teachers claim the lack of programmes to train educators in these topics. Specifically, **Educate today for a more sustainable Madrid** offers educational courses, but only for teachers in this region. The new educational law project LOMLOE aims to reinforce contents related to climate change, ecological transition and sustainable development through a subject called *"Civic and ethical values"*, in line with the **España** Circular 2030 strategy of the government, committed to the empowerment of a responsible culture and society concerned about circular economy from an early age. Nevertheless, the law is still under revision, and once approved, each autonomous community will develop a new curriculum according to the law.

Finally, education in Spain used to be predominantly face-to-face. Due to the actual Covid crisis, there is a debate going on about going back to school in September or start a semi-presencial school year. Nowadays, the recommendations for secondary education are to start an in-person course, however, the government recommends the use of open spaces when possible. These recommendations will be actualized according to the evolution of the pandemic and a contingency plan will be established soon by the government. On the other hand, the conference of university rectors of Spain (CRUE) indicated that independently of the Covid evolution, the coefficient of in-person learning will be reduced. Thus, it would be of great interest for the Spanish education system to develop both online resources, out of class face-to-face workshops material and guides for remote coaching.

9.6. OTHER INFORMATION

The programme **Educate today for a more sustainable Madrid** is an environmental education activity of the Madrid City Council, which aims to improve the school environment, both locally and globally, in order to make Madrid a sustainable urban ecosystem and a city with quality of life. Since 2005, more than 850 schools, with more than 400 teachers and 13,000 school groups, have participated in the programme Educate Today for a More Sustainable Madrid. In 2012 the **Network of Environmentally Sustainable Centres** was launched, for which this **web portal** is a tool for finding information, knowledge, educational ress and materials, support services, etc., allowing the creation of virtual spaces for communication, interaction and exchange of experiences between schools. The programme is divided into 5 pillars: mobility; public spaces and urban interventions; nature and biodiversity; consumption and natural resources; energy efficiency and climate change.

The learning plan for Consumption and natural resources module (which most concerns our project) includes: forming Environmental Committees to encourage the participation of their members; creating Real or Virtual Corners for the promotion, information and diffusion of the Project; organizing campaigns to sensitize its Educational Community; carrying out games and activities on responsible consumption and waste separation; participating in RED actions with other centers in the Programme; survey on consumption habits; collecting data on knowledge of waste management; organizing markets and exchanges with used products; calling for exhibitions of work done with waste; promoting Fair Trade; choosing a mascot and a slogan for the project; analyzing the production of waste in their facilities; reusing and recycling waste; evaluating the need for waste containers in their facilities; implementing selective waste separation; controlling the quality of waste separation in their facilities; visiting municipal facilities; using social networks to promote your project.

There is a web tab with plenty of **resources for teachers** with practical activities grouped by topics and educational levels (15 for Bachillerato + 17 for mandatory secondary education) that facilitate the search of activities for students, with proposals aimed at raising awareness of the whole educational community; observe, explore or investigate the environment; carry out actions to improve the school or the surrounding environment; etc. For instance, through **The life cycle of a T-shirt** activity, students learn about fast fashion and learn the content of *"The circular economy model to avoid the increase of waste in landfills"*. **Responsible nutrition** (to evaluate the impact that different food products can have both on people's health and on the socio-economic and environmental issues) and **The history of things: mobile phones** (awareness raising activity on the ecological and social consequences of the current consumption model through of the specific case of the mobile phone) are other two activities related to the topics of **TRAIN-CE-FOOD**.

At a local level, the ***"Environmentally Sustainable Centre"*** accreditation is a recognition that the Madrid City Council grants, within the framework of the *"Educating today for a more sustainable Madrid"* programme, to educational centres that develop environmental education projects that improve the school environment and contribute to making Madrid a city with quality of life. Accreditation is carried out through the program's system of sustainability indicators, which consists of five educational dimensions: sustainable management of the center, curricular integration, participation, involvement with the city and networking. Three levels of accreditation or quality (from highest to lowest degree of sustainability) have been established: Level I (green), Level II (blue) and Level III (yellow), depending on the challenges, objectives and achievements.

At an international level, there are more than 50,000 **Eco-Schools** in the world, and almost 600 are in **Spain**. It is a project launched to promote environmental sustainability in schools. There are already 166 eco-schools in the region of Madrid, all of them outside the capital. The Eco-Schools program, developed by the Association of Environmental and Consumer Education (ADEAC) and the Foundation for Environmental Education (FEE), awards a *"Green Flag"* to infant, primary and secondary schools that develop an environmental plan. To participate in the program, each school must follow a seven-step methodology that includes creating an Environmental Committee, designing an Environmental Action Plan or developing a Code of Conduct, among others, all related to the school curriculum. The Programme encourages students to develop an active and participatory role in their schools and shows them how they can improve and benefit their local environment, especially in the basic areas of WATER, ENERGY, WASTE, RESPONSIBLE CONSUMPTION, INTERNATIONAL COOPERATION and FAIR TRADE. In this way, it stimulates in future generations the habit of participating in the decision-making processes, as well as the awareness of the importance of environment in their daily family and social life.

10 CONCLUSIONS

By carrying out national state-of-the-art analyses and review of existing educational offers, we can conclude the following gaps, synergies, similarities and differences:

Austria

- Has a strong focus in education on topics, such as circular economy, food supply chain, social entrepreneurship, and even learning about co-operatives was perceived;
- the curricula regarding the food supply chain cover the first part of the chain, which is a food production;
- in the business oriented curriculum, social entrepreneurship was identified (in seminar work of the University of Natural Resources and Life Sciences in Vienna), but plays a minor role.

Croatia

- courses on circular economy and sustainability were identified, which could draw a correlation with TRAIN-CE-FOOD project. However, the topics identified are very general oriented (e.g. introduction to circular economy) ;
- The Faculty of Economy has a part of curriculum connected with entrepreneurship and economy, where Accounting as a basis for the benefits of investing in a CE was introduced;
- most of the higher education and secondary schools curriculum cover sustainable development and circular economy on non-specific level;
- no cooperative or (social) entrepreneurship topics were perceived.

Cyprus

- tertiary education offers topics in the fields of entrepreneurship, developing entrepreneurship mind-set and attitudes, creativity and innovation, etc;
- a shortage on the topics, and consequently skills obtained regarding the circular economy, food value chains and cooperatives, so the **TRAIN-CE-FOOD** project will offer to Cyprus, the chance to upgrade the educational offers and skills to students;
- no circular economy, entrepreneurship, cooperatives and food supply chain topics were perceived at the secondary school level.

Malta

- no topics as circular economy, food supply chains, cooperatives, etc were identified at the secondary or tertiary level;
- courses identified cover mostly general topics, such as promoting sustainable development or sustainable business models and its fundamental understandings.

Slovenia

- circular economy and supply chains were not introduced as such. The current educational offer on these topics is relatively sparse;
- educational programmes, topics deal with sustainable development and CE in its infancy, while few initiatives to introduce entrepreneurship among youth in Slovenia have been identified;
- there is nothing in the curriculum at the higher education or secondary level that directly addresses the business models of the circular economy;
- there were some informal courses perceived in the field of cooperatives, mostly via projects.

Spain

- in Madrid study opportunities in the fields of circular economy, food supply chains, and entrepreneurship for youth were identified, mostly in-person regular cases, but also via non-formal workshops;
- secondary education is already addressing sustainable development and entrepreneurship in Spain. Although, there is nothing on the curriculum directly addressing circular economy business models at national level;
- higher education level addresses food Science and technology, where both entrepreneurial and by-products uses are considered;
- courses on cooperatives were perceived, considering general introduction, e.g. What is a Cooperative. Types of cooperatives, applicable regulations, characteristics of the cooperative, social bodies, and partners and responsibility and taxation.

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