ENTREPRENEURIAL INNOVATION IN AGRI-FOOD SCIENCE

COURSE FOR TRAINERS

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Course for trainers: Entrepreneurial innovation in agri-food science
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Introduction

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Although policy makers and researchers are increasingly concerned with developing sustainably the agrifood sector and they have created several guidelines and policies which supports this area, the businesses have as well one of the leading roles in supporting and promoting sustainable practices in the agrifood sector, moreover while considering their direct and faster contact with consumers and their practical approach of issues and activities. This is why, the businesses should have the instruments, the technologies, the strategies, the ways through which to develop and commercialize more sustainable agrifood products and processes, such as organic food, biological products, sustainable management of resources, etc..

Also, there is more and more interest from businesses in becoming more sustainable, while the new entrepreneurial initiatives are becoming more focused on approaching sustainable areas of the future, such as organic farming, developing greener technologies and processes in the field, streamlining the logistics system by considering the principles of sustainable development, green economy and circular economy, finding new instruments of assessing sustainable practices, understanding and changing consumers' behavior regarding the sustainable agrifood products, etc..

Thus, in order to support entrepreneurial initiatives in the agrifood sector, the innovation and the exchange of good practices should be promoted and supported by all stakeholders according to their possibilities and leverages.

The "Course for trainers: Entrepreneurial Innovation in Agri-Food Science" is one of the second intellectual output derived from the Erasmus + project "Evaluation of agro-ecological development potential through transnational cooperation and entrepreneurial innovation" (Agroecoinn), granted under the contract no. 219-1-RO01-KA203--063939. This publication represents a joint effort of all partners involved in the project implementation, namely: University of Alexandru Ioan Cuza – Iasi, Romania; University of Catania, Italy; Bucharest University of Economics Studies, Romania; ISCTE University Institute of Lisbon, Portugal; Institute of Agricultural Economics – Belgrade, Serbia; and University of Bucharest, Romania.

This course is mainly destined for biologist, biochemists, environmental and agricultural science specialists, as it aims to develop their entrepreneurial skills in the agrifood sector by considering the principles of sustainable development. However, it could also be helpful for the teaching staff from the EU universities interested in harmonizing their curriculum with current and future professional trends and interests.

This volume is structured in four thematic sections and 14 chapters. The ones from the first section – Descriptive information – aim to present an overview of the research trends in agri-food innovation which supports sustainable practices, the importance of research and of producer organizations in developing the organic farming, all at European level. The second section – Sustainable entrepreneurial strategies – approaches the framework and the major entrepreneurial opportunities of green economy, it presents several Romanian good practices of entrepreneurial initiatives related to organic agriculture, it assesses and exemplifies indicators, reporting, and concrete actions of several Romanian big food businesses towards improving the sustainable development, as well as it emphasized the role of government policies in promoting production and export of organic agriculture products by exposing the differences between various regions worldwide. The third section – Economic estimations in the agri-food sector – emphasizes several economic indicators and approaches for estimating and reporting of agrifood investments in general, European biological products, and the impact of organic products' processing in the case of Serbian family farms. Finally, the forth section –Consumption perspectives in agri-food sector – provides information on the main determinants of consumer behavior and perceptions related to food use, organic products, and rebranding strategies in terms of the current literature and national case studies.

We hope this publication will help entrepreneurs and other stakeholders to move towards a sustainable future in the agrifood sector.

April 2021.

FIRST SECTION:

DESCRIPTIVE INFORMATION

1. Agri-food Innovation for Sustainable Practices in EU
2. The Research's Benefits of the Growth of Organic Farming in European Union
3. Concept and State of Producer Organizations Development in European Organic Farming

1. Agri-food Innovation for Sustainable Practices in EU

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Abstract: The health, environmental and economic issues related in some way to the agri-food systems, which diversified in the context of globalization and technological development, are attracting increasingly more attention from the part of policy makers, economic agents and consumers, by trying to find viable and practical solutions for these challenges. The desideratum of sustainable food, namely healthy, available, sufficient and environmental-friendly food, can be accomplished through innovation, which represents all new functional and accessible solutions. In this context, this paper aimed to create a systematic overview of the state of the art on innovation and sustainability in the agri-food sector, providing practical topics of research results in some countries of Europe. The results indicate a growing interest of the research world on innovation in the agri-food system and the importance of digitization in developing it.

Keywords: agriculture, bibliometric analysis; content analysis; food, innovation, research, sustainability.

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1. Introduction

In the race towards sustainability, the agri-food system plays an important role, which could be boosted though innovation. The benefits of innovation are vast, from firm level advantages in terms of productivity growth, cost reduction, better work conditions and processes, to bigger system benefits in terms of technological, social, environmental, and economic positive changes, by creating incremental adaptation, collaboration among different stakeholders, and synergies (Salter & Alexy 2013). Also, Kahn (2018) exemplifies several advantages of product innovation, namely, cost reductions, product improvements, line extensions, new markets, new uses, new category entries, and new products for the world, by considering the novelty from lowest to highest – from incremental to radical types of innovation.

The aim of this chapter is to overview theoretical and practical approaches on innovation in the agri-food system, with a focus on sustainability. The first part of the chapter will approach the meanings and typologies of innovation and sustainability, as theoretical concepts. The second part will present mixed methods analyses for literature reviewing on innovation and sustainability in agri-food sector by investigating the scientific publications from worldwide recognized international databases, i.e. Scopus, Web of Science and ScienceDirect. The third part of this chapter will emphasize the trends of innovation in EU, by exploring examples of good practices in the field of agri-food sector. Finally, concluding remarks will be presented.

2. Conceptual background

2.1. Innovation

The concept of 'innovation' supports various definitions and it is related to the positive and practical changes of institutions, businesses, networks, platforms, sectors, markets, technology, digitalization, research, knowledge, design, management, marketing, ecosystems and society.

OECD and Eurostat (2018) define the innovation as being "a new or improved product or process (or combination thereof) that differs significantly from the unit's previous products or processes and that has been made available to potential users (product) or brought into use by the unit (process)".

According to the Romanian Academy (Academia Română 2010), the innovation represents the introduction, the improvement or the renewal of a novelty in a field, system etc. The Italian view of the concept is about "introducing new systems, new order/types, new production methods [...] every novelty, change, transformation that radically modifies or in any case causes an effective rejuvenation in a political or social order, in a production method, in a technique" (Istituto Giovanni Treccani 2018). Also, the Portuguese perspective is in line with the previous ones, by defining the innovation as "the act or effect of innovating, everything that constitutes something new, [...] development and use of new products, methods or concepts" (Priberam Dicionário 2020).

In the simplest form, innovation is "a new idea that proves successful in practice" (EIP-AGRI 2020). There is no necessary need to create something entirely new, but it is enough to combine old things in a new way for adding that novelty factor which can and is implemented into practice (OECD & Eurostat 2018; Salter & Alexy 2013). Additionally, there is a difference between an innovation and an invention, because the invention refers only to new, inventive and applicable solutions for technical problems (Eurostat 2020a), which may or not be applicable into practice. However, the creativity and the inventions could be drivers of innovation (Salter & Alexy 2013).

Particularly, in the agricultural sector, EIP-AGRI (2020) defines innovation as being "the introduction of something new (or renewed, a novel change) which turns into an economic, social or environmental benefit for rural practice".

Also, FAO (2018) defines agricultural innovation as "the process whereby individuals or organizations bring new or existing products, processes or ways of organization into use for the first time in a specific context in order to increase effectiveness, competitiveness, resilience to shocks or environmental sustainability and thereby contribute to food security and nutrition, economic development or sustainable natural resource management".

So, the definition of innovation could not represent absolute and concrete views, but leaves room for creativity and imagination by connecting these two with applicability, practical solutions for past, current and future challenges. The actual implementation and the functionality of value-added products and services could represent essential features of an innovation. Also, collaboration is key for materializing the innovative potential of businesses by setting in motion the resources, knowledge and skills from others, while the internal resources and knowledge are less relevant nowadays (Salter & Alexy 2013).

There are many types of innovation in the international literature.

For example, OECD & Eurostat (2018) classifies the business innovation into product innovation (outcome), business process innovation, and a mixed one, based on the previous four major categories: product innovation, process innovation, organizational innovation and marketing innovation.

"The *product innovation* is a new or improved good or service that differs significantly from the firm's previous goods or services and that has been introduced on the market.

A *business process innovation* is a new or improved business process for one or more business functions that differs significantly from the firm's previous business processes and that has been brought into use by the firm" (OECD & Eurostat 2018).

The marketing innovation (which refers to price, promotion and placement) was included into the product innovation concept, while the organizational innovation (referring to business and workplace practices and external relations) was included under the process innovation (OECD & Eurostat 2018).

Similarly, starting from product or process innovation, Kahn (2018) emphasizes six other sub-types of outcome innovation related to: product, process, marketing, business model, supply chain, and organizational innovation. Also, according to Dodgson et al. (2013), there are six types of innovation processes used in an organization, by focusing on:

1. Research and technology
2. Market
3. Internal factors
4. External collaboration
5. Strategic integration
6. Readiness for the future

The intensity of change could divide the innovation into *incremental innovation*, which could be exemplified with temperature sensors in agriculture or artisanal beer in food industry, and *radical innovation*, which could be exemplified with the invention of the tractor in agriculture or the chemical fertilizers in the food industry. The incremental innovation represents improvements of products, processes and organizational elements based on already existing parts, while the radical innovation are truly the new breakthroughs for society (Dodgson et al. 2013).

By considering the targeted sector for the innovation, there are many types of innovation:

- Digital innovation: software development;
- Service innovation: financial services, consultancy, software development;
- Business model innovations: the type(s) of business model(s) used in management;
- Social innovation: new forms of relationships and collaboration;
- Workplace innovation: human resource management, acquisitions, business structure;
- Eco-innovation: creating packages from natural materials, introducing processes which use the natural resources more efficiently, zero-waste processes.

Considering the study of Albert (2019), 'frugal innovation' could be defined as the innovation which stimulates resource diminution (natural, financial, human, and other types of resources), social accessibility and business functionality. This means it contributes to sustainability. This concept is similar to sustainable innovation, which tries to consider all the pillars of sustainability into assessing an innovation, namely economic, environmental, social, and governing one (Cillo et al. 2019). More understandings of sustainable innovation are reviewed in the paper of Cillo et al. (2019).

Finally, the opposite of innovation is 'exnovation', which represents the removal or modification of innovation in order to be able to adopt a new one (Holbek & Knudsen 2020).

2.2. Sustainability and sustainable development

The concept of sustainability is widely used and, lately, it identifies with the 'sustainable development' notion. However, some authors (Zaharia 2018) consider the sustainable development as a broader concept, while the sustainability is a more specific term, referring to the support capacity of the natural environment. The 'sustainability' concept referring to environmental challenges appeared for the first time in 1972 (Meadows et al. 1972), while the 'sustainable development' notion was defined as "the development that meets the needs of the present, without compromising the ability of future generations to meet their own needs" in the Brundtland report in 1987 (Brundtland et al. 1987). Since then, several definitions and understandings have emerged. For example, Khalili et al. (2015) defines it as "the design of integrated approaches that are capable of addressing environmental sustainability and waste while ensuring social and economic prosperity at the national or even global level implying a macroeconomic scope". However, the first definition it is still the most known one.

3. Innovation and sustainability in agri-food sector: state of the art

This section proposes mixed methods approaches for analyzing the scientific publication on the topic of innovation in the agri-food sector in view of sustainability. Thus, the state of the art initially emphasizes the quantitative trends of research by using the bibliometric technique. Further, a more in-depth analysis of the literature content is performed by using the corpus-based analysis for a better understanding of the main themes discussed in terms of innovation and sustainability in the agri-food sector.

3.1. Bibliometric analyses

The bibliometric analysis represents a quantitative method of reviewing the scientific publications from international databases by considering different criteria of inquiry, such as geography, time frame, authorship, journals, topics, etc. (Zaharia et al. 2016). We investigated three international databases, namely ScienceDirect, Scopus and Web of Science, because of their focus and accessibility.

3.1.1. ScienceDirect publications

The ScienceDirect platform offers open access scientific publications on different topics, with more than 1.2 million articles (Elsevier, 2020a). For accessing relevant publications, the following searching criteria was used: "innovation" and "sustainab" and ("food" or "agri"). This generated 60 documents, of which 52 food-related and 8 agri-related, all open-access articles. These will also be qualitatively analyzed further in subsection 2.2.

The number of papers identified by applying the above-mentioned criteria grew from 1 in 1996 to 16 in September 2020, demonstrating the increasing interest of researchers in innovation and sustainability topics in the agri-food sector. The Journal of Cleaner Production was the top journal, with more than 40% of papers published of 60 considered. Also, 55% of them are research articles.

3.1.2. Scopus publications

The Scopus platform is a wide database with scientific publications on different topics, with more than 75 million documents (Elsevier, 2020b). For accessing relevant publications, the following searching criteria was used: (TITLE-ABS-KEY ("innovation*") AND TITLE-ABS-KEY ("sustainab*") AND TITLE-ABS-KEY ("food" OR "agri*")). This generated 4202 documents, of which 24% are open access. As in the case of ScienceDirect publications, the interest in the analyzed topic has considerably increased from one in 1984 to 541 papers in 2019 and to 460 papers until September 2020.

Approximately 59% of papers are articles, 14% are conference papers and 11% are reviews, while 16% are other types of publications. Also, the majority of the papers were published in a journal (70%). In addition, 95% of the documents are in English, while the rest are in French, Chinese, Spanish, and others. The highest number of papers are affiliated to the United States (16%), Italy (11%) and the United Kingdom (10%), from a total of 149 countries.

In terms of the subject area, out of 4202 papers, 36% were related to agricultural and biological sciences, 33% to environmental science, 27% to social sciences, 18% to business, management and accounting and 16% to engineering. The first three journals with the most published papers are Sustainability Switzerland, Journal of Cleaner Production, and Acta Horticulturae.

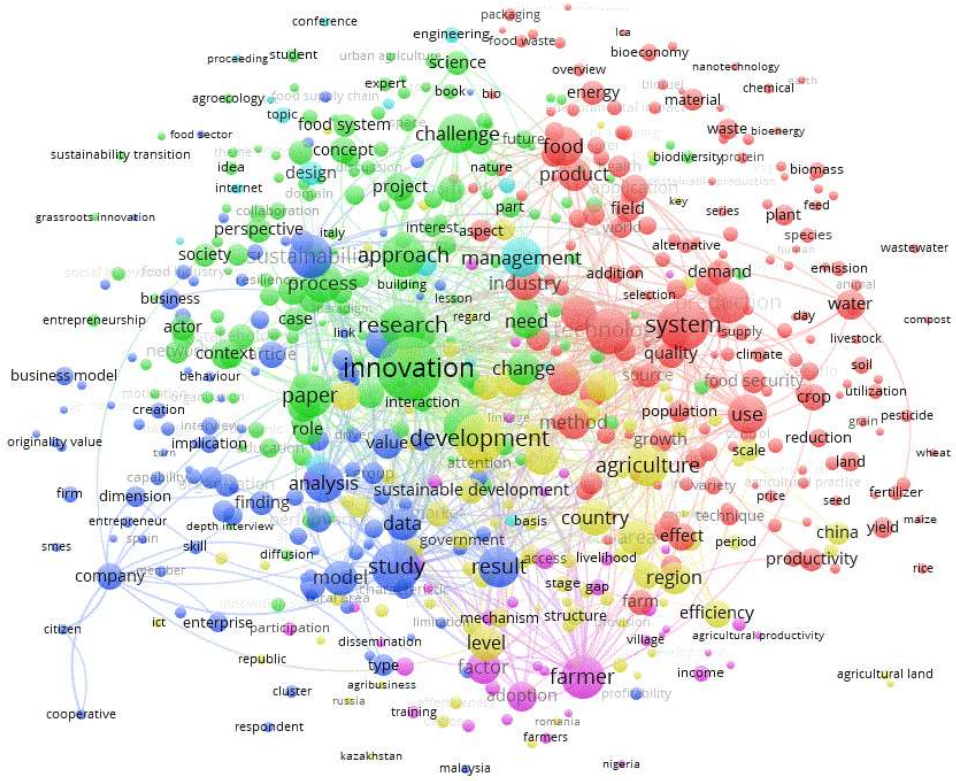
The authors from the first three positions with the highest number of papers published on agri-food innovation and sustainability themes are Klerkx, L., Hickey, G.M., Levidow, L. and Meynard, J.M., while the most cited documents are authored by Lambin, E.F. and Meyfroidt, P. in 2011 with 1300 citations, Munos, B. in 2009 with 743 citations, and Lin et al. in 2013 with 525 citations.

When analyzing the abstracts of the newest 2000 Scopus publications on agri-food innovation and sustainability by investigating the word frequency over 25, we identified 599 terms, of which the following have more than 500 occurrences per word: innovation, system, development, technology, farmer, sustainability, agriculture, production, analysis, management, process, practice, food, strategy, country, model, policy, product, factor, industry and change.

When analyzing the abstracts of the most cited 2000 Scopus publications on agri-food innovation and sustainability by investigating the word frequency over 25, we identified 592 terms, of which the following have more than 500 occurrences per word: innovation, system, development, technology, farmer, agriculture, process, sustainability, practice, production, management, food, change, analysis, strategy, model, product, policy, knowledge, need, impact, and country.

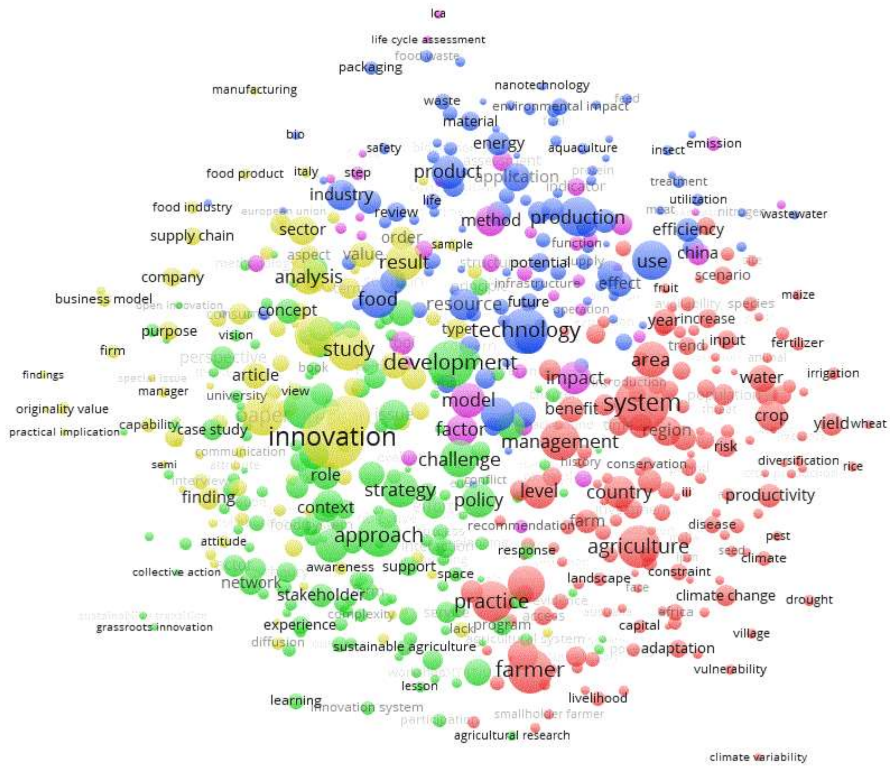
The VosViewer software allowed for determining the word frequencies and it generated the figures 1.1 and 1.2.

Figure 1.1. The keywords map of the newest 2000 Scopus publications on agri-food innovation and sustainability



Source: data from Elsevier (2020b) illustrated with the VosViewer software

Figure 1.2. The keywords map of the most cited 2000 Scopus publications on agri-food innovation and sustainability



Source: data from Elsevier (2020b) illustrated with the VosViewer software

The same themes in both cases can be easily observed, namely the newest and the most cited papers, which generate six clusters: methodology, management, research and innovation, system parts, development, and farm structures.

3.1.3. Web of Science publications

The Web of Science (WoS) platform is an interdisciplinary scientific platform, with more than 171 million records since 1950 (Clarivate, 2020). For accessing relevant publications, the following searching criteria was used: TOPIC: ("innovation*") AND TOPIC: ("sustainab*") AND TOPIC: ("food" or "agri*"). This generated 3223 documents, of which 38% are open access. As in the case of previous database analyses, the interest in the analyzed topic has risen from four in 1991 to 511 papers in 2019 and to 403 papers until September 2020.

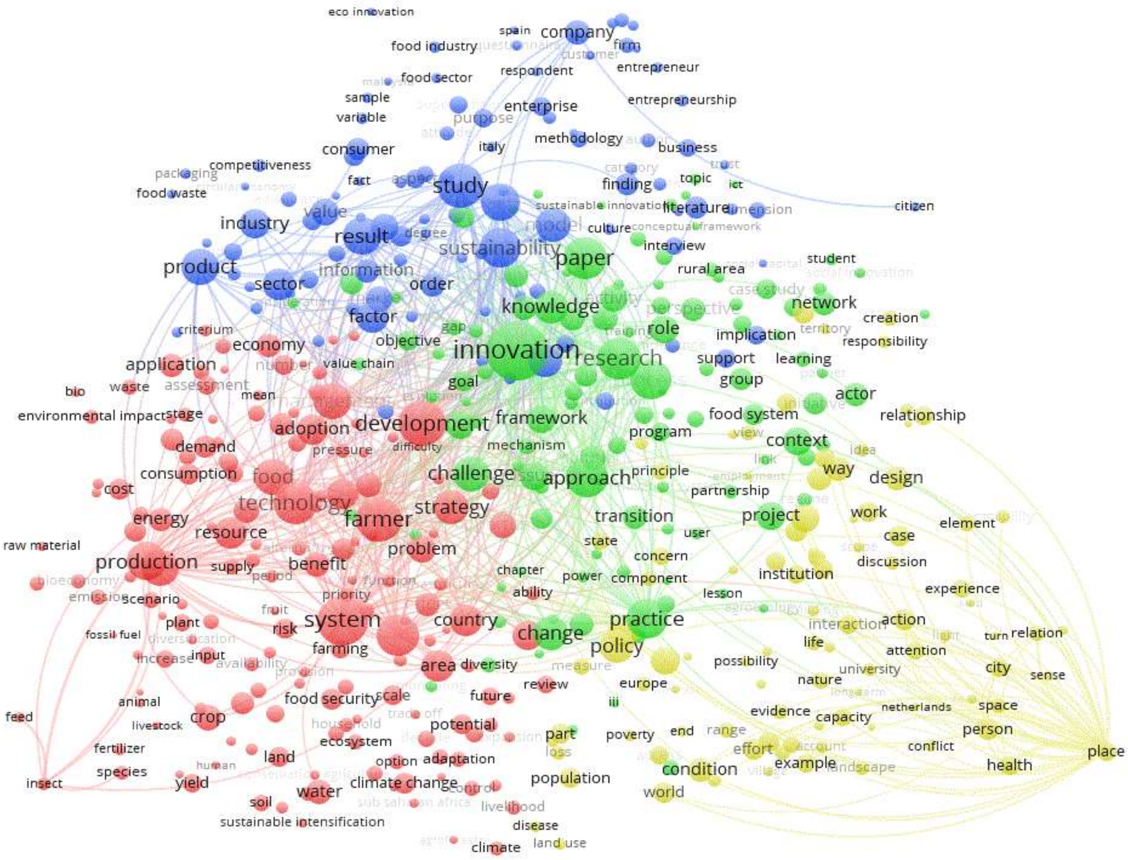
Approximately 72% of the papers are articles, 18% are proceedings papers and 10% are other types of publications. Also, 96% of the documents are in English, while the rest are in French, Spanish, Portuguese, and others. The highest number of papers are affiliated to the United States (16%), Italy (11%) and the Netherlands (10%), from a total of 100 countries.

In terms of the subject area, out of 3223 papers, around 30% were related to environmental sciences, 27% to agriculture, 21% to science technology, 14% to business economics and 9% to engineering. The first three journals with the most published papers are the same as the ones from Scopus, namely Sustainability Switzerland, Journal of Cleaner Production, and Acta Horticulturae.

The authors from the first three positions with the highest number of papers published on agri-food innovation and sustainability themes are Klerkx, L., Hickey, G.M., and Meynard, J.M., while the most cited documents are authored by Lambin, E.F. and Meyfroidt, P. in 2011 with 1216 citations, Kemp et al. in 1998 with 1155, Munos, B. in 2009 with 647 citations, and Seyfang, G. and Smith, A. in 2007 with 620 citations. In this case, we could also see similarities with the Scopus results. However, older papers are more cited in WoS compared to Scopus.

When analyzing the abstracts of the 3223 WoS publications on agri-food innovation and sustainability by investigating the word frequency over 25 and 50, we identified 888 and 477 terms, of which the following have more than 500 occurrences per word: innovation, system, development, farmer, technology, research, agriculture, practice, process, sustainability, production, analysis, food, use, management, product, model, strategy, change, knowledge, policy, country, factor, resource, impact, industry, environment, framework, project, method, community, data, problem, value, activity, opportunity, market, crop, company, benefit, solution, quality, water, stakeholder, and effect. These keywords are illustrated in figure 1.3, which presents four clusters: research and innovation, food market, system, and resource approaches.

Figure 1.3. The keywords map of the WoS publications on agri-food innovation and sustainability



Source: data from Clarivate (2020) illustrated with the VosViewer software

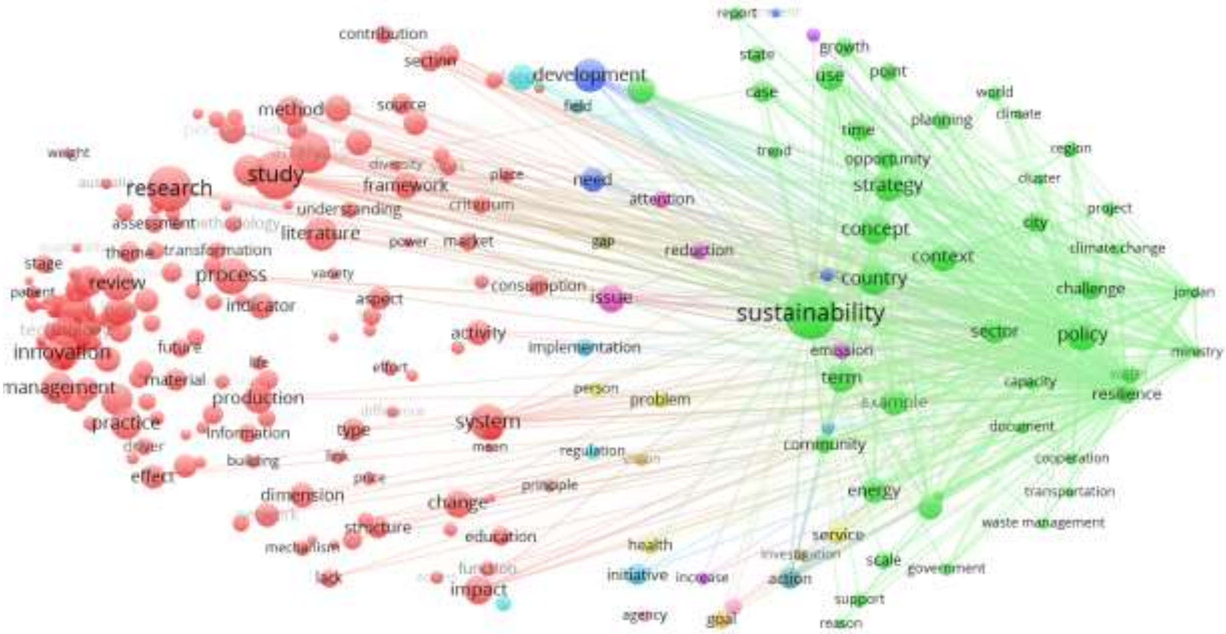
3.2. Corpus-based analysis of ScienceDirect publications

The corpus-based analysis represents a qualitative analysis for investigating research's content with the help of AntConc, a software designed for this matter (Anthony 2020; Zaharia 2018). This method was used for exploring the ScienceDirect publications, because of open access to scientific publications (Zaharia 2018). After eliminating the duplications and retrieving the whole available documents, we were able to analyze the content of 50 studies on agri-food innovation and sustainability out of the 60 documents on innovation and sustainability in the agri-food sector by using the searching criteria: "innovation" and "sustainab" and ("food" or "agri"). After selecting the 50 documents, a content control and formatting was performed due to the need of transforming the pdf files into text files in order to be able to use the AntConc software. Also, the references from all the papers have been deleted.

Thus, the content of the 50 analyzed documents has 18445 word-types and 479607 word-tokens, considering all the content of the paper, including title, authors, abstract and appendices. All the papers considered in the analysis are referred to in table B1.1 from appendix B1.

The main key words of the ScienceDirect corpus are illustrated in figure 1.4, by considering all the 374 terms with more than 50 occurrences of a term.

Figure 1.4. The key words map of the ScienceDirect corpus on agri-food innovation and sustainability



Source: data from Elsevier (2020a) illustrated with the VosViewer software

Surprisingly, the majority of the studies represent reviews, which were conducted by using the bibliometric technique, on topics related to: clean production, planning and assessing urban sustainability, education, transformative change, the innovation of small and medium enterprises, the relationship between consumers' preferences and products' attributes, transition, packaging, purchasing, supply, digitization, food retail industry, business practices, sustainable governance, innovation, technology, eco-innovation, future research opportunities, circular economy, sustainability and sustainable development. So, we can observe that the focus of the analyzed literature is more directed to theoretical approaches instead of practical and concrete ones. This result is in accordance with the opinion of Johnsen et al. (2017).

The *most frequent key words* found in the analyzed corpus, with *more than 1000 occurrences*, are:

- sustainability;
- research;
- sustainable;
- food;
- environmental;
- social;
- management;
- development;
- innovation;
- energy;
- studies;
- supply;
- literature;
- analysis;
- production;
- waste.

Also, the following topics with *frequencies between 500 and 1000* are:

- economic;
- system;
- knowledge;
- data;
- policy;
- economy;
- change;
- technology;
- systems;
- results;
- green;
- future;
- practices;
- process;
- circular;
- business;
- countries;
- performance;
- local;
- water;
- resources.

The different types of key words suggest two main ways of approaching research on agri-food innovation: first, with a practical orientation, presenting results from specific research projects on this matter (i.e. practices, results, technology, process, change), but with a lower occurrence, and second, with a theoretical or conceptual orientation, approaching different data modelling or assessments of already available results, policies or business strategies (i.e. studies, knowledge, policy, business, performance), which register a considerable higher occurrence than the first category.

The word 'sustainability' registers an occurrence of 3237 times in the analyzed corpus presented in table B1.1 and it is used in relation to transitions, performance, issues, challenges, research, indicators, attributes, centers, management, practices, education, science, initiatives, visions, behavior's, dimensions, assessment, concerns, impact, engagement, pillars, standards, goals, labels, measures, reports, score, strategy, transformations, criteria, effects, implementation, improvement, movement, perspective, concepts, focus, literature, and outcomes (after the word), as well as environmental, social, economic, towards, urban, strategic, corporate, embedding, ecological, external, internal achieve, and chain (before the word), with frequencies more than 5 times per cluster. The term 'sustainability' was found to occur more than 50 times in 23 publications out of the 50 analyzed.

The most frequent sustainab* - related two-word clusters are referring to:

- sustainable development, with an occurrence of 517 times, in the context of addressing, promoting and achieving it by considering its principles, dimensions and their interactions, drivers, social implications, as well as its challenges (e.g., corpus no.7, 14, 30, 38, 39, 42, 46). Other aspects focus on improving the incentive system for sustainable development (corpus 14), strengthening education for improving the responsibility of citizens (corpus 17), and finding effective solutions for achieving sustainable development or addressing the problems related to it (corpus 7). Further, Shamout et al. (2020) emphasize the increasing practical examples of the measures taken so far for achieving sustainable development, such as the implementation of "2030 Agenda for Sustainable Development", initiatives, projects, strategies and 'green' codes, like the ones for energy efficient buildings. Moreover, sustainable development is found to be one of the central themes approached in scientific publications (Corsi et al. 2020). Also, the important role of education in stimulating collaboration and boosting sustainable approaches of various stakeholders is presented in corpus 44 by Soini et al. (2018). Several studies (Bolis et al. 2014; Geneletti et al. 2017) observe the different understanding of the concept of sustainable development by stakeholders, but this should not be an obstacle in adopting effective solutions and policies. However, it is important to define it concretely when it is used in order to eliminate the misunderstandings (Bolis et al. 2014).

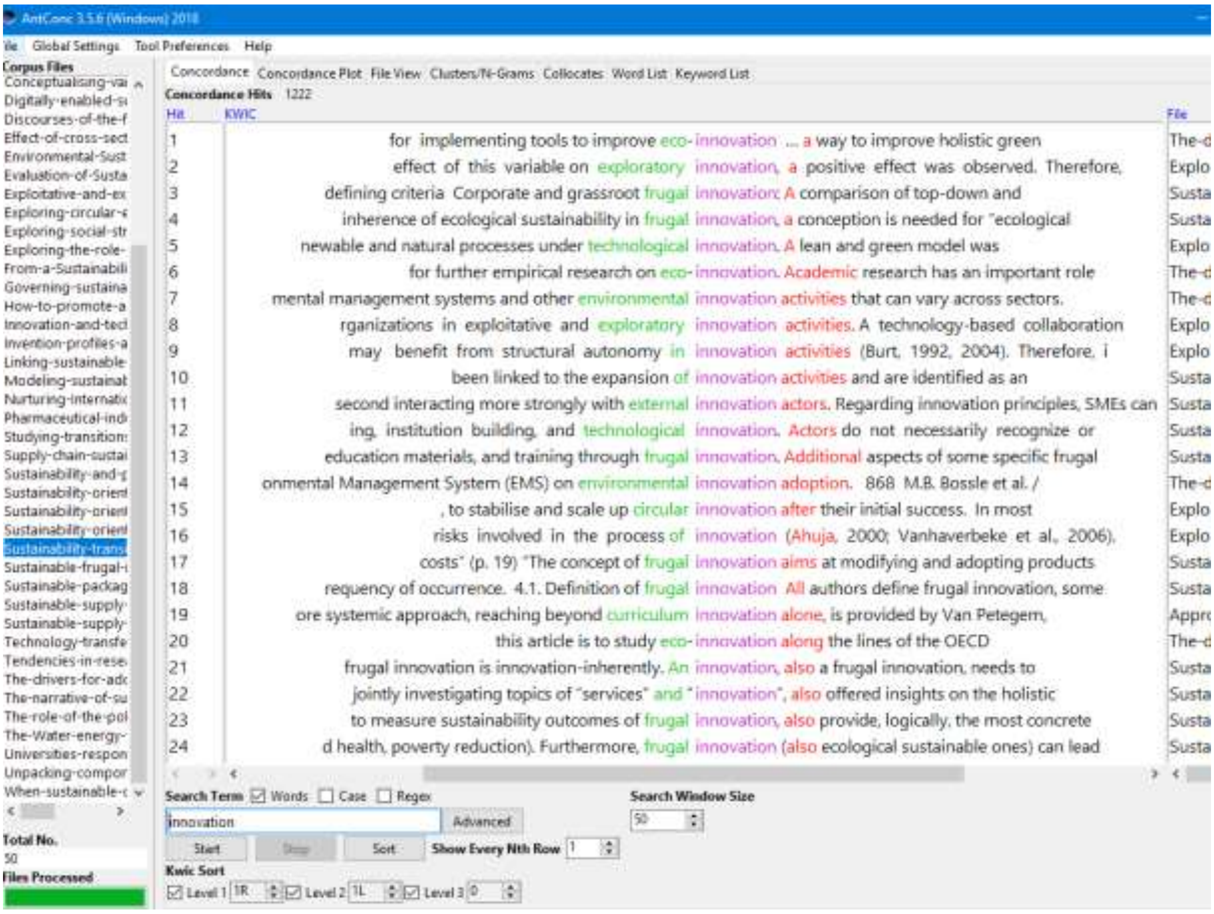
- sustainability in (e.g., pharma, developing countries, supply chains, the food, frugal innovation, higher education, teacher education, marketing), with an occurrence of 165 times;
- sustainability of (e.g., hospital, food service, a company, agricultural commodity, food systems, Brazilian products, cattle production, health, standard, supply, urban systems), with an occurrence of 154 times;
- sustainable supply, with an occurrence of 100 times;
- sustainability is (e.g., understood, valuable, multidimensional concept, confusing concept, not only an academic interest, used, framed, negotiated, obtained), with an occurrence of 96 times;
- sustainable practices, with an occurrence of 75 times;
- sustainability transitions, with an occurrence of 70 times;
- sustainability-oriented, with an occurrence of 70 times;
- sustainable purchasing, with an occurrence of 64 times;
- sustainability performance, with an occurrence of 51 times, and many other clusters.

The word 'research' registers an occurrence of 2339 times in the analyzed corpus presented in table B1.1 and it is used in relation to question(s), agenda, methods, stream(s), questionnaire, efforts, gap(s), directions, policy, opportunities, topic, on sustainability, area, communities, design, focus, process, and scope (after the word), as well as future, empirical, sustainability, transition(s), relevant, management, production, scientific, existing, academic, action, different, related, current, previous, primary (before the word), with frequencies more than 10 times per cluster. The term 'research' was found to occur more than 50 times in 20 publications out of the 50 analyzed.

The word 'food' registers an occurrence of 1719 times in the analyzed corpus presented in table B1.1 and it is used in relation to system(s), waste, supply, production, security, nutrition, industry, banks, sharing, products, education, wastage, consumption, sector, quality, procurement, choice, safety (after the word), as well as local, patient, sustainable, organic, urban, global, reducing, alternative, scale, healthy, bulk, compare, public, agri-, and reduce (before the word), with frequencies more than 10 times per cluster. The term 'food' was found to occur more than 50 times in only five publications out of the 50 analyzed, i.e. the corpus no. 12, 23, 40, 46, and 22, in descending order of hierarchy.

According to figure 1.5, the word 'innovation' registers an occurrence of 1222 times in the analyzed corpus presented in table B1.1 and it is used in relation to practices, process, systems, and management (after the word), as well as frugal, eco-(innovation), service, exploratory, exploitative, environmental, technological, oriented, product, and sustainable (before the word), with frequencies more than 10 times per cluster.

Figure 1.5. Corpus analysis of the word 'innovation' by using the concordance tool



Source: data from table B1.1 illustrated with the AntConc software

A significant number of hits of the term 'innovation' has been found in corpus no. 1, 28, 8, 10, 21, 4, and 34 being indicated only the publications with more than 50 occurrences, in descending order of hierarchy.

Thus, corpus no. 1 (Albert, 2019) proposes a content analysis of 14 texts by capturing the definitions and the relationship between frugal innovation and sustainability, for emphasizing the mostly positive effect of frugal innovation for social and economic sustainability. Some examples of frugal innovation are related to circular economy and degrowth, while its advantages consist in minimizing the use of resources, increased affordability, and better accessibility compared to conventional innovation (Albert 2019).

Corpus no. 28 (Klewitz & Hansen 2014) presents a systemic overview of the scientific research on sustainability-oriented innovations of small and medium size firms between 1987 and 2010, resulting in observing the strong focus of research on eco-innovation and less on the integrated three pillars of sustainability (economic, social and environmental), while emphasizing the importance of collaboration between various stakeholders for increasing the innovation.

For example, eco-innovation is discussed in corpus no. 8 in terms of its implementation in the business area by considering the external and internal factors influencing the adoption of innovation by companies, such as technological change, regulation, policy makers, market interactions and functionality, cooperation between stakeholders, as well as cost savings, efficiency goals, and systemic approaches of a business (Bossle et al. 2016).

Further, in corpus no. 10, Calabrese et al. (2018) observed a small, but increasing focus of research on the relationship between service innovation and sustainability.

A more specific study, corpus no. 21 by Guan & Liu (2016), presents some impact of knowledge transfer among organizations on their innovative approach by considering both exploitative and exploratory innovations in the nano-energy field.

Also, corpus no. 4 (Aznar-Sánchez et al., 2019) explores the focus of scientific articles regarding innovation and technology on improving the sustainability of the mining industry through the method of bibliometric analysis. The findings suggest that the research focuses mostly on the exploitation phase with more than 80% of the studies, and more than 60% are investigating the environmental impact of mining innovations (Aznar-Sánchez et al. 2019).

Another innovation-related research is approached in corpus no. 34 by Markard et al. (2012), who observe the increasing number of studies, organizations and interests on sustainability transitions in different fields and on various levels.

4. Agri-food research project results in Europe

This section presents an investigation of some of the research results in Europe, with a focus on Italy, Portugal, Romania, and Serbia.

The European Union aims to boost innovation by several organizations, initiatives, programs and financial schemes, such as: European Innovation Council, European Institute of Innovation and Technology (EIT), EIP-AGRI, Horizon 2020. Also, it tries to ensure free access to innovation for other stakeholders than the ones from academia and science, as well as to ensure free knowledge-transfer worldwide.

The hottest spots of research have been found to be in the Northern and Central Europe according to CORDIS (2020a), followed by the Western part and then, the South and East countries. In terms of the collaboration networks, we found approximately 790 in Portugal, 5,100 in Italy, 490 in Romania, and 200 in Serbia out of around 30,000 collaboration networks from Europe in September 2020 (CORDIS, 2020a).

The CORDIS platform offers valuable information in terms of research results of the European projects by programmes and themes. The main funding programmes are: Horizon 2020, Framework Programmes 1-7 (historical research-related programmes during 1984 and 2013) and other types of programmes related to sectoral topics, such as employment, agriculture, small and medium enterprises, environment, energy, Erasmus (CORDIS 2020b).

In September 2020, we found 127,722 project results on CORDIS (2020b), of which 8,579 projects are related to food topics and 7,952 to agriculture topics. More than half of the food-related projects have been funded since 2007, namely 33% through Horizon 2020 (2,842) and 23% through FP7 during 2007-2013 (1,987). Also, almost half of the agriculture-related projects have been funded since 2007, namely 31% through Horizon 2020 (2,457) and 18% through FP7 during 2007-2013 (1,447). This indicates a strong focus from the EU on research and innovation by creating a better support for this field.

The number of the agriculture-related projects implemented through Horizon 2020 was 920 in Italy, 338 in Portugal, 149 in Romania, and 73 in Serbia in September 2020 (CORDIS, 2020b). The number of the food-related projects implemented through Horizon 2020 was 901 in Italy, 352 in Portugal, 131 in Romania, and 68 in Serbia in September 2020 (CORDIS, 2020b), indicating a need for a higher focus especially from Romania in accessing the programme's funding, considering the geographic and population dimensions compared to other countries. Some food-related projects focus on improving the health system by introducing and assessing new medical or healthier technologies and practices. However, several projects are framed in both agriculture and food sectors.

Some of the topics of the agri-food-related projects from Italy are:

- Improving of the food quality schemes, public food procurement and food supply by policy measures development (e.g. Strength2Food);
- Developing digital tools for knowledge-transfer, spatial planning, policy implementation, healthy food security and safety, competitiveness improvement (e.g. DataBio, LANDSUPPORT, IoF2020);
- Implementing biosecurity practices at farm level (NETPOULSAFE);
- Developing management systems of pesticides (e.g. EMPHASIS, POnTE);
- Combating weeds by using laser technologies (e.g. WeLASER);
- Valuing the agri-food waste by reusing it in new products (e.g. AgriMax).

Some of the topics of the agri-food-related projects from Portugal are:

- Developing the research and innovation capacity by related to nitrogen cycle, biodiversity, and biorefineries (e.g. NitroPortugal, EnvMetaGen, BLUEandGREEN);
- Improving the products, technologies and practices, including waste recovery, in the fishing sector (e.g. SEA2LAND, SEAFOODTOMORROW, MINOUW);
- Increasing the organic seed availability and diversification (e.g. LIVESEED);
- Developing new irrigation solutions considering environmental sustainability (e.g. MASLOWATEN);
- Developing innovative resource-efficient (water and energy) compounds for the textile industry (e.g. H2COLOR-AUX).

Some of the topics of the agri-food-related projects from Romania are:

- Developing the research capacity and infrastructure (e.g. eLTER PLUS);
- Developing new processes for sustainable cellulose-based materials (e.g. NeoCel);
- Developing digital platforms for connecting and exchanging information (e.g. FOODSAFETY4EU, MOSES);
- Developing irrigation systems by using renewable resources and green technologies (e.g. SolAqua)

Some of the topics of the agri-food-related projects from Serbia are:

- Developing biostimulants for mushroom industry (e.g. BIOSCHAMP);
- Developing learning centers for farmers (e.g. AgriDemo-F2F);
- Developing integrated digital platform for agri-food and environmental information access, data interchangeability, monitoring and assessments (e.g. CYBELE, ENVISION, DIONE, LANDSENSE);
- Developing tools and services for agricultural insurance (e.g. BEACON);
- Improving the research capacity for developing green electronics (e.g. GREENELIT).

Another funding opportunity is given through EIP-AGRI (2020), which ensures funding opportunities for increasing the collaboration and the partnerships between different stakeholders for the development of the agriculture. We found 1544 published projects only from the Western, Central and Northern Europe in September 2020, of which 329 projects in Italy and 119 projects in Portugal, but none in Romania and Serbia (EIP-AGRI 2020). Some examples of good practices financed through EIP-AGRI by rural development programmes (2020) will be presented further.

Italy registered 157 projects in 2020, 47 in 2019, 89 in 2018, and 36 in 2017, while the number of projects in Portugal was distributed as follows: 4 in 2020 and 115 in 2018, with 0 projects in 2019 and 2017. The year 2020 was not completed during the search, because the website has been investigated on 20.09.2020.

Most of the projects focus on the traditional, organic, healthy, low environmental impact and digitization benefits of all the ideas proposed by the Italian researchers and the budget of projects was around 300,000-400,000 euros in 2020. Also, the Portuguese researchers focus on the use of local resources and digitization, and the budget in 2020 was usually lower than the Italian one, around 100,000 – 300,000 euros.

For the Italian case, the 26 projects destined for operational groups and published from May until September 3rd 2020 on the EIP-AGRI website (2020), are:

- Developing new product concepts and new packaging in oil and bakery sectors;
- Developing new race crossing in pig farming;
- Developing new sustainable products from agricultural waste, such as: essential oil from hemp waste;
- Improving the quality of fruits, grapes, forest fruits;
- Improving the production techniques of agricultural products;
- Improving the business competitiveness in sectors such as fruit production sector and chestnut farming.
- Developing integrated IT platforms, aerial spraying systems, business management platforms in agriculture;
- Implementing new cultivation procedures of grapes and new production technologies in the wine-making industry;
- Defining of new services and business models for pesticides use;
- Experimenting new business management system for cattle and dairy sector.
- Improving forestry and pastures management practices;
- Defining economic and environmental indices by integrating the precision agriculture conditions;

For the Portuguese case, the 4 projects destined for operational groups and published from May until September 3rd 2020 on the EIP-AGRI website (2020), are related to:

- Developing strategies for local and traditional food use;
- Developing investment tools for forestry management;
- Developing forestry management systems by using a digital application;
- Conserving genetic resources and improving the quantity and quality of agricultural products such as the fruit of opuntia ficus-indica.

In addition, some of the most recently published Portuguese projects on the EIP-AGRI website (2020) in 2018 emphasize issues such as: developing digital systems for fruit production prediction, developing strategies for disease prevention and controlling, use of natural resources in the textile industry, improvement of the cheese production system, and optimization of chestnut commercialization.

Finally, it is interesting to observe that there are important country-particularities in terms of the research focus, generated by their differences in climate and biodiversity.

5. Conclusion

The global challenges, connected directly or indirectly to the agri-food system, require a more responsible approach in regard to innovation from the decision-makers, which highlights the greater importance and support of research in order to develop sustainable and, especially, applicable ideas on a large scale.

The research and the development of collaborative partnerships and platforms foster the innovation, but it is not enough, because the innovation is about finding new solutions for current and future problems by focusing mostly on the criteria of applicability and accessibility.

This paper aimed to create a systematic overview of the state of the art on innovation and sustainability in the agri-food sector, while providing as well practical topics of research generated by the research project results conducted in some European countries.

The results of the bibliometric and content analyses indicate an increased interest of researchers for the innovation topic related to sustainability within the agri-food system. This is understandable considering the growing interest of policy makers in stimulating the research and innovation. Also, the research projects financed through Horizon 2020 are really focusing on sustainability, as well as on developing international networks for collaboration with the use of digitization in all the four countries analyzed.

Finally, future studies should approach innovation by indicating concrete case studies applicable in a specific geographic area in order to achieve the exchange of good practices and the development of real functioning collaboration partnerships by focusing on both advantages and disadvantages of the innovative solutions for a better transparency.

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Appendix A1. Definitions of key terms

The agri-food sector represents all activities from agriculture and food sectors, from cultivating crops and animal husbandry to processing the agricultural and food products with all the works and use of inputs, production, distribution, waste management, and all other auxiliary activities.

Innovation - new ideas for current and future problems by focusing mostly on the criteria of applicability and accessibility.

Quantitative method – an approach of analyzing data and information through a measurable unit with precision;

Qualitative method – an approach of exploring the data and information by emphasizing different phenomenon through observation, interviews, focus groups.

Research – a systemic approach of examining an idea or a phenomenon through various qualitative and quantitative methods.

Appendix B1

Table B1.1. The corpus on innovation and sustainability in agri-food sector from ScienceDirect

Corpus no.	References of ScienceDirect publications on innovation and sustainability in agri-food sector
1	Albert, M. (2019). Sustainable Frugal Innovation-The connection between frugal innovation and sustainability. *Journal of Cleaner Production*, *237*, 117747.
2	Amaral, A. R., Rodrigues, E., Gaspar, A. R., & Gomes, Á. (2020). A review of empirical data of sustainability initiatives in university campus operations. *Journal of Cleaner Production*, *250*, 119558.
3	Anand, A., Rufuss, D. D. W., Rajkumar, V., & Suganthi, L. (2017). Evaluation of sustainability indicators in smart cities for India using MCDM approach. *Energy Procedia*, *141*, 211-215.
4	Aznar-Sánchez, J. A., Velasco-Muñoz, J. F., Belmonte-Ureña, L. J., & Manzano-Agugliaro, F. (2019). Innovation and technology for sustainable mining activity: A worldwide research assessment. *Journal of Cleaner Production*, *221*, 38-54.
5	Bangsa, A. B., & Schlegelmilch, B. B. (2020). Linking sustainable product attributes and consumer decision-making: Insights from a systematic review. *Journal of Cleaner Production*, *245*, 118902.
6	Billi, M., Mascareño, A., & Edwards, J. (2020). Governing sustainability or sustainable governance? Semantic constellations on the sustainability-governance intersection in academic literature. *Journal of Cleaner Production*, 123523.
7	Bolis, I., Morioka, S. N., & Sznelwar, L. I. (2014). When sustainable development risks losing its meaning. Delimiting the concept with a comprehensive literature review and a conceptual model. *Journal of Cleaner Production*, *83*, 7-20.
8	Bossle, M. B., de Barcellos, M. D., Vieira, L. M., & Sauvée, L. (2016). The drivers for adoption of eco-innovation. *Journal of Cleaner production*, *113*, 861-872.
9	Boutelhig, A., Melit, A., & Hanini, S. (2017). Groundwater sources assessment for sustainable supply through photovoltaic water pumping system, in M'zab valley, Ghardaia. *Energy Procedia*, *141*, 76-80.
10	Calabrese, A., Castaldi, C., Forte, G., & Levialdi, N. G. (2018). Sustainability-oriented service innovation: An emerging research field. *Journal of Cleaner Production*, *193*, 533-548.
11	Caldera, H. T. S., Desha, C., & Dawes, L. (2017). Exploring the role of lean thinking in sustainable business practice: A systematic literature review. *Journal of Cleaner Production*, *167*, 1546-1565.
12	Carino, S., Porter, J., Malekpour, S., & Collins, J. (2020). Environmental Sustainability of Hospital Foodservices across the Food Supply Chain: A Systematic Review. *Journal of the Academy of Nutrition and Dietetics*.
13	Chai, L., & Tassou, S. A. (2019). Effect of cross-section geometry on the thermohydraulic characteristics of supercritical CO2 in minichannels. *Energy Procedia*, *161*, 446-453.
14	Corsi, A., Pagani, R. N., & Kovaleski, J. L. (2020). Technology transfer for sustainable development: Social impacts depicted and some other answers to a few questions. *Journal of Cleaner Production*, *245*, 118522. https://doi.org/10.1016/j.jclepro.2019.118522
15	De Marchi, V., Di Maria, E., Golini, R., & Perri, A. (2020). Nurturing international business research through global value chains literature: A review and discussion of future research opportunities. *International Business Review*, 101708.
16	Ehgartner, U. (2018). Discourses of the food retail industry: Changing understandings of 'the

Corpus no.	References of ScienceDirect publications on innovation and sustainability in agri-food sector
	consumer'and strategies for sustainability. *Sustainable Production and Consumption*, *16*, 154-161.
17	Evans, N., Stevenson, R. B., Lasen, M., Ferreira, J. A., & Davis, J. (2017). Approaches to embedding sustainability in teacher education: A synthesis of the literature. *Teaching and Teacher Education*, *63*, 405-417. https://doi.org/10.1016/j.tate.2017.01.013
18	Fratini, C. F., Georg, S., & Jørgensen, M. S. (2019). Exploring circular economy imaginaries in European cities: A research agenda for the governance of urban sustainability transitions. *Journal of cleaner production*, *228*, 974-989.
19	Geneletti, D., La Rosa, D., Spyra, M., & Cortinovis, C. (2017). A review of approaches and challenges for sustainable planning in urban peripheries. *Landscape and Urban Planning*, *165*, 231-243.
20	Guan, J., & Liu, N. (2015). Invention profiles and uneven growth in the field of emerging nano-energy. *Energy Policy*, *76*, 146-157.
21	Guan, J., & Liu, N. (2016). Exploitative and exploratory innovations in knowledge network and collaboration network: A patent analysis in the technological field of nano-energy. *Research policy*, *45*(1), 97-112.
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23	Halbe, J., & Adamowski, J. (2019). Modeling sustainability visions: A case study of multi-scale food systems in Southwestern Ontario. *Journal of environmental management*, *231*, 1028-1047.
24	Jabbour, C. J. C., Fiorini, P. D. C., Ndubisi, N. O., Queiroz, M. M., & Piato, É. L. (2020). Digitally-enabled sustainable supply chains in the 21st century: A review and a research agenda. *Science of The Total Environment*, *725*, 138177.
25	Jia, F., Zhang, T., & Chen, L. (2020). Sustainable supply chain Finance: Towards a research agenda. *Journal of Cleaner Production*, *243*, 118680.
26	Jia, F., Zuluaga-Cardona, L., Bailey, A., & Rueda, X. (2018). Sustainable supply chain management in developing countries: An analysis of the literature. *Journal of Cleaner Production*, *189*, 263-278.
27	Johnsen, T. E., Miemczyk, J., & Howard, M. (2017). A systematic literature review of sustainable purchasing and supply research: Theoretical perspectives and opportunities for IMP-based research. *Industrial Marketing Management*, *61*, 130-143.
28	Klewitz, J., & Hansen, E. G. (2014). Sustainability-oriented innovation of SMEs: a systematic review. *Journal of cleaner production*, *65*, 57-75.
29	Kobza, N., & Schuster, A. (2016). Building a responsible Europe-the value of circular economy. *IFAC-PapersOnLine*, *49*(29), 111-116.
30	Ladu, L., Imbert, E., Quitzow, R., & Morone, P. (2020). The role of the policy mix in the transition toward a circular forest bioeconomy. *Forest Policy and Economics*, *110*, 101937.
31	Linnenluecke, M. K., Verreynne, M. L., de Villiers Scheepers, M. J., & Venter, C. (2017). A review of collaborative planning approaches for transformative change towards a sustainable future. *Journal of cleaner production*, *142*, 3212-3224.
32	Linnér, B. O., & Wibeck, V. (2020). Conceptualising variations in societal transformations towards sustainability. *Environmental Science & Policy*, *106*, 221-227.
33	Magon, R. B., Thomé, A. M. T., Ferrer, A. L. C., & Scavarda, L. F. (2018). Sustainability and performance in operations management research. *Journal of Cleaner Production*, *190*, 104-117.
34	Markard, J., Raven, R., & Truffer, B. (2012). Sustainability transitions: An emerging field of research and its prospects. *Research policy*, *41*(6), 955-967.
35	Martins, C. L., & Pato, M. V. (2019). Supply chain sustainability: A tertiary literature review. *Journal of Cleaner Production*, *225*, 995-1016.
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Sources: based on data of Elsevier (2020a)

OBJECTIVES: The readers will be able to:

- ✓ Identify online information on innovation and research projects in the agri-food system
- ✓ Create a systemic review of research in any field by using the bibliometric technique
- ✓ Give practical examples of innovations

SKILLS: The test provides both hard and soft skills, i.e. data management, research skills, critical thinking, and communication.

QUESTION 1 (PLEASE CHECK THE CORRECT ANSWER)

Which of the examples below represent a radical innovation?

- ☐ The invention of the tractor
- ☐ Temperature sensors in agriculture
- ☐ Artisanal beer
- ☐ Vegan cakes

QUESTION 2 (PLEASE CHECK THE CORRECT ANSWER)

Which data platforms offer relevant information about the scientific research on innovation?

- ☐ Scopus
- ☐ Web of Science
- ☐ ScienceDirect
- ☐ All the above

QUESTION 3 (PLEASE CHECK THE CORRECT ANSWER)

Where are the hot spots of European research according to cordis data?

- ☐ Northern and Eastern Europe
- ☐ Northern and Central Europe

- ☐ Eastern and Central Europe
- ☐ Western and Southern Europe

QUESTION 4 (PLEASE CHECK THE CORRECT ANSWER)

Which option from below it is not an advantage of frugal innovation?

- ☐ Better accessibility to the products
- ☐ Reducing the use of natural resources
- ☐ Well-known and applicable by all
- ☐ Adopting the principles of circular economy

QUESTION 5 (PLEASE CHECK THE CORRECT ANSWER)

What is innovation?

- ☐ New accessible and practical solutions
- ☐ Inventions
- ☐ The research projects
- ☐ Ideas based on creativity, which could have or not real application

QUESTION 6 (PLEASE WRITE THE CORRECT ANSWER WITHIN THE BOX)

Please provide three examples of possible innovation results in the agri-food system based on the horizon 2020 data.

PRACTICAL APPLICATION: IDENTIFY, DESCRIBE, COMMENT AND DISCUSS WITH YOUR PEERS A CASE STUDY ON INNOVATION IN AGRI-FOOD SYSTEM

2. The Research's Benefits of the Growth of Organic Farming in European Union

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Abstract: Organic farming has become a very specialized field for which specific knowledge and technologies are needed. Relevant research directions in this field focus both on the production of new crops and on the improvement and breeding of animals in organic production. The research is directed at increased sustainability, efficiency in using the resources, including water and soil protection, biodiversity, as well as on climate change alleviation and adjustment. The present study aims to analyze the state of research in the field of organic agriculture, respectively the research directions in this field and the funding provided to substantiate, from a scientific point of view, the embracing of organic farming practices by harvesters. The evolution of research will be analyzed and, also, the link between scientific contributions in this field and the level of advancement of organic agriculture in European Union countries.

Keywords: organic farming; economic growth; innovation in agriculture

1. Introduction

Research in the field of organic farming has evolved along with the interest given to the consumption of organic products. Given that the organic sector is responding to a growing desire for healthy food consumption, it leads to sustainable production but at high costs. The challenges facing scientific research are related to improving agricultural methods through the increased use of technology, digitization and genetically modified organisms, in order to reduce production costs and to increase the quality of the products and the efficiency of the production. Thus, the impact of research results would be reflected both in the increase in agricultural incomes and in the decrease in consumer prices. Niggli and Lockeretz (1996) were the first to map previous research in organic farming (Wynen & Vanzetti 2000). Lockeretz (2007) showed that, from a humble start in the early half of the former one hundred years, organic farming has become very important, influencing the whole world. In fact, the figures provided by the European Commission (2019) show that the growing demand for organic products has led to a boost in production. And to boost production, the EU's organic area increased by 70% between 2008 and 2018. Under these conditions, sales of organic products reached, in 2017, 34 billion EUR (European Commission 2019).

The latest mapping of scientific contributions Organic agriculture and food research (OAFR) is presented by Freyer et al. (2019) which identifies a difference between what one would like to be the object of research and what is actually being researched. Seven directions are identified:

1) OAFR pursues a fundamental research plan of attack;

2) OAFR is lead by the principles of the International Federation of Organic Agriculture Movements (IFOAM) and organic regulations;

3) research prerogatives are stipulated in association with experts;

4) transdisciplinarity became an important plan of action of the OAFR;

5) the OAFR generates items that are precisely befitting in practice;

6) the means applied in the OAFR are essentially different from methods in conventional farming research; and

7) researchers conducting studies in the domain of organic farming are completely integrated into the scientific community (Freyer et al. 2019).

The interest in scientific research in the area of organic agriculture can also be quantified in figures. For example, if at the first international meeting of Organic Agriculture Movements (IFOAM) in 1977, organized in Switzerland, 25 papers were presented, at the conference of the same organization in 2000 more than 500 were presented (Alfoldi et al. 2000 in Lockeretz 2007).

IFOAM - Organics International identifies three directions through which scientific research can support organic farming:

1) expanding the competitiveness, sustainability, and productivity of organic agriculture systems;

2) research of organic resolutions to particular local agricultural issues, one of the biggest problem for farmers eager to changeover to organic products;

3) granting scientific proof of the diversified benefits of organic farming, to back up awareness-raising campaigns addressing both end-users and legislators.

Research and innovation in the organic sector are considered essential in order to develop production systems that will be more and more sustainable, also in creating innovative powerfull business models, finally supporting stakeholders to work together towards deliverying services and public goods. Research and innovation have the key role of providing the evidence needed to substantiate effective institutional policies (IFOAM 2017).

IFOAM's technological innovation platform - Organics International (TIPI) - created a vision and a plan of action, as well as a schedule to develop organic farming through the help of innovation, research and technology substitution (Niggli et al. 2017).

Organic 3.0 is the title of a vision and strategy for the development of the organic sector. It is the result of a discussion held between 2013 and 2016 under the leadership of IFOAM - Organics International. After Organic 1.0 pioneering moment, followed by Organic 2.0 regulating direction and current systems with accredited organic farming which now has an absorption of around 1% of the worldwide agriculture and food market, Organic 3.0 aims to better contribute to solving the food chain, for instance healthy and attainable food for the world, minimal environmental and food pollution, equity for producers, high animal health and the use of resources efficienly (Arbenz et al. 2017).

Economic development is one of the conditions for the advance of organic agriculture, the results of some analyzes, and the application of the VIKOR method showed that the highest level of advancement of organic farming was attained by France, Germany and Italy, these three countries being labelled as "countries of good practices", i.e., countries whose standard regarding the development of organic farming should be embraced by other EU countries (Krstić & al. 2017).

The hypothesis set out to be verified in this study is that the interest of EU Member States in funding/supporting research in the field of organic farming is amoung their priorities and has a positive impact on the economy and consumers. We expect the verification of the hypothesis of the study to highlight the particularities, challenges and opportunities of research in the sphere of interest of organic agriculture.

2. The situation of organic farming in EU Member States

At the end of 2017, there were over 305,000 organic farming producers in the European Union and over 12.8 million hectares were organically managed. In addition, 7.2% of the European Union's agricultural area was organically cultivated. Organic agricultural land at European level encountered, in 2017, one more million hectares comparing with 2016, and the three countries reporting the bulkiest organic agriculture fields are Italy (1.9 million hectares), France (1.7 million hectares) and Spain (2.1 million hectares). The EU states with the largest cultivated organic area, relative to the total area, are Estonia - 20.5% and Austria - 24%. Within the EU, retail sales of organic products increased by 10.5% compared to 2016, meaning 34,3 billion euros. Germany was top market in 2017 for organic products, retail worthing € 10 billion euros, seconded by France (€ 7.9 billion euros) and Italy (€ 3.1 billion euros) (Willer & Lernoud 2019).

As in the previous period, Switzerland reported the top consumption of organic food (288 euros per capita), closely seconded by Denmark (278 euros per capita). Within in the European Union, in 2017, per capita consumption increased from 47 to 67 euros. The Czech Republic stands out as the singular country with a constant method for collecting retail information. (Willer & Lernoud 2019). Presently, available information on the subject of organic farming in the worldwide but, in particular, the European market demonstrates that European organic category is advanced in a global framework. Large areas of agricultural land, continuous growth in the number of agents, together with a rapid growth of market display the excellent dynamics of the market, especially the green subdivision, in Europe. In numerous countries, the organic market is more rapidly developing than production, therefore the national supply cannot satisfy the demand. Accordingly, abounding organic organizations or market players request for more producers to become organic. Although organic agricultural land in part of Eastern and Central European countries accounts for a generous share of total agricultural land, consumer expenditures on organic products, even though increasing, are not significant comparing to total food expenditure in these countries (Willer & Lernoud 2019).

3. The main challenges of research in the department of organic agriculture

A SWOT analysis of organic farming research highlights strengths, weaknesses, opportunities and threats.

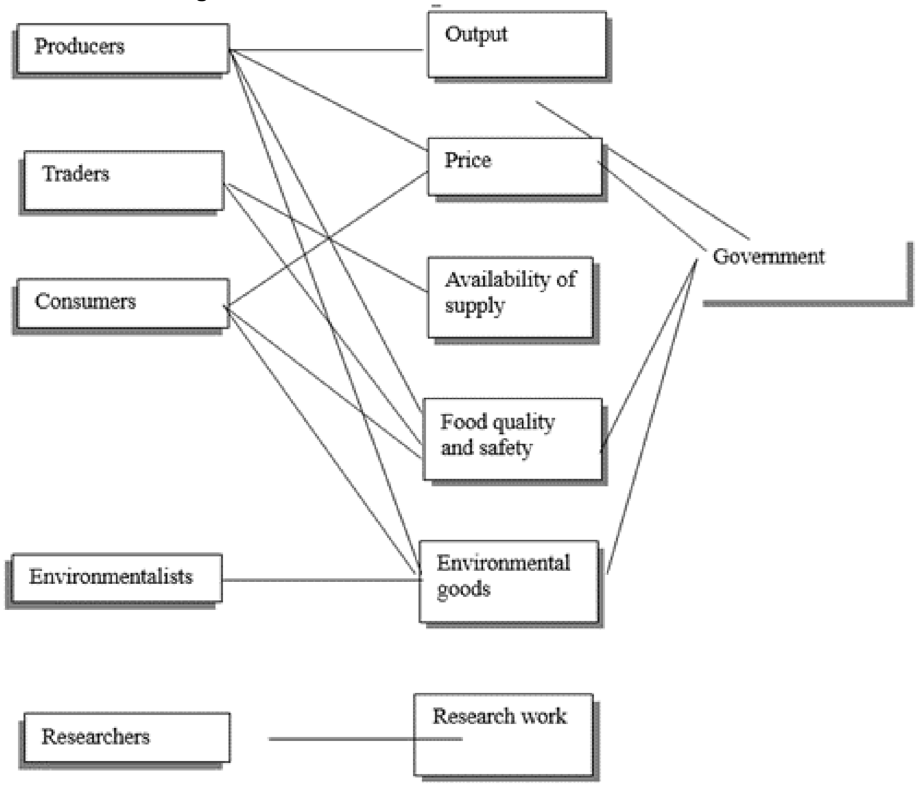
Among the strengths of organic farming are: profitability (in many circumstances, organic farming is undoubtedly more advantageous than common agriculture), multifunctionality and resilience (increasing the resilience of organosystems where organically grown), biodiversity, environmental protection and human health, protection of the soil and carbon sequestration, climate change mitigation, production quality and food security.

Weaknesses and threats are: the yield gap (organic farming needs more land in order to produce akin amount of products to common agriculture), lack of incentives to produce diversified goods, lack of standards and rules, insufficient funding, lack of competition regulation.

Opportunities for organic agriculture include that the huge number of smallholders who produce ‘organic by default’ using traditional methods, presents a chance to get good and rapid returns to research funding by facilitating science-driven innovations. This may reduce the trade-offs between productivity and sustainability and lead to self-sufficiency in times of limited resources. (Niggli et al. 2017).

Scientific research in the field of organic farming has begun to be financially supported by Community or national funds. The financing of research directions determines their prioritization according to the interests of producers, traders, consumers, ecologists or researchers, as can be seen in Figure 2.1 (Wynen & Vanzetti 2000).

Figure 2.1. Diverse stakeholders' research interests



Source: Wynen & Vanzetti 2000

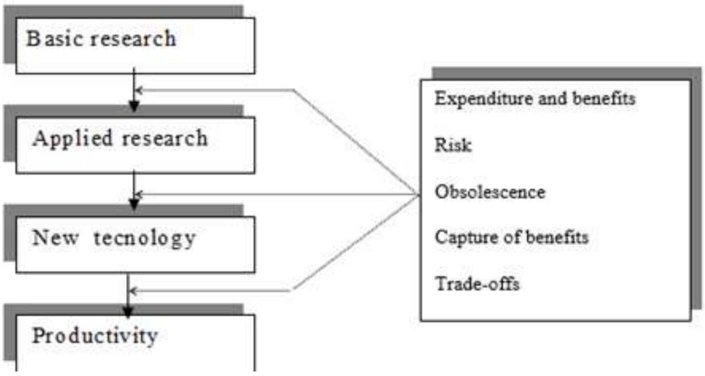
While producers are mainly concerned with increasing farm productivity at the lowest possible cost, they can also target environmental protection measures or food safety. At the same time, together with traders, they are concerned by the development of the organic farming industry. Buyers are primarily interested in food security, nourishment and the cost of organic products. They may also be interested in how the production, distribution and consumption of organic products affect the environment and, in the same time, they can influence production through the consumption preferences they have.

Traders, placing themselves between producers and consumers, are interested in a consistent supply of organic products. Environmentalists who are interested in the effect of production on the environment can be both consumers and producers.

An evaluation of the research results showed that they reflect an individual interest of the researcher or the use of methodologies with which they are familiar, rather than the impact of the study on the organic agriculture sector.

The relationship between the research methods, the context of their realization and the obtained result is presented in Figure 2.2 (Wynen & Vanzetti 2000).

Figure 2.2. Pipeline model of research



Source: Wynen & Vanzetti 2000.

In order to substantiate tactics decisions, Governments use research, and are they are concerned with industry profitability, consumer safety, environmental topics as well as with basic research capacity.

The allocation of funds for research must take into account the relationship between the various research methods, with an emphasis on the relationship between elementary and applied study and subsequently the development of new production technologies that determine productivity growth. The results of basic research are not put into practice as quickly as those of applied research which justify, from this perspective, the allocation of funds. Another risk is that the research result will become obsolete due to the period of time in which the scientific activity took place.

The conclusion is that the funds should be directed where the relationships of the components in figure 2.2 are the closest. For example, the development of a new cultivation technology as a result of applied research has a faster impact on productivity than research aimed at plant growth.

The transfer of the research results undertaken has a significant impact, especially since not all scientific approaches benefit from funding. At the same time, not all research results are suitable for transfer, due to differences between soils and climate in different regions. While the use of certain technologies can be broadly enforced, the transmission of disease-resistant species could not be as appropriate as some diseases could be particular in certain areas (Wynen & Vanzetti 2000).

The challenge for funding entities is to assess the chances of a positive research outcome and to obtain rapid benefits as a result of its transfer to the market. Such an evaluation could prioritize research funding.

Besides these aspects, generally speaking as genuine for study issues, there are several aspects distinguishing the organic farming.

The first problem appears to be the comprehensive approach to agriculture, established from the perspective that the whole system means more than the total of its pieces - the synergy paradigm. Hardly any scientists have been prepared to apply comprehensive methods.

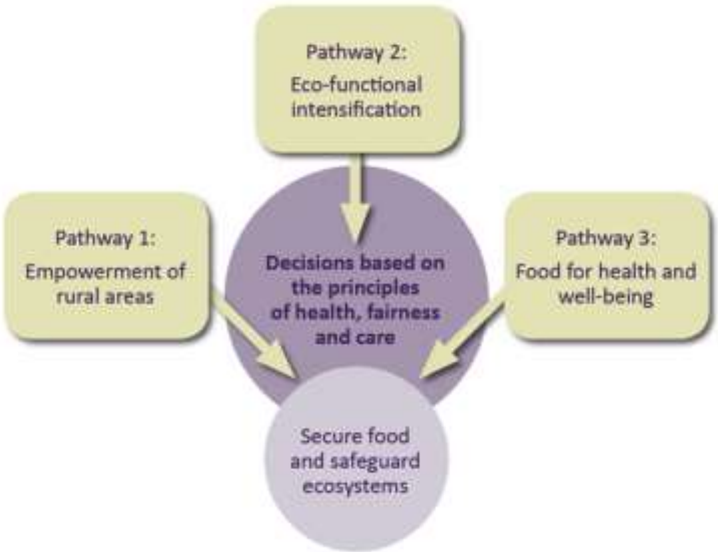
The second aspect, particular regarding organic farming is the disconnected funding. As organic farming is frequently considered a danger to the controlling archetype, there is an altercation that the distribution of funding should be divided between organic farming study and common farming.

The predominant argument is that people unfamiliar with organic farming may not have the abilities to properly appreciate priorities and cannot decide on project funding in this sector. A more effective mean of assigning organic research funds is to have an independent amount allocated for organic farming with evaluators who know the field (Wynen & Vanzetti 2000).

Analysis about organic farming and food frameworks is probable to pursue three essential directions to organic farming, as presented in Figure 2.3:

1. be preferred as a land use system in rural areas all around the world,
2. to provide food to the population and save the planet's natural riches,
3. to make healthy food in a correct manner for the good health of all (Krstić & al. 2017).

Figure 2.3. Directions for the future development of research in organic agriculture



Source: Krstić & al. 2017.

The development of organic farming needs lasting plans of action to create research capacity around the world, distribute research results and assist farmers and possible other participants involved along the value chain to develop and adopt more efficient technologies.

TIPI has identified three strategies that could help to the advancement of research and innovation in organic agriculture:

1. Advancement of appropriate ways for organic farming systems and usual procedures;
2. Permanent alliance among farmers, agricultural consultants, researchers and end users;
3. Integrating the technological, social and environmental ranges of novelty (Krstić & al. 2017).

Along with TIPI's vision, The German Alliance for Agricultural Research, the International Federation of Organic Agriculture Movements (IFOAM), the Italian Organic Research Strategy and the EU Technology Platform Organics have proposed research directions that should be followed and backed to reach the Organic goals. 3.0 (Rahmann et al. 2017).

The need for mixed, multidisciplinary research teams in the field of organic agriculture is evident in most studies to date. Factors that could block multidisciplinary research have been identified. Some of these relate to common values, ensuring the balance between technical skills, institutional research capacity, problem-solving team capacity and institutional resilience, while other factors relate to leadership and knowledge control, the proposed experimental plan and the involvement of the team (Barbercheck et al. 2012). In order for organic farming to be able to diminish the yield gap compared to common farming, it is a need for organic farmers and the specialised subdivision to advance innovation and the disseminate new practices and solutions. Strategic planning is also essential (Tsvetkov et al. 2018).

4. Institutional organization of research in the organic sector

About 20 universities and public research centers are currently conducting research in the field of organic farming. Another 10 private centers are involved in similar activities. European countries collaborate to establish prevalent priorities in organic farming based on dialogues with national stakeholders (CORE Organic) (Niggli et al. 2017).

A study that analyzed the market and the political factors that influenced land conversion in 61 countries between 1990 and 2001 found that the availability of advice was one particular determinant, that had the greatest impact on the development of organic farming in its initial stages of the sector's growth. In that time, national organic study activities have developed into the most dominant factor in the postliminary phases of development (Wheeler 2006).

In Germany, since 2000, the Institute of Organic Agriculture has been established in the Federal Research Institute for Rural Areas, Forestry and Fisheries (known as the Thünen Institute). A creative conversion plan has recently been started in this country which assumes that common farmers engrossed in adaptation can get a farm where they can check how to convert, making it easier for them to meet potential customers, i.e., processors and distributors.

In some countries there is a specific organic study department that firmly coordinates this field (although other institutions can also carry out organic research), such as Switzerland (Swiss Research Institute of Organic Agriculture - Forschungsinstitut für biologischen Landbau in short FiBL) and Hungary (Hungarian Research Institute of Organic Agriculture - Ökológiai Mezőgazdasági Kutatóintézet, in short ÖMKi).

An intermediate model is in Denmark where in ICROFS (International Center for Research in Organic Food Systems) research is carried out in multidisciplinary cooperation between study groups from distinctive entities, like institutions and universities. In Denmark, there is also a public consultation process and the involvement of stakeholders in setting organic research priorities. The simulated "conversion checks" are days with plenty discussions offering the farmers a full sketch on what it would mean to convert organically for their private farm - practice and daily customs, answers to common habits, threats, growing specific requires for land or food, adjustments to specific buildings, how they could obtain a contract for the distribution of organic products etc.

Conversion controls proved to be very motivating for the farmers and were a huge success in Denmark, country where they contributed in 2016 unquestionably to a 20% increase in organic land surfaces. The idea was so efficient that it became supported by private firms fundings (such as the Coop market chain) and also by the state, so that the provision of chargeless alteration controls to farmers is currently supported in 25 areas. (IFOAM-Organics International, Guidelines, 2017).

Research for organic farming has been a primary focus of farmers in Denmark since 1981, the year when the National Association for Organic Agriculture (currently known as Organic Denmark) considered this topic a priority. The growth of a powerful research dashboard in Denmark was represented by notable discussion between the organic stakeholders and government, also the government's obligation to support organic research, in particular through the Ministry of Food, Agriculture and Fisheries, the Danish University for Agriculture and the engagement to encourage organic study in the government's national strategy for farming research. The 1995 action plan in Denmark to promote organic food production urged that the first concern was to support organic farming study, in order to ease the alteration and boost organic food production towards meeting customer demand. This policy also suggested to create a station commited to organic research. In this context, the Ministry of Food, Agriculture and Fisheries drew an action plan in order to set up, in September 1995, the Danish Agriculture Research Center for Organic Farming (DARCOF) and allocated approximately 13 million euros for development and research between 1996 and 1999. In addition, the ministry was determined to set up an organic research station together with a series of organic workshops. DARCOF functioned as a "center without walls" in which researchers stayed in their private places of residence while collaborating inter-institutionally. At the Foulum Research Center, Aarhus was a secretariat that harmonized the University DARCOF actions. Between 1995 and 2008, three important organic study curricula were started - DARCOF I, II, III. Following intense support by Denmark Organic, the ministry expanded to 22 million euros the research financing for DARCOF II (2000-2005). Around 100 scientists from 20 institutions got employed in DARCOF programs. In 2008, the government expressed the intention of making its first organic research institute a worldwide research center with a worldwide funding mandate. (IFOAM-Organics International, Guidelines, 2017). ICROFS is currently chaired by worldwide directors with CEOs delivered by Danish entities, such as organizations and universities and IFOAM - Organics International, Asia, Europe, Africa and North America. ICROFS has a committee of the Danish agenda, which supervises internal research programs, also DARCOF III (going on with idea of "wellless center") and Organic RDD, a different program containing 11 plans and their budget of 12 million euros for the years 2014-2018. ICROFS takes part in EU and international study platforms as well, activates in global research projects – for example, Productivity and Growth in Organic Value Chains (GrOV), helping to develop the organic value chain in East Africa. ICROFS is, moreover, involved in disseminating data at all levels, national and international. Internationally it manages www.orgprints.org site, organic e-prints, the biggest database on organic studies, all those accessible to the public in open format. The archive includes over 13,000 documents from international sources and has over 23,500 enrolled users. In Denmark, the private sector through the Danish Agricultural Advisory Service and Organic Denmark offer nearly entirely organic expansion services. Nevertheless, ICROFS scatters the expertise at national level by coordinating days dedicated to the farmer, thematic workshops and a large organic congress at national level (IFOAM-Organics International, Guidelines, 2017).

The case of Sweden is a special one, in the sense that in this country organic research was taken over by a public institution that received significant public financial support but its research is not easily accepted in academia, although it has been carried out since the 1990s.

If it is not possible to organize an institute for research exclusively in the domain of organic farming, one option is the existence of an effective instrument for national or regional, as at European level, administration of organic field research, which will help alliances and foster strategies in long-term. About this type of collaboration can be achieved either in the form of a committed organic study program (financed for several years), for example BÖLN in Germany, or by appointing the duty to a specially designed organization with ongoing public financial support, as ICROFS in Denmark (IFOAM-Organics International, Guidelines, 2017).

If there are successive projects in the EU to support organic research, yet there is not a constant endowment to ensure constant support, in the USA the financing for organic research was established at 13.7 million euros / year since 2008 (IFOAM-Organics International, Guidelines, 2017).

At EU level, the European Technology Platform for Organic Food and Agriculture, TP Organics, offers good practice on setting the organic study platform through a participatory method of implicating the different stakeholders of the organic action.

Some European Union countries have imposed short courses in organic farming for farmers in order to have access to different forms of public help for organic farming. The reason for such an obligatory necessity is that preparation in organic farming considerably aids alteration and confines the exposure of farmers returning to common agriculture or having problems complying with organic standards. Preparation sessions for organic farmers are possible to be arranged by diverse entities, such as NGOs, farmers' associations, universities, consultants, organic research organizations, all of them financed from public funding. Training courses are usually organized in winter to maximize the presence of farmers (IFOAM-Organics International, Guidelines, 2017).

5. Funds allocation for research in the field of organic farming at EU level

5.1. European funds

Since the 1990s, the EU has increasingly expanded, albeit slowly, the contribution available to ecological agricultural research. For the first time, between 1990 and 2006, European Commission funding for organic farming for research amounted to 64.2 million EUR. (IFOAM-Organics International, Guidelines, 2017).

Today, the EU has become a major founder and created a structure for European organic studies (although this is still a small amount of total farming research).

There are two levels of action at EU level:

1) through the EU research framework programs, which are the main tools in support of agricultural research - HORIZON 2020 and EIP-AGRI;

2) transnational / international coordination projects, such as CORE Organic, FACCE-JPI (Joint Programming Initiative for Agriculture, Food Security and Climate Change), COST behaviours.

EU research programs are financially supported by the EU, but international coordination projects, for example ERA 60-Nets, are funded mainly by the Member States (IFOAM-Organics International, Guidelines, 2017).

The EU Research and Innovation Framework Program - HORIZON 2020 has provided solutions and tools to improve the performance and uptake of research results. The mechanisms provided promoted research and innovation, coordination, networking and training, as well as support for infrastructure and innovation and for SMEs working in the organic farming sector (European Commission, 2014).

The allocation for HORIZON 2020 was almost double compared to the previous Seventh Framework Program (European Commission, 2015). In HORIZON 2020, priorities are changed compared to previous EU research programs, and the focus has changed from research to innovation with tangible impact. It is noted that in the calls started until now the multi-actor approach has been necessary in most study topics important to agro-ecology and organic farming (Delate et al. 2017).

Although, for example, within 2016-2017, the European Union provided 33 million euros for financing organic study projects through Horizon 2020, they still represent almost 1% of Horizon 2020, speaking of the absolute funding accessible for research over the same period of time.

The Horizon 2020 regulations specifically stipulate organic farming should have a focus on the agenda. For the first time, official European research policy documents recognize the importance of funding organic farms. (IFOAM-Organics International, Guidelines, 2017). In Horizon 2020 the milestone backbone for farming research aims to put into action in biannual work agendas that explain the actions for future funding (calls). To the purpose of developing programs that meet the requires of industry, the European Commission broadly consults on European Technology Platforms (ETPs), as well as TP Organics, a technology podium for organic food and agriculture, with the aim of recognizing change objectives for organic products and advertising to decision-makers. The TP Organic platform, developed in 2008 by IFOAM Europe, has built a wide, powerful affiliation with different entities, like civil society organizations, farmers, researchers, and companies. TP Organic, also acknowledged in 2013 by the European Commission as a European Technology Platform (ETP), provided a formal counseling role in the fulfillment of the Horizon 2020 program. The TP Organics study programs of 2009, 2014 were essential regarding the establishing priorities referring CORE later (IFOAM-Organics International, Guidelines, 2017).

Horizon Europe will fund research and innovation (R&I) activities, distributing a total budget of €95.5 billion between 2021 and 2027. This budget will be divided over six clusters, one of which relates closely to Catalyze's Agri, Food & Bioeconomy branch: 'Food, Bioeconomy, Natural Resources, Agriculture and Environment' (total estimated budget: 2021: €923.4M and 2022: €910.30 M) (Catalyze, 2020).

The attendance of the organic farming sector in the European Innovation Partnership on Agricultural Productivity and Sustainability (EIP) has been the key to stimulating innovation and improving cooperation between science, agriculture, agricultural consultancy and industry, both at regional and national level, and at European level. Stronger involvement of farmers in identifying research and innovation needs is essential to meet future challenges. Several formats can be used in the EIP to explore specific issues that are relevant to organic farming and that would stimulate the active involvement of farmers (European Commission 2014).

In the period 2000-2012, 49 EU-funded research projects on low-consumption agriculture and organic farming strengthened the research and innovation capacity of the organic sector. (European Comission, 2020).

Despite significant funding from the European Union, most funds allocated to farming studies are still handled by EU Member States, but occasionally in the form of transnational mutual effort, bringing together national budgets. Many EU Member States, since 2004, have been participating in a transnational alliance called CORE Organic, which brings together assets in organic food and agriculture research.

This type of partnership is known as ERA-Net CORE Organic "Coordination of European Transnational Research in Organic Food and Farming Systems". Following the first stage (CORE Organic I beginning 2004 until 2007) and the second stage (CORE Organic II beginning 2010 until 2013), the third period followed (CORE Organic Plus, active from 2013 to 2018). Core Organic II had a total budget of 14 million euros and Core Organic Plus, 2.8 million euros. (IFOAM-Organics International, Guidelines, 2017).

The countries were the government funds in particular designed organic research program are part of CORE Organic leadership. Nearly all agendas also have a coherent aim to improve the swap of knowledge in the organic category and to fund websites, conferences, seminars etc. to popularize the results of recent research. Organic E-prints, an open access digital archive, makes research approachable to various range of users, also through national websites, workshops, conferences and encouraging the percent of results in the (organic) agricultural press (IFOAM-Organics International, Guidelines, 2017).

5.2. National funds

A lot of European states and regions offer study grants dedicated to projects for particular affairs (national or regional) related to organic farming.

For example, in the Netherlands, important attention has been paid to training, education and research in organic farming. Through its national organic action plan from 2005-2007, 63% of the total agricultural research allocation was pointed to those endeavors. The Netherlands allocated, in 2009, 10% of the entire farming study budget to organic farming, moreover the percentage for organic research increased, in 2008, to a total of 9.6 million euros. (IFOAM-Organics International, Guidelines, 2017).

Organic research for the Dutch government follows mainly the market demand. Since 2005, the authorities have accredited the accountability for adapting the organic study agenda to stakeholders, for this they developed and funded Bioconnect (an organic sector knowledge network, now part of Bionext). This dedicated sector convinced the government that a pilot project would be assigned for creating the organic study agenda to Bioconnect. Bioconnect help was subsequently continued until 2011. The attendance rate was tremendous (organic processing involved 50% of actors and 60% of organic farmers).(IFOAM-Organics International, Guidelines, 2017).

In Germany, the BÖLN course of action supports study projects by pointing out research priorities, advertising research ideas, evaluating the items according to cost-effectiveness, relevance, and practicality, so that they can be funded and monitored until they are fulfilled. Research projects include a wide variety of topics, along with the value chain. Further, besides funding research, BÖLN takes care of and consolidates the supply and demand for environmentally friendly or otherwise sustainable products, in various forms of training and dissemination. The final beneficiaries of such funded study projects are the relevant aim groups - stakeholders in agriculture, beginning with procurement and processing, trade and continuing with large users, consumers, traders. Looking back from the start, this course of action has supported, with an amount of 126 million euros, 930 research projects. Moreover, it has facilitated 3,500 knowledge transfer events beginning with 2005. Therefore, its input to the development of organic farming has been widely recognized. In addition to federal budget, the German states (Länder) financed organic studies as well. A relevant example was Bavaria, between 1995 and 2008, which spent 3.7 million euros funding ecological studies. (IFOAM-Organics International, Guidelines, 2017).

Organic farming initiatives in Europe (e.g., EEAS in Spain, PRO-BIO in the Czech Republic, BioAustria in Austria, FNAB in France, umbrella organizations 'Ökoringe' for producer associations in the Länder (State) - in Germany) they likewise obtain public financing for the training and guidance of agriculturists. Speaking of PRO-BIO, the Czech farmers' association, the costs of the courses it manages are 30% borne by the association's backing and rewarded 70% of government support. (IFOAM-Organics International, Guidelines, 2017).

In Switzerland FiBL organic research institute was created in 1974 and brought this country the recognition as one of the global commanders in organic farming studies. FiBL is a private entity, though it operates with almost 50% of its budget from public funding, which meant about 8 million euros coming from public funding in 2014. In addition, other 3 federal centers have been involved in studying organic agriculture during several years. Regarding such a center, Agroscope, has 3 working points aiming at organic research, those branchs are located below the federal public office for agriculture. Agroscope's annual funding goes about 16% of organic research, meaning almost 30 million euros. The Swiss parliament, in 2014, was urged by the Swiss Federal Council to increase the sums allocated to organic research by several million more each year. (IFOAM-Organics International, Guidelines, 2017). Furthermore, public universities (ZHAW Wädensil, HAFL Zollikofen, ETHZ Zürich) accomplish important organic studies. Consulting services became closely connected to research field: the regional government financially supports FiBL's consulting service. In addition, the federal government finance dedicated organic advisory service in the general agricultural sector. FiBL developped branches in Austria and Germany.

In 2011, FiBL founded ÖMKi in Hungary, were the FiBL framework of the specialized non-profit private organic study and expansion center was replicated. In 2013, the University of Debrecen awarded to ÖMKi the title of Agrobiodiversity and Organic Agriculture - External Department. FiBL developed best-practice provided to other countries on how to develop their own capacity for organic study and enlargement (IFOAM-Organics International, Guidelines, 2017).

In Italy, since the early 1990s, the line ministry has played an important mission in preparation and directing funds towards national research for organic farming and food (OFF). In line with the demands of operators and bearing in mind gaps in technical, scientific and regulatory best practice, the first projects implemented during 1994 and 2006 focused mainly on plant protection plans of action as well as researching soil fertility management. For the implementation of the national plan, the ministry found four strategic axes and 14 key actions to support research in the period 2009-2014. This research plan supplied the institutional framework for funding research actions and was progressively implemented.

Most EU Member States are backing up, regardless the way, the issue of organic recommendation in their enlargement services, also through correspondent systems, an important aspect being training plans delivered to organic agriculturists (such examples were in Germany, the Netherlands, Finland, Flanders, Luxembourg, Spain, Poland, Wallonia (Belgium), Italy, Ireland). A great part of the EU has started the organic changeover facilities for farmers wishing to make the change (Bavaria in Germany, Italy, Luxembourg). (Canali et al. 2020).

6. Conclusion

The main threat in terms of public support for organic studies and expansion is the existence of an institutional framework, the amount of funding but also the continuity of support. The analysis confirms that the concerns for ensuring an institutional framework, regulated by strategic documents and providing funding for research are found mainly in European countries where we find either the largest share of organically cultivated area or in the countries that are leaders in selling organic products or have the highest level of consumption of organic products per capita.

It is noted that there is a concern for supporting ecological research both at the governmental level through institutionalization and at the level of some associations that have been very successful in placing organic agriculture on the political study plan. A relevant example is the IFOAM-EU organisation. Succeeding publishing in 2014 a strategic innovation and research PT Organics Agenda for organic food and agriculture, the EU's technology podium for organic food and agriculture, the EU financial support for organic research has been raised and organic farming is currently present especially in study policy approaches. Specifically, coherent research framework has determined the orientation of financial allocations as close as possible to the needs.

The hypothesis formulated in this study is based on the fact that the predictability of the funding for research in organic farming altogether with strategic inclusion in public policies for environment and sustainable development is very important for the producers (and finally for the economy) especially by creating interventions for actions on multiple levels: environmental protection, increasing the health of the population, increasing agricultural productivity as well as creating dedicated sales markets. All these actions are subscribing to the principles of Health, Ecology, Fairness, and Care which are the roots from which organic agriculture grows and develops. They express the contribution that organic agriculture can make to the world, and a vision to improve all agriculture in a global context. (IFOAM Organics International, 2020)

Obtaining the appropriate level of stakeholder involvement in identifying research priorities remains an important challenge in setting up organic research programs funded by public, national or European funds. For this desiderate it is useful to involve the actors (producers, researchers and consumers) from this field in the mechanism of entrepreneurial discovery from which to result the specific fields of smart specialization in order to bring significant added value for the economy.

Regarding the involvement of farmers, the knowledge in European modernization association projects in organic research has been very beneficial, as the requirements of farmers are at the heart of them. The involvement of the end user (farmers) is crucial, but researchers and technicians also have their own valid worries and beliefs regarding research priorities, as do consumers and environmental NGOs. Politicians could address the increasing farm output or other problems in agriculture, e.g. using new and/or improved technologies, digitalization, the employment issue.

In addition, international research cooperation remains a challenge, although it is not specific to funded organic research, as well as the more economic and social visible features of organic farming (especially speaking of markets and policies). This has undeniable value for educating advocacy and bureaucratic activities, but is of insufficient use to organic farmers. It appears to be significant difficult to design such parallel studies to the point where there will be important information about organic farming in each country, for both farmers and researchers, as parallels are of significant relevance only if they are built on pragmatic crop rotations and if farmers would use frequently common organic procedures. For instance, it would be beneficial to have at country level, a strategic promotion and clear action plans to raise awareness of the importance of introducing research results into production.

Strengthening the effective implementation of research knowledge, especially in terms of production methods, would increase the efficiency of research results and improve the performance of the sector. Certain measures should be encouraged to use existing knowledge, gained through research and practice, to test potential solutions and put them into practice. For e.g. the entrepreneurial discovery process can begin in the universities with agricultural profile.

In order to have results materialized in technological transfer with economic impact, for study and modernization in the field of organic farming, the presence of multi-stakeholder, multidisciplinary consortia necessary to ensure the efficient dissemination of research, in conditions of adequate funding. Transparent and participatory processes will allow the scientists and all actors interested to reflect their values and needs and will influence the actions of the political decision makers.

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Appendix A2. Definitions of key terms

DARCOF - the Danish Agriculture Research Center for Organic Farming.

EIP - the European Innovation Partnership on Agricultural Productivity and Sustainability.

ERA-Net CORE Organic - Coordination of European Transnational Research in Organic Food and Farming Systems.

ETP - the European Commission as a European Technology Platform.

FACCE-JPI - Joint Programming Initiative for Agriculture, Food Security and Climate Change.

ICROFS – the International Center for Research in Organic Food Systems, Denmark.

GrOV - Productivity and Growth in Organic Value Chains, a global research project.

HORIZON 2020 - The EU Research and Innovation Framework Program.

International Federation of Organic Agriculture Movements (IFOAM) – IFOAM's mission is to lead, unite, and assist the organic movement in its full diversity. The goal of IFOAM is the worldwide adoption of ecologically, socially, and economically sound systems that are based on the principles of organic agriculture.

ÖMKi - Hungarian Research Institute of Organic Agriculture - Ökológiai Mezőgazdasági Kutatóintézet.

theThünen Institute - the Federal Research Institute for Rural Areas, Forestry and Fisheries, Germany.

TP Organics - the European Technology Platform for Organic Food and Agriculture at EU level.

SWOT Analysis - is a strategic planning technique used to help a person or organization identify strengths, weaknesses, opportunities, and threats related to business competition or project planning.

TIPI - The Technology Innovation Platform of IFOAM (TIPI) is a research action network of the International Federation of Organic Agriculture Movements (IFOAM).

Ch.2

THE RESEARCH'S BENEFITS OF THE GROWTH OF ORGANIC FARMING IN EUROPE

Research and innovation in the organic sector are considered essential in order to develop production systems

OBJECTIVES:

- Students will be informed about the state of research regarding organic agriculture domain.
- Students will find out which are the main institutional actors with a significant role in guiding research in organic agriculture domain.
- Students will understand how to fund organic research through national or community programs.

SKILLS:

- Analysis of different perspectives;
- Question the relevance of arguments;
- Information management.

QUESTION 1 (PLEASE CHECK THE CORRECT ANSWER)

What are the strategic approaches that could push the development of research and innovation in organic agriculture identified by TIPI?

- 1. Increasing methods appropriate to organic farming systems and practices;
  2. Permanent collaboration between farmers, agricultural consultants, researchers, consumers;
  3. Integrating the social, technological, environmental aspects of innovation.
- 1. Permanent partnership between farmers, agricultural consultants, researchers and consumers;
  2. Integrating the technological, social and environmental dimensions of innovation.
- 1. The need for mixed, multidisciplinary research teams in the field of organic agriculture;
  2. Permanent partnership between farmers, agricultural consultants, researchers and consumers.
- 1. Integrating the technological, social and environmental dimensions of innovation.
  2. Development of methods appropriate to the systems and practices of organic farming.

QUESTION 2 (PLEASE CHECK THE CORRECT ANSWER)

What role plays the TP Organics platform at EU level?

- It sets the agenda for organic research by supporting an assumed process involving the various stakeholders of the organic movement.
- Funds research in the organic farming sector.
- Carries out collaboration between interdisciplinary research groups from various institutions and universities.

- Ensures the distribution of organic issues.

QUESTION 3 (PLEASE CHECK THE CORRECT ANSWER)

What is the largest publicly available organic research database in open format?

- www.orgprints.org.
- www.catalyze-group.com.
- www.ifoam.bio.
- www.ec.europa.eu.

QUESTION 4 (PLEASE CHECK THE CORRECT ANSWER)

The regulations of the Horizon 2020 Program clearly provides that:

- Organic farming should get resources from the program.
- Dissemination of information at national and international level on organic farming.
- Organic extension services should be provided entirely by the private sector.
- Existence of an effective mechanism for coordinating organic research.

QUESTION 5 (PLEASE WRITE THE CORRECT ANSWER WITHIN THE BOX)

Which two levels the EU uses for funding organic research?

PRACTICAL APPLICATION OF THE PREVIOUS CHAPTER. PLEASE DEBATE WITH YOUR PEERS THE MEANING OF FIGURES 2.1 AND 2.2.

3. Concept and State of Producer Organizations Development in European Organic Farming

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Abstract: The "European Green Deal" as a new set of European Commission's policy initiatives, and the "Farm to Fork Strategy" within this policy, emphasize the importance of sustainable development, circular and resource-efficient economy. "Farm to Fork Strategy" promotes further development of organic agriculture and also contains proposals to improve farmers' market position in the food value chain. One of the best ways to improve the market position of farmers is the farmers' associations, primarily producer organizations. The organic farming is one of the rare sectors where small-scale production is not an obstacle to competitiveness and where the increase in assets and funds (consolidation) is not an imperative for market success, so producer organizations represent an ideal type of cooperation, contributing to strengthening farmers' market position in the organic food supply chain. The authors analyze the concept of producer organizations and the state of their development in the European organic farming sector, to point out the possibilities of further development of organic production together with improving the market position of farmers in this production.

Keywords: organic farming, producer organizations, market access, food supply chain, bargaining power.

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1. Introduction

The role of agriculture in the developed economies of the world has changed significantly in the last few decades and is moving in the direction of sustainability, "Green Deal", multifunctionality and diversification of activities on farms. In such circumstances, organic agriculture, as a system that is sustainable in environmental, economic and social terms, plays an important role.

Based on the principles of sustainability and developed towards multifunctionality, organic farming is aimed at producing quality and safe food for the population, while contributing to the preservation of natural resources, animal welfare, overall rural development and preservation of cultural, historical and landscape identity. This method of farming provides the possibilities of employment and income growth, while the associations of organic producers offer numerous benefits for the regional economy (Offermann & Nieberg 2000; Pugliese 2001; Finley et al. 2017; Qiao et al. 2018). The results of a study that included seven-year-long research and monitoring of small-scale households dealing with organic farming in the mountainous areas in Jiangxi Province, China, show that organic farming contributed to higher incomes of small-scale and medium-scale households in comparison to those practicing conventional farming (Qiao et al. 2018). Also, organic farmers which were members of cooperatives performed better economically than those who operated individually (Qiao et al. 2018).

The "Farm to Fork Strategy" 2020 is an integral part of the new EU development strategy for the 21st century – "The European Green Deal" 2019 (European Commission 2019). This strategy emphasizes, inter alia, the importance of the use of sustainable practices, such as organic farming and ways in which the European Commission will act to "help farmers and fishers to strengthen their position in the supply chain and to capture a fair share of the added value of sustainable production" (European Commission 2020, p. 10).

A significant existing instrument of improving the market position of farmers in the agricultural and food supply chain, within the EU policy of the rural development is producer organizations (abbr. POs), which "help farmers to face together the challenges posed by increased competition and consolidation of downstream markets concerning the marketing of their products including in local markets" (Regulation (EU) No 1305/2013). Recognized POs contribute to a range of benefits for agricultural producers. They strengthen farmers' position in the food supply chain by ensuring better market access and greater bargaining power in regard to their business partners, for example by defining the different conditions of purchase contracts (Amat et al. 2019). POs also can ensure technical assistance to production (e.g. supporting producers participating in various production or product certification schemes); infrastructure for production, storage or processing plants (e.g. joint procurement or use of equipment, facilities); research and development activities, and all of these activities can decrease production and transaction costs (Amat et al. 2019).

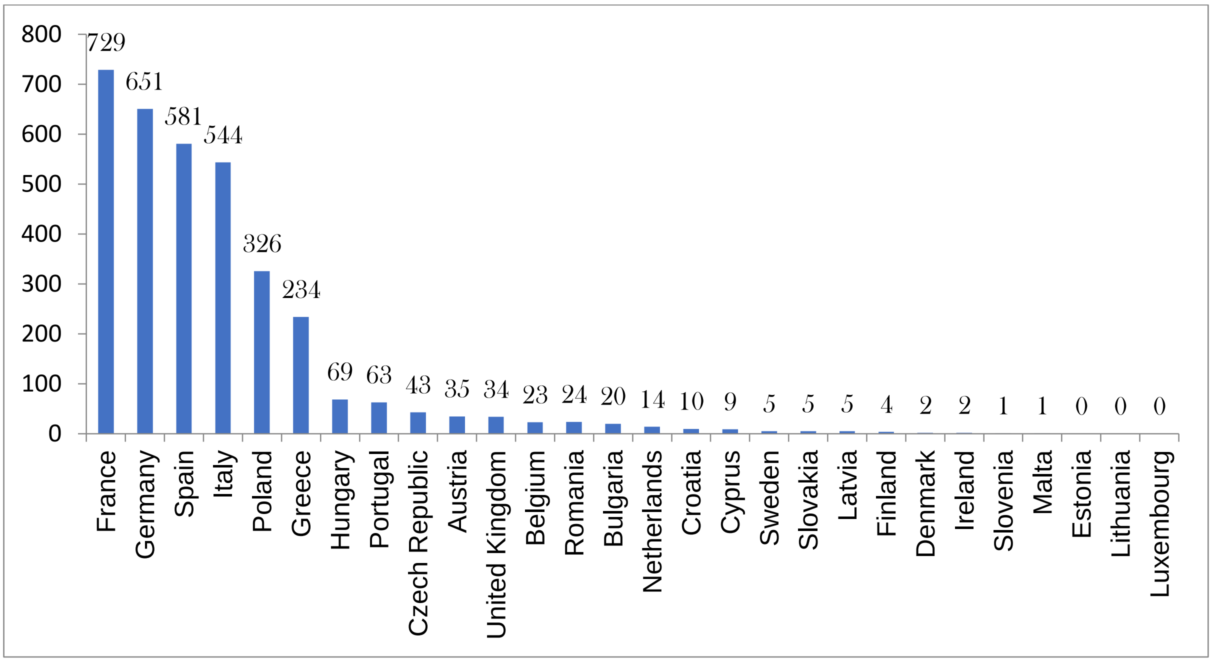
The growing importance of POs is a response of small-scale and medium-scale farmers to numerous market factors that harm their competitive position and decrease their income and market power, such as:

- Processes of globalization and liberalization of the agricultural products market;
- Imbalance of economic powers of market participants between numerous small-scale agricultural producers who offer goods, and few economically strong and concentrated participants who demand goods (retailers, hypermarkets, processors, exporters);
- Consolidation of agricultural production (enlargement processes);
- The inefficient policy of competition protection (unfair competition, dishonest practices of buyers, unfavorable conditions of purchase contracts for farmers);
- The unstable market of agricultural products (in terms of prices, quantities and alike);
- Difficulties in placing small quantities of products on the local market, and especially on the global agricultural market.

According to the Directorate-General for Agriculture and Rural Development database of recognized POs in EU countries (DG AGRI 2019), in the middle of 2017, in the EU countries there were 3,505 recognized POs and recognized associations of POs. Split by sectors: 1,851 are in the sector of fruit and vegetables (52.8%); 334 are in the dairy sector (9.5%), and 1,320 (37.7%) in all other sectors (except the fruit and vegetables and dairy sector).

The state of POs' development differs significantly in the EU countries. The largest number and higher state of POs' development are in five so-called "old" EU countries (France, Germany, Spain, Italy, and Greece), and only in one post-communist country, Poland (Figure 3.1; Amat et al. 2019).

Figure 3.1. Recognized POs by EU countries, number, 2017



Source: Authors' calculation and presentation based on *Inventory of recognized producer organizations in the EU's agricultural sector* (DG AGRI, 2019). Situation at 01 July 2017. European Union Open Data Portal. Available from: http://doi.org/10.2906/097103114105/1.

On the other hand, POs are still not significant in many post-communist countries, which later became EU members and Western Balkan countries. In the countries which later became members of the EU (post-communist countries), a larger number of POs were initially recognized at the national level and they have used support funds from the national budget and also from the European Agricultural Fund for Rural Development. However, today several of these POs are active. They don't meet the recognition requirements and don't provide support to farmers to strengthen their market and competitive power. Therefore, it can be concluded that most of these POs were established only to facilitate funds collection (Alboiu 2015; Kotyza, Tomsik, Elisova & Hornowski 2018; Michalek, Ciaian & Pokrivcak 2018; Privredni Vjesnik 2019; Ramanauskas, Žukovskis & Zinovchuk 2017; Van Herck 2014). Besides, farmers themselves are not interested in these forms of associations. For example, farmers in the Romanian fruits and vegetables sector estimate that the benefits of operating outside POs (selling in local markets and avoiding paying taxes while operating in grey economy) are greater than the benefits offered by POs – which include introducing producers to large retail chains and additional charges such as taxes and other costs of working within a legal framework (Alboiu 2015). Since they are not EU members, Western Balkan countries (Bosnia and Herzegovina, Serbia, Montenegro, North Macedonia, Albania, and UNMIK Kosovo) are not obliged to set up and recognize POs, and these are not legally regulated within the organization of agricultural markets. In these countries, there is only the "declared commitment to associating, while in practice, maintaining the status quo" (Živkov 2013, p. 31). Existing farmers' associations are numerous, but they are overburdened by numerous inherited and current problems, which is why these associations provide little or no benefit to farmers (Paraušić & Cvijanović 2014; Paraušić 2018; Živkov 2013).

Organic farming is suitable for small-scale production and it is a rare type of production where small-scale production is not an obstacle to competitiveness and where the increase in assets and funds (enlargement and consolidation) is not an imperative for market success. On the other hand, organic farmers face constant challenges regarding the renewal and costs of organic farming certification, efficient access to the input and sales market, and creation of new placement and marketing channels for organic products. Therefore, POs represent an ideal form of associating and joint activities of producers in organic farming, as well as in the other types of farming directed at improving and protecting the natural environment.

These organizations are important mechanisms of strengthening the organic farmers' market position, and their economic power and negotiating position. Compared to the individual organization of production, the POs provide farmers with more efficient access to the output and input markets, better and easier cooperation with certification bodies and all downstream operators, transactional costs reduction, as well as an easier transfer of new knowledge, information, skills, and farming methods (Cherukuri & Reddy 2014; Edwardson & Santacoloma 2013; Manaswi et al. 2020; Pellegrini, Faccilongo & Camposeo 2015). Additionally, these forms of organic producers' organizations are particularly useful when it is necessary to ensure the greater influence of organic producers on the processes of creating public policies, and when it is necessary to provide larger quantities of organic goods for placement on the domestic or export markets.

The new EU development strategy (directed towards the EU's sustainable economy), the significant role that recognized POs have for their members (farmers) and other participants in the food value chain, as well as available EU financial support for the establishment and operation of POs, have motivated authors to analyze the concept of POs and the state of their development in the European organic farming sector. The main goal of this analysis is that the academic and professional public, as well as business and policymakers, acquire knowledge, so that in the coming period activities can be undertaken (political, business, academic) for further development of organic farming, while promoting the greater role of POs, and improving the market position of farmers in the organic food supply chain.

2. Methodological approach and data sources

For this research, authors used desk method of research and secondary data. The obtained data were summarized and presented in the form of graphs and tables using descriptive statistics.

The use of secondary information is often referred to as secondary analysis (or desk research). Secondary analysis is simply a collecting and further analysis of the information that has already been obtained (secondary data). This research helps define the agenda for subsequent primary research by suggesting which questions require answers that have not been obtained in previous research (Stewart & Kamins 1993). Secondary data are data which can be collected without fieldwork. They come in many forms, ranging from large statistical offices and studies published by the government to the different observations of scientists, experts, etc. (Stewart & Kamins 1993). Descriptive statistics is a field of statistics in which data are only used for descriptive purposes and include methods and procedures for presenting and summarizing data, like tables and graphs, and also the computation of measures of central tendency and variability (Stewart & Kamins 1993).

The sources of secondary data involved in the analysis were: (a) relevant literature of domestic and foreign authors in the analyzed field; (b) studies and research of international organizations and institutions (World Bank, FAO), as well as the studies realized by independent experts for the needs of Directorate-General for Agriculture and Rural Development; (c) "Inventory of recognized producer organizations in the EU's agricultural sector", July 2017 (DG AGRI 2019); (d) analysis of the appropriate European Commission regulations in the field of recognizing and supporting POs; (e) the Internet sources, including the official website of the European Union and websites of chosen POs.

Searching the "Inventory of recognized producer organizations in the EU's agricultural sector" (DG AGRI 2019) was done considering the POs' names and by using the keyword "organic". Also, authors supplemented searching POs' titles by using the words "green", "ecology" and "sustainable", for the purpose of more comprehensive research. Also, by reviewing the websites of all selected POs authors analyzed their operations, objectives, and etc.

3. Concept of POs

In the EU countries, the concept of POs dates from the 1970s, when the European Commission realized the importance of farmers' associations in the fruit and vegetable sector for the organization of markets for these products. Initially, they represented the instrument of pillar 1 of the EU's common agricultural policy (abbr. CAP): "Common Organization of the Markets in Agricultural Products" (abbr. CMO). Following numerous reforms of the CAP and CMO, POs today represent the instrument of market measures, i.e., the organization of agricultural products markets in all agricultural sectors, as well as the instrument of improving farmers' competitiveness in the EU's rural development policy (Regulation (EU) No 1305/2013; Regulation (EU) No 1308/2013).

3.1. Definitions of POs

The following definitions of the POs are most common in the literature:

- *"POs can be defined as any type of entity that has been formed on the initiative of producers in a specific sector (horizontal cooperation) to pursue one or more of the specific aims listed in the CMO Regulation, whether or not it is formally recognized; POs are controlled by producers and can include cooperatives, different forms of associations, and private companies in which farmers are shareholders"* (DG AGRI 2018, p. 17);
- *"POs are structures for mediation between rural producers and others who act in their economic, institutional, and political environment"* (World Bank 2001, p. 2);
- Stichting Nederlandse Vrijwilligers as a non-profit international development organisation defines POs as *"formal rural organizations whose members are smallholder farmers who organize themselves with the objective of improving farm income through improved production, marketing, and local processing activities"* (Stichting Nederlandse Vrijwilligers 2016, p. 14).

For the needs of this chapter, the authors define POs as sector associations initiated and controlled by farmers, with the basic aim to advocate for the economic interests of their members and define contractual relationships between farmers and buyers of their products in the agricultural products market. Recognized POs are defined as the POs fulfilling the requirements for recognition defined by the national legislation of the country in which they are based.

3.2. Characteristics of the POs

The following list represents the basic characteristics of all POs, both formally recognized and non-recognized at the national level, regardless of the production sector in which they are formed (Amat et al. 2019; Bijman 2007; DG AGRI 2018; La Sala & Perri 2015; Penrose-Buckley 2007; Regulation (EU) No 1308/2013; Regulation (EU) No 1305/2013):

- They are established on the initiative of farmers ("bottom-up approach") in rural areas, owned by farmers and controlled by farmers who democratically manage them;
- They are created per product sector and are related to specialized production;
- They are economic or commercial organizations (businesses) oriented towards their members, realizing the following joint activities: transport, packaging, product marking, market placement, joint use of facilities and equipment etc.;
- The basic objectives of POs are strengthening farmers' income growth and reinforcing their market and competitive position in the food supply chain; production planning and adjustment supply to the market requirements; concentration of supply; placing of products on the market; optimization of production costs and improvement of product quality.
- The most significant activities of POs are: planning the market surplus (the amount of goods for placement); planning of products quality; contractual negotiations (defining the elements and contents of sales contracts between farmers and buyers); organization of quality control and commercialization strategies.
- They must have the status of a legal entity but can take various legal forms, including cooperatives, associations, or private companies in which agricultural producers are shareholders. Depending on the country, they can be cooperatives (the most frequent type of POs in the EU countries), association or private companies in which agricultural producers are shareholders. Generally speaking, cooperatives and associations are the most efficient methods of organizing farmers and their collaboration regarding input procurement, selling final products, investment, market orientation, marketing etc.;
- They are not companies oriented towards investment and profit, nor small family companies;
- To be recognized at national level by the relevant ministry, they have to fulfil the requirements and criteria for recognition defined by the country they operate in, such as the minimum number of members and/or minimum value or quantity of the products placed on the market by the PO's members, and other conditions set by law.

3.3 Role of POs in the agricultural and rural sector

According to CMO regulation, *"producer organizations and their associations can play useful roles in concentrating supply, in improving the marketing, planning and adjusting of production to demand, optimizing production costs and stabilizing producer prices, carrying out research, promoting best practices and providing technical assistance, managing by-products and risk management tools available to their members, thereby contributing to strengthening the position of producers in the food chain"*(Regulation (EU) No 1308/2013, p. 682).

The EU Regulation on the support of rural development underlines that POs should be supported primarily because they *"help farmers to face together the challenges posed by increased competition and consolidation of downstream markets in relation to the marketing of their products including in local markets"* (Regulation (EU) No 1305/2013, p. 491). The Regulation also underlines the role of POs in the realization of the third EU priority in the field of rural development which states: *"the improving competitiveness of primary producers by better integrating them into the agri-food chain through quality schemes, adding value to agricultural products, promotion in local markets and short* *supply circuits, producer groups and organizations and inter-branch organizations"* (Regulation (EU) No 1305/2013, p. 500).

The following is an overview of the roles of POs as seen by different institutions or by independent experts:

- According to the research conducted by independent experts for the needs of the Directorate-General for Agriculture and Rural Development, the greater bargaining power of farmers who act through POs is often seen in more favorable conditions and provisions of sales contracts (higher selling price, long-term contracts, regular orders, etc.) in comparison to the contracts made by individual farmers, i.e., farmers operating outside POs (Amat et al. 2019);
- FAO defines the role of POs as a struggle of small-scale and marginalized farmers for fairer market conditions (easier market access, a greater role in defining conditions of sales contracts, payment conditions and prices), but also for greater participation of farmers in defining the measures of agricultural and rural policies, and building working partnerships between the governments (national, regional) and POs (FAO 2010);
- POs can assume the function of representing farmers' interests in negotiating process with the private sector and governments, and function of economic and technical support (supporting producers in production, financing, accessing credits, placement, marketing, providing the information), and they can also enhance local development and village life (World Bank 2001).

On the other hand, some authors critically analyze the roles of POs and point out the problems that POs face in practice. For example, La Sala & Perri (2015) and Lamonaca, Scarinci & Silvestri (2015) state that the rate of farmers belonging to some of the recognized POs in the EU countries is low in comparison to the total number of farmers, they often exist only formally (just in an administrative way), and joint activities and cooperation are minimal (commercial activities are undertaken only by a few producers based on individual initiatives).

Retailers and processors (manufacturers) have numerous benefits from cooperating with POs (reduction of transactional costs, price stability, easier planning of production and stock, raw products quality, etc.), but they sometimes perceive POs as a threat to their bargaining power and prefer making contracts with individual farmers (Amat et al. 2019).

Also, Eastham (2014, p. 50) states that due to frequently antagonistic market conditions and "highly concentrated and consolidated downstream buyers", POs do not always ensure positive effects for farmers and the measures for preventing "side-selling in POs can deflate farm incomes and result in negative yardstick effects".

4. European legal and regulatory framework of the POs

POs are regulated by the EU legislation and national legislation of each member state. The EU legislation in the field of POs recognition and operation includes:

- General exemptions from the EU competition rules for the agricultural sector by the "Treaty on the functioning of the European Union" (Official Journal of the European Union 2012). Although competition rules prohibit cooperation, the Article 42 of the "Treaty on the Functioning of the European Union" allows legislators to limit the application of competition rules in the agricultural sector and the field of farmers' cooperation;
- The current CMO Regulation (Regulation (EU) 1308/2013; Regulation (EU) 2017/2393) details the derogations from competition rules in the agricultural sector. The certain EU competition rules do not apply to some activities of farmers and their

recognized POs, such as planning production; offer concentration; cooperation of farmers in the processes of input procurement, processing, selling, marketing; negotiating supply contracts; conclusion of the certain agreements on production or sale of agricultural products (Articles 152 and 209). CMO regulation defines the recognition criteria, goals of the POs, mandatory elements of the statute, and additional rules for specific product sectors;

- Additional EC regulations for POs in several agricultural products sectors, like fruit and vegetables, milk and dairy products, etc.

According to the CMO regulation, the EU countries may recognize POs at their request, and in the several sectors recognition of POs by the Member States is mandatory (Regulation (EU) No 1308/2013, Articles 161 (1) & 159 (a)):

1. milk and dairy products,
2. fruit and vegetables,
3. olive oil and table olives,
4. silkworm and
5. hops sector.

The mentioned regulation states the following requirements for the recognition of POs (Regulation (EU) No 1308/2013, Articles 152 & 154): *„The Member States may, on request, recognize producer organizations, which are constituted, and controlled by producers in a specific sector; are formed on the initiative of the producers; has a minimum number of members and/or covers a minimum volume or value of marketable production, to be laid down by the Member State concerned, in the area where it operates; and pursue a specific aim which may include at least one of the following objectives...".*

CMO Regulation specifies a total of 11 POs' objectives, like (Regulation (EU) No 1308/2013, Article 152):

- *„ensuring that production is planned and adjusted to demand, particularly in terms of quality and quantity;*
- *the concentration of supply and the placing on the market of the products produced by its members, including through direct marketing;*
- *optimizing production costs and returns on investments in response to environmental and animal welfare standards, and stabilizing producer prices;*
- *carrying out research and developing initiatives on sustainable production methods, innovative practices, economic competitiveness and market developments;*
- *promoting, and providing technical assistance for the use of environmentally sound cultivation practices and production techniques, and sound animal welfare practices and techniques;*
- *contributing to the sustainable use of natural resources and climate change mitigation and*
- *developing initiatives in the area of promotion and marketing".*

The CMO Regulation also defines (Regulation (EU) No 1308/2013):

- What the PO's Statute requires from its members (Article 153). The members shall: apply all the rules adopted by the PO regarding production, placement, and environmental protection; be members of only one organization for one individual product; contribute financially to the operation of the organization, make decisions and monitor the PO operation democratically;
- In the part of the "Extension of rules", Article 164 envisages that in the cases when a recognized PO is considered to be a representative of the product sector within which it is registered, the EU Member State concerned may, at the request of that PO,

make some of the agreements, decisions or practices agreed within that PO binding on other participants, whether they belong to the PO or not, for a limited period.

In general, recognized POs differ from agricultural cooperatives and other forms of farmers' associations and organizations regarding the business criteria (imposed on them by the EU and the national legislation), which POs must meet to be nationally recognized as partners of the relevant ministry and downstream actors (wholesalers and processors). By fulfilling the legally defined criteria (in terms of goals and manner of work, statute, business plan, number of members, size of turnover that members achieve together, etc.), they gain legitimate roles in regulating the market of agricultural products in those product sectors in which they are formed.

Reasons for seeking recognition as POs are mostly: access to EU funding (rural development, operational programmes); visibility and reputation vis-à-vis other market operators and legal certainty and exemption from certain EU competition rules (Amat et al 2019).

5. European organic farming sector and state of POs' development in the organic sector

5.1. European organic farming: general overview

Agriculture, as a dominant activity in rural areas, strongly influences the management of natural resources and the creation of a basis for economic diversification and social development of rural areas. The development of organic agriculture in the EU countries, as a system that is sustainable in environmental, economic and social terms, is a consequence of the transformation of economic and social policy, and above all agricultural policy in the direction of sustainability and higher protection of natural resources.

The number of agricultural producers in organic farming in the EU-28 in 2016 was 295,577, which is 15% more than in 2013 (Eurostat, 2020), and research shows that it is one of the fastest-growing agricultural sectors in the world, especially in the European Union (Jezierska-Thöle et al. 2017).

As a key component of the „Farm to Fork Strategy" 2020, this type of farming contributes to designing a "fair, healthy and environmentally-friendly food system" (European Commission 2020). The transition to sustainable food production has begun, but much remains to be done in this segment, bearing in mind that food production consumes significant natural resources, causing great pollution of land, water and air, thus contributing to the loss of diversity and climate change. To protect the environment and preserve biodiversity, the Commission will assess and support strategic plans precisely in relation to climate and environmental criteria. These plans should lead to the use of sustainable practices, such as „precision agriculture, organic farming, agroecology, agro-forestry and stricter animal welfare standards" (European Commission 2019, p.12).

Organic farming is an integrated, environmentally sound, safe and economically sustainable agricultural production system, with a high contribution to the overall sustainable rural development (Roljević Nikolić & Paraušić 2020). This is a system that uses environmentally friendly production methods, and shall be based on the following principles, inter alia: *"the appropriate design and management of biological processes based on ecological systems using natural resources; the restriction of the use of external inputs; or limitation of the use of chemically synthesized inputs"* (Council Regulation (EC) No 834/2007). Such method of farming plays a dual societal role – *"on the one hand it provides for a specific market responding to consumer demand for* *organic products, while on the other hand, it delivers public goods contributing to the environmental protection and animal welfare, as well as to the rural development"* (Council Regulation (EC) No 834/2007).

The development of the organic products market is part of a complex phenomenon of ecological consumption and strengthens the development of a new paradigm called "green marketing" (Bryla 2016), and the study of causes and motives for using organic products has become an important field of marketing research. In this context, consumer personal values and health reasons are recognized as important factors influencing the choice of food of organic origin (Honkanen et al. 2006). However, financial performance has also been seen as an important factor in the growth of the organic sector in recent years. Namely, in addition to the fact that organic products achieve higher prices on the market, the strong growth of the sector is also encouraged by the financial support that a large number of countries provide to organic producers (Roljević Nikolić et al. 2017).

5.2. Role and state of the PO's development in the organic farming sector

There are numerous studies in the literature that prove the positive role of POs in the sector of organic production and the so-called "green" agriculture, which also contributes to the improvement and quality of the environment and below are some of them:

- POs provide numerous benefits for organic producers regarding better commercialization of products; technical, counselling and logistical assistance, and improvement of the supply chain of organic products (Edwardson & Santacoloma 2013);
- The case study of Aproli, an organization of olive oil producers (Italy), points to the importance of POs in achieving goals that contribute to environmental sustainability, but also goals related to economic sustainability, through optimizing production costs, improving the product and process quality and similar (Pellegrini, Faccilongo & Camposeo 2015);
- A study on the operation of the three largest POs in the milk sector in the Czech Republic (Bošková, Ahado & Ratinger 2020) indicates that farmers have economic benefits from their membership in POs and that they are satisfied with POs' operation. While the greater negotiating power in determining the milk price and safe sales market is what farmers mainly demand from analyzed POs, PO managers have a more long-term perspective and focus on the activities related to consumer health and environmental protection, or vertical collaboration of members in the product value chain.
- The research on the role of POs in organic farming in India shows that producers involved in the production through POs realize a higher gross rate of return and higher incomes than those who are not members of POs. The key roles of POs for members are decreasing transactional costs due to the lowered number of intermediaries in trade, better market access, better structure of the final price of the agricultural product for farmers, offering technical and counselling assistance to members, etc. (Cherukuri & Reddy 2014; Manaswi et al. 2020).

On the other hand, the contribution of POs in the segment of organic certification (renewal of certificates or reduction of certification costs), although important, has remained unclear and insufficiently explored. This is because in practice the organic certification costs are often insufficiently transparent. The research conducted by Kuit & Waarts (2014) in the field of costs and benefits of various certification schemes (including organic certification) shows that data on certification costs for small-scale farmers and certificate-holders are mainly unavailable, unreliable and incomplete for various reasons: (a) these are donor-funded projects, which makes data insufficiently transparent; (b) companies which are certificate-holders are unwilling to share these data and keep them as a business secret; (c) calculations are often based on numerous hypotheses, etc.

The following is an overview of the development of POs in the sector of organic farming in European countries. Before that, it is important to point out that the development of these organizations in the organic sector differs by country, primarily given the different economic, production, social, historical, nature and other conditions for the development of organic production, as well as differences in the degree of social capital development. The research on organic farming that was conducted by the group of authors (Michelsen et al. 2001) in 6 European countries (Austria, Belgium, Denmark, United Kingdom, Greece and Italy), which differ significantly regarding business and institutional elements of organic production development, showed basic differences in terms of the development of farmers' associations in this farming method (Table 3.1).

Table 3.1. Features of organic farming associations in the selected countries

Countries	Features of organic farming organisations
Austria	The largest and one of the oldest organic farming sectors. Due to the division of umbrella organizations, lack of good collaboration and lack of clearly defined competencies, the organic farming sector is characterized by inner disagreements and lack of joint initiatives, which is reflected in the development policy of this sector at the national level.
Belgium	Two organic POs operate in two different regions. They cooperate and provide counselling services to farmers, monitor and control their production, promote the change to organic farming and offer all required information to farmers.
Denmark	Two main umbrella associations are “Organic Service Centre” and “The Danish Association for Organic Farming”. They encompass numerous organizations of organic producers of milk, meat, egg and poultry, fruit and vegetables, plant products. They have a good collaboration and provide farmers with technical support, information, assistance in marketing and placement and generally advocate for the interests of organic farmers.
Greece	The smallest and youngest sector of organic farming. The sector is characterized by a weak association and organization of farmers. There are dozens of local organizations of organic farmers which account for about 10-15% of the total number of organic farmers. However, these associations are not regarded as professional ones.
Italy	The field of POs in organic farming is undeveloped, which is unfavorable for farmers dealing with organic production. A large number of organic farmers’ associations are transformed into certification bodies, while the interests of these associations differ significantly. The certification bodies are more interested in the growth of the areas under the certified organic farming, while organic farmers are more interested in the support in placing and marketing of their products, lobbying with regional and national authorities, etc.
United Kingdom	“The Soil Association” represents a significant association in the organic farming sector, which is widely represented in all phases of organic production and consumption. It is led by the certification department “SACert”. Simultaneously, another 5 associations operate in this sector, all of them being active in certification and much less in the process of lobbying and advocating for farmers’ interests.

Source: Authors based on Michelsen et al. 2001.

To analyze the number of POs in the sector of organic farming the authors used “Inventory of recognized producer organizations in the EU's agricultural sector” (situation as of 01 July 2017), as a database of the number and name of recognized producer organizations (POs) and recognized associations of producer organizations in the agricultural sector in the EU (DG AGRI 2019).

Searching the database by using the keyword "organic", authors have found only three POs with the word "organic" in their titles, and the basic information about these organizations is available to the public through their websites:

- "South Devon Organic"; the United Kingdom, sector of vegetables. It's a recognized producer organization with the Rural Payments Agency on the Fruit and Vegetable Scheme which provides different services for its 13 growing farmer members, such as "marketing of organic vegetables; specialist machinery and specialist operators; a pool of experienced field staff; administration center; access to grants through working together; technical support for growers; crop walking";
- "Italian organic vegetables" (Italy), sector of vegetables. Storage, handling and preserving of raw materials are within the members' competence, and packaging and delivering of organic vegetables are labelled according to EU normative;
- Bulgarian Organic Foods Ltd", Bulgaria, is the largest organization of producers of organic honey and bee products in Bulgaria, recognized by the Ministry of Agriculture. The organization covers 27 bee farms, with more than 5,000 organically certified hives, with the main purpose of promoting and marketing of organic honey and development of organic beekeeping, as well as supporting members at all stages of the production and sale of final products.

Given the existence of only three POs in organic sector, research are expanded and supplemented searching the database by using the keywords "green", "ecology" and "sustainable", in order to investigate existence of POs in the agricultural sectors, which as well as organic are close to the principles of environmental protection and production of quality and safe food. Authors have found 17 POs with the word "green" in their titles. All of them are in the sector of fruit and vegetables, except two, which are in the sector of olive oil and table olives and sector of cereals. The following is an overview of these POs:

- Green Diamond (Belgium);
- Green farm (Belgium);
- New Green (Belgium),
- Gaza Nord Green (Denmark);
- Green Correspondence Farm and Fruit Producer co-operation (Hungary);
- Quality Green Producer Organisation Ltd (Ireland);
- South Green Economic Society (Sweden);
- Grupa Producentów Green Sad (Poland);
- Green Union (Poland);
- Green grow (Poland);
- Greenshoots Ltd (United Kingdom);
- GreenCoop družstvo (Slovakia);
- GREENMED (Spain);
- The Green Pea Company Ltd (United Kingdom);
- KIWI GREEN SUN (Portugal);
- Creta Green Agrofarm Ike (Greece), sector of olive oil and table olives;
- Alia Greene Group Ltd. (Bulgaria), sector of cereals.

All shown POs grow crops strictly taking into account high quality and food safety standards, using the organic farming method (for 3 POs in the organic sector) or applying the principle of integrated production or production certified according to GlobalGap standard (for those POs that contain the word "green" in their titles). Producers, i.e., their POs, take into account the use of resources in agricultural production, in a way that chemical means of protection are increasingly replaced by biological protection, and often with the use of renewable energy sources and innovations. This ensures the protection and improvement of the quality of land, water and biodiversity on member farms, and food is produced in compliance with high standards of quality and safety.

By analyzing the websites of POs, the authors note that almost all POs have the same objectives: protection of farmers' interests in the market and their empowerment, primarily in the segment of sales of final products. By concentrating the supply of member products, pooling the strengths and resources of individual producers, these organizations succeed in providing members with the security of placement, optimal farm gate prices, adding value through joint processing or packaging of products.

It can be concluded that in the EU's organic farming sector there are only three recognized POs (two in the fruit and vegetable sector, and one in the honey and bee products sector). In the sector of "green" agriculture (Integrated Farming or GlobalGap certified farming), which also aims at greater sustainability of agriculture, there are 17 POs (15 of them are in the fruit and vegetable sector), and this number is certainly higher, bearing in mind that this sector probably also includes organizations that do not contain the word "green" in their name. Such a few recognized POs means that farmers do not take full advantage of these type of organizations either the national nor EU funds available for financing the setting-up of POs and their operation.

5.3. Support for setting-up and operation of POs in organic farming from the EU funds

The EU fruit and vegetable regime support POs with funding contributions for the implementation of operational programmes. Within the CMO Regulation (Regulation (EU) No 1308/2013, Articles 32-35), POs in the organic fruit and vegetable sector can benefit from the EU funding for "operational programmes" by, for example, securing support for collective financing of logistics. According to the Article 34, the EU's financial assistance for operational programmes is limited to "50% of the actual expenditure incurred or 4.1% of the value of the marketed production of each PO or their association". At the request of the PO, this amount can be increased to 60% for the operational programme or part of the operational programme if it includes "solely specific support for the production of organic products". If a PO wants to include organic farming in its operational programme it is required to provide a detailed production description and cost estimation, and the EU support will cover the difference between the costs incurred in organic and conventional production.

Also, POs in organic farming or those POs that operate on the principles of integrated production or GlobalGap certified farming, may use the EU support funds from the European agricultural fund for rural development, for the setting-up POs, as well as all other POs (regardless of the sectors in which they operate). Within the rural development policy of the EU (Regulation (EU) No 1305/2013, Article 27, p. 511), measure "Setting-up producer groups and organizations" is available for facilitating the foundation of recognized POs for the needs of:

- *"Adapting the production and output of producers who are members of such groups or organizations to market requirements;*
- *Jointly placing goods on the market, including preparation for sale, centralization of sales and supply to bulk buyers;*
- *Establishing common rules on production information, with particular regard to harvesting and availability; and*
- *Other activities that may be carried out by producer groups and organizations, such as the development of business and marketing skills and the organization and facilitation of the innovation processes".*

The Regulation highlights the following (Regulation (EU) No 1305/2013, p. 511): “Support shall be granted to producer groups and organizations which are officially recognized by a Member State's competent authority based on a business plan. It shall be limited to producer groups and organizations that are SMEs”. The maximum annual amount of support per producer group or PO is defined based on the business plan and can amount to “the maximum of 100,000 EUR or max 10% of the annual marketed production of the group or organization during the first five years following recognition” (Regulation (EU) No 1305/2013, Annex II). The support is digressive and can last up to five years following the PO’s recognition.

Additionally, support for agri-business operations of POs, within the EU rural development policy, is available by following measures (Regulation (EU) No 1305/2013):

- Article 16 “Quality schemes for agricultural products, and foodstuffs”. The Member States can give preference to recognizing POs whose members participate in some of the quality schemes for agricultural products which include farm certification schemes, i.e., organic farming, as a specific farming method. Through this support measure, CAP contributes to value-added agriculture in EU countries.
- Article 17 “Investments in physical assets” (“collective investments, including those linked to a merger of Producer Organisations”). For instance, POs in the milk sector can use the EAFRD funds for constructing dairy and starting milk processing, or in the fruit and vegetable sector for joint investment in logistics from which all members will benefit.
- Article 35 “Co-operation” (between various actors in the agricultural and foodstuffs sectors).

Although recognized POs can be financially supported by the EU funds and the national budgets of EU member states, they should tend to be economically and financially sustainable, without constant reliance on external financial support.

6. Conclusion

Producer organizations represent an ideal form of associating and joint activities of producers in organic farming, as well as in the other type of farming directed at improving and protecting of the natural environment. Although their role for farmers (members), as well as other participants in the food supply chain, is very useful, number of the recognized POs in this sector cannot be characterized as favorable.

To analyze the number of POs in the sector of organic farming in EU countries the authors used “Inventory of recognized producer organizations in the EU's agricultural sector”, situation as of 01 July 2017 (DG AGRI 2019). This database was searched by using keywords "organic”, "green”, “ecology” and “sustainable” in the POs' titles.

Authors have found only three recognized POs with the word “organic” in their titles, and they operate in the fruit and vegetables sector (two), and one in the honey and bee products sector. In the sector of “green” agriculture (those POs which contain word “green” in the title) there are 17 POs (15 of them are in the fruit and vegetables sector), and this number is certainly higher, bearing in mind that this sector probably includes organizations that do not contain the word “green” in their title. POs in “green” agriculture are mostly organization of farmers operate on principles of Integrated farming or in the system of GlobalGap certified farming.

POs in analyzed sectors are mostly located in the following countries: Italy, United Kingdom, Bulgaria, Belgium, Hungary, Ireland, Poland, Slovakia, Spain, Denmark, and Sweden.

Almost all of recognized POs presented in the paper have the same goals: protection of farmers' interests in the market and their empowerment, primarily in the segment of sales of final products (providing safe placement, optimal farm gate prices, adding value through joint processing or packaging products and the like). Compared to the individual organization of production, they provide farmers with more efficient access to the output and input markets, better and easier cooperation with certification bodies, as well as easier transfer of new knowledge, information, skills, and farming methods. Besides, these forms of organization are especially useful when it is necessary to ensure the greater influence of organic producers on public policymaking processes in organic farming, as well as when it is especially necessary to provide larger quantities of organic products for placement on domestic or export markets. All analyzed POs take strict account of the use of resources in agricultural production, so that chemical means of protection are replaced by biological protection, and often with the use of renewable energy sources and innovations to make production sustainable. In this way, protection and improvement of the quality of land, water and biodiversity on member farms are provided, and food is produced in compliance with high standards of quality and safety.

Although POs contribute with many benefits to farmers, it can be concluded that small number of recognized POs in analyzed sector means that members of organizations (producers) do not use the benefit of this type of organization to a sufficient degree, nor do they use the national or EU funds available for financing their setting-up and operation.

Having in mind all above-mentioned, future activities of organic producers, professional community and representatives of local and regional authorities should aim at developing organic farming, while promoting and popularizing a more active role of POs, to improve the market position of farmers in the organic food supply chain.

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Appendix A3. Definitions of key terms

Producer organizations (POs) and recognized POs in the agricultural sector – POs are sector associations initiated and controlled by farmers with the basic aim to advocate for the economic interests of their members and define contractual relationships between farmers and buyers of their products in the agricultural products market. Recognized POs are those POs that meet the requirements for recognition defined by the national legislation of the country in which they are based.

EU's policy on the POs – EC sees POs as significant instrument of improving the market position of farmers in the agricultural and food supply chain, which "help farmers to face together the challenges posed by increased competition and consolidation of downstream markets concerning the marketing of their products including in local markets" (Regulation (EU) No 1305/2013).

Conditions for POs' recognition – Member States may or shall (in several sectors) recognize the POs at their request "which are constituted, and controlled by producers in a specific sector; are formed on the initiative of the producers; has a minimum number of members and/or covers a minimum volume or value of marketable production, to be laid down by the Member State concerned, in the area where it operates; and pursue a specific aim which may include at least one of the following objective..." (Regulation (EU) No 1308/2013, Articles 152 & 154).

Objectives of the recognized POs – According to EU regulation No 1308/2013 (Article 152), POs for recognition have to realize some of the following objectives: „ensuring that production is planned and adjusted to demand, particularly in terms of quality and quantity; concentration of supply and the placing on the market of the products produced by its members, including through direct marketing; optimizing production costs and returns on investments in response to environmental and animal welfare standards, and stabilizing producer prices; carrying out research and developing initiatives on sustainable production methods, innovative practices, economic competitiveness and market developments; promoting, and providing technical assistance for, the use of environmentally sound cultivation practices and production techniques, and sound animal welfare practices and techniques; developing initiatives in the area of promotion and marketing".

The legal form of recognized POs – Legally, POs must have the status of a legal entity, but they may have different types of SMEs. Depending on the country, they can be cooperatives (the most frequent type of POs in the EU countries), or entities, like association, private companies, such as Ltd. in which farmers are shareholders. Cooperatives and different forms of associations are the most efficient methods of organizing farmers and their collaboration regarding input procurement, selling final products, investment, market orientation, marketing, etc.

Ch.3

CONCEPT AND STATE OF PRODUCER ORGANIZATIONS DEVELOPMENT IN EUROPEAN ORGANIC FARMING

State of the art on producer organizations

OBJECTIVES: The purpose of this chapter is to introduce students to the concept and different aspects of producer organizations (abbr. POs) in EU countries: definition of POs; their role and characteristics, objectives of their activities, conditions for recognition, as well as with available sources of funding their establishment and activities, with emphasis on the organic farming sector.

SKILLS: Students should acquire knowledge in the area of producer organizations and find out about the number, degree of development and representation of these farmers' associations in the European organic sector.

QUESTION 1 (PLEASE CHECK THE CORRECT ANSWER)

How are producer organizations in the agricultural sector defined?

- ☐ Producer organisations are farmers' associations that contribute to the quality and better living conditions in rural communities.
- ☐ Producer organisations are associations of farmers and processors of agricultural products.
- ☐ Producer organisations are sectorial associations formed at the initiative of farmers and controlled by farmers with the primary objective to advocate for the economic interests of their members and regulating contractual relations between farmers and purchasers of their products on the agricultural market.
- ☐ Producer organisations are farmers' organizations created with the aim of more efficient access farmers to the market of agricultural input.

QUESTION 2 (PLEASE CHECK THE CORRECT ANSWER)

According to the European Commission, what are the most important roles of producer organizations for farmers?

- ☐ Strengthening bargaining power, better integration of farmers into agri-food chain, and improving farmers' competitiveness.
- ☐ More efficient farmers' access to the market of agricultural input.
- ☐ Providing advisory and technical support to farmers.
- ☐ Yield growth and quantity of produced agricultural products.

QUESTION 3 (PLEASE CHECK THE CORRECT ANSWER)

In which agricultural sectors producer organizations are the most developed in EU countries?

- ☐

Fruit and vegetable sector.

- ☐ The sector of milk and dairy products.
- ☐ Cereals sector.
- ☐ Organic sector.

QUESTION 4 (PLEASE CHECK THE CORRECT ANSWER)

Is a producer organization a favourable form of association for farmers engaged in organic production?

- ☐ Yes, it is.
- ☐ No, it is not.

QUESTION 5 (PLEASE CHECK THE CORRECT ANSWER)

Why producer organization is a favourable form for organic producers' association?

- ☐ Organic farming is a production where small-scale farmers and small plots aren't an obstacle for farm development, and consolidation isn't necessary for competitiveness.
- ☐ Organic producers can certify organic production only through group certification and by producer organisation.
- ☐ Organic producers can have market access only if they are a member of producer organisations.
- ☐ Holders of certificates in organic production can cooperate with their subcontractors only if they are a member of producer organizations.

PRACTICAL APPLICATION OF THE PREVIOUSLY ACQUIRED KNOWLEDGE: RELATED TO THE EXAMPLE EXPLAINED IN THE CHAPTER, TRY TO INVESTIGATE NEXT ISSUES: ARE THERE ANY PRODUCER ORGANIZATIONS IN THE ORGANIC FARMING SECTOR IN YOUR COUNTRY AND HOW DEVELOPED ARE THEY IF THEY EXIST? IF PRODUCER ORGANISATIONS ARE NOT SUFFICIENTLY DEVELOPED, WHAT DO YOU THINK ABOUT THE BENEFITS THAT ORGANIC PRODUCERS COULD HAVE FROM ESTABLISHING RECOGNIZED PRODUCER ORGANISATION IN THE ORGANIC FARMING SECTOR IN YOUR COUNTRY?

SECOND SECTION:

SUSTAINABLE ENTREPRENEURIAL STRATEGIES

4. Entrepreneurial opportunities in the green economy
5. Entrepreneurial initiative in organic agriculture: case studies among young people in eastern Romania
6. Sustainable Development Strategies in the Food Business
7. Promoting Production and Export of Organic Agriculture Products through Government Policies

4. Entrepreneurial opportunities in the green economy

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Abstract: The green economy is often considered in the extant literature as a way to reconcile economic development, environmental protection, and social well-being. Its development represents the result of two factors: (1) reaction to climate change and its impact; (2) green entrepreneurship. The aim of the chapter is twofold: first, we present the green economy and the green entrepreneurship; secondly, some megatrends suggesting possible entrepreneurial opportunities in the green economy at the European level are highlighted. The most important megatrends that green entrepreneurs should consider are the following: climate change, public policies for the protection of the environment, crises and government stimulus, and digitalization.

Keywords: green economy; green entrepreneurship; entrepreneurial opportunities; climate change.

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1. What is a green economy?

Given the significant impact of climate change on human and non-human life, policymakers have recognized the need and took measures to develop "green" or "low-carbon" economies (Davies & Mullin 2011).

The term "green economy" has been coined for the first time in 1989 in the report entitled *Blueprint for a Green Economy* (Pearce et al. 1989) . It was reinforced in 2012 at the United Nations Conference on Sustainable Development . Alternative terms used to describe green entrepreneurship are: "ecoentrepreneurship", "ecopreneurship", "environmental entrepreneurship", "sustainable entrepreneurship", "ecological entrepreneurship", "enviropreneurship" or "sustainopreneurship" (OECD 2011).

However, the concept is not yet defined in a precise and uniform way. For example, the United Nations Environment Program (UNEP) considers the green economy as the "*one that results in improved human well-being and social equity, while significantly reducing environmental risks and ecological scarcities. It is low carbon, resource-efficient, and socially inclusive [where] growth in income and employment should be driven by public and private investments that reduce carbon emissions and pollution, enhance energy and resource efficiency, and prevent the loss of biodiversity and ecosystem services*" (UNEP 2011, 16). This transformational definition has been so for the most cited in the reports and scientific papers. Wennekers & van Steel (2017, 63) argue that the green economy is "characterized by green products that are organically produced or use inexhaustible energy and resources, and by new production methods based on cradle-to-cradle or circular economy principles". Georgeson et al. (2017) provide for an extensive discussion of the existing definitions of "green economy".

However, several non-governmental organizations are trying to develop alternative definitions. For example, the Green Economy Coalition (an association of non-governmental organizations, trade union groups, and other entities focused on the green economy) argues that the green economy is "*a resilient economy that provides a better quality of life for all within the ecological limits of the planet*" (Green Economy Coalition 2012) and it establishes out nine principles for a green economy (see figure 4.1 for the original description of these principles) (Green Economy Coalition 2012).

Figure 4.1. Principles for a green, fair and inclusive economy

No	Principle name	A green, fair and inclusive economy ...
1	The sustainable principle	"...is a mean to deliver sustainability"
2	The justice principle	"... supports equity"
3	The dignity principle	"... creates genuine prosperity and wellbeing for all"
4	Healthy planet principle	"...restores lost biodiversity, invests in natural systems, and rehabilitates those that are degraded"
5	The inclusion principle	"...is inclusive and participatory in decision making"
6	The good governance and accountability principle	"... is accountable"
7	The resilience principle	"... contributes to economic, social and environmental resilience"
8	The efficiency and sufficiency principle	"... delivers sustainable consumption and production"
9	The generations principle	"... invests for the present and the future"

Source: Green Economy Coalition (2012)

Bina (2013) employed three approaches to the green economy – "business-as-usual", "greening the economy", and "all change". In a similar approach, Ferguson (2015) distinguishes between "conventional pro-growth", "selective growth", and "limits to growth". Despite these interpretations and the drawbacks of current approaches, the green economy is considered an "enabler" for the 2015 UN Sustainable Development Goals (Georgeson et al. 2017).

2. Green entrepreneurship – a conceptual framework

The starting point for any good reading on entrepreneurship should be a shared understanding of the meaning of the words **entrepreneurship** and **entrepreneur**.

Although there are several definitions, we stick to the following: Shane (2011, 143) defines entrepreneurship as "the identification, evaluation, and exploitation of opportunities".

In a similar approach, entrepreneurship is "the pursuit of opportunity without regard to resources currently controlled" (Stevenson 1983, 23). Also, Leach & Melicher (2012, 7) consider entrepreneurship as the "process of changing ideas into commercial opportunities and creating value".

Social entrepreneurship consists of "the activities of individuals and groups (social entrepreneurs) who identify gaps in the social system as an opportunity to serve groups who are marginalized in different ways and aim to address these needs in entrepreneurial ways" (Bjork et al. 2014, 35).

Mariotti & Glackin (2016) consider **green entrepreneurship** as another form of social entrepreneurship. Some authors consider that green entrepreneurship developed because of the environmental concerns and challenges that we are currently dealing (Melay & Kraus 2012) and it is seen as one of the key pillars of the green economy (Ahmad et al. 2015). In the last decade, this form of entrepreneurship has developed extensively as highlighted by the increased number of articles, books, and reports published on this topic.

According to the OECD approach, a green entrepreneur "can be either **making her business green** or simply **entering a green business**" (OECD 2011, 24). In the first case, the entrepreneur is defined using the "**technology** used for the production in any sector of the economy" (so-called *process approach*), while in the latter using the **sectors** in which the firms are active (so-called *output approach*) (OECD 2011, 24-25).

The next step/task in defining green entrepreneurship will be to define green (or environmental) sectors (Marin 2015). Jones (2017) notes that the first green sectors have been food and energy.

Only some sectors are fully green (e.g., "waste collection, treatment, and disposal activities; materials recovery"). Some are producing environmental goods but they generate pollution and/or are material-intensive (e.g., "manufacturing of wind turbines or photovoltaic panels").

Also, some sectors do not produce environmental products, but they have changed (significantly) the production process in or to decrease the environmental impacts[2]. For example, given the huge impact of single-use plastic bottles, Sarah Kauss created in 2010 the world's first reusable hydration accessory – the 17-ounce bottle. Using a reusable bottle instead of several single-use plastic bottles can have a major impact on the environment. Later, the startup S'well expanded into food, barware, and accessories. Also, as part of her CSR program, the company is a partner of UNICEF, providing financial resources to poor countries to provide clean and safe water.

According to the extant literature, green entrepreneurship (Mariotti & Glackin 2016, 38-39; Mohsen et al. 2020, 27-28) has the potential to:

- deal with environmental challenges (e.g., climate change);
- create (new) jobs and provide entrepreneurship opportunities both in developed and developing countries;
- support the eco-friendly innovations;
- protect workers' health;
- allow new ventures to use new sources of funding available at the local (e.g., city-level), state, and federal level;
- support the development of the local business environment as the green ventures tend to remain embedded within more localized markets (O'Neill & Gibbs 2016);
- provide useful lessons for policymakers;
- educate potential customers about the benefits and costs of green products.

The word "entrepreneur" comes from a 13th-century French verb, "entreprendre", meaning "to do something" or "to undertake" (Sobel 2011, 2). Currently, the word is used to designate individuals who "think, reason, and act to convert ideas into commercial opportunities and to create value" (Leach & Melicher 2012, 7).

Based on the literature, Hebert & Link (1989, 39-40) show that entrepreneurs play several **roles**:

- "the individual who takes the risk;
- the individual who provides the financial resources;
- an innovator;
- a decision-maker;
- an industry leader;
- a manager or administrator;

[2] See OECD (2011) for additional examples of environmental sectors.

- an organizer and coordinator of economic resources;
- the owner of a firm;
- an employer of the factors of production;
- a contractor;
- an arbitrator;
- the person who allocates resources between the possible alternatives;
- the person who starts a new venture".

The green entrepreneur (environmental entrepreneurs or ecopreneurs) is a "*person who seeks to transform a sector of the economy towards sustainability by starting a business in that sector with a green design, with green processes and with the life-long commitment to sustainability in everything that is said and done*" (Isaak 2005, 13-25). Similarly, several authors have argued that green entrepreneurs start a venture and/or run a business having in mind both profit and environmental goals, aiming at the same time to transform their sector/industry to become more environmentally friendly (Isaak 2002; Farinelli et al. 2011; Jolink & Nieston 2013; O'Neill & Gibbs 2016). Jones (2017) provides some good examples of green entrepreneurs who benefitted from the changing environmental mindset over time.

The importance of green entrepreneurs has been recognized in the extant literature. Some authors consider that they are "key change agents in enacting a green economy" (O'Neill & Gibbs 2016), offering "exemplary solutions for a social transformation" (Isaak 1998, 88), and putting environmental concerns on the agenda (Jones 2017).

Why do people choose to become an entrepreneur? There are many reasons to become an entrepreneur (Mariotti & Glackin 2016, 31-34; Anton et al. 2018). First of all, an entrepreneur has better control over his time, working conditions, and business organization. Secondly, creating and developing a successful business can bring a sense of accomplishment and independence to the entrepreneur. Thirdly, entrepreneurs contribute to the development of society by developing innovative products and/or markets that respond to problems/needs. Entrepreneurs, like Henry Ford (founder of Ford), Bill Gates (co-founder of Microsoft), Steve Jobs (co-founder of Apple), Larry Page (co-founder of Microsoft), are known for the firms and products they create, that have a long-term impact on society. Fourthly, entrepreneurs devote much of their time to developing a profitable business. Thus they become owners of the firms and the profits obtained by these firms. Last but not least, an entrepreneur has control over his compensation. He will choose how and when he will be paid for his effort and risk taken.

But there are also many costs/challenges associated with the entrepreneurial approach. First of all, the risk of failure is very high. Statistics show that in the first years of life this risk is very high, even successful entrepreneurs experienced (several) failures before they succeeded (e.g., Henry Ford or Walt Disney). In case of failure, the entrepreneur will lose his initial investment, time, and energy spent in the venture. Also, his/her reputation will be affected. Secondly, during the launching of the new venture, numerous obstacles will appear and the entrepreneur will have to deal with them. Thirdly, the entrepreneur is responsible for his firm's success, but also its failure. Thus, a feeling of loneliness/isolation may appear. Fourthly, although entrepreneurship is seen as a source of wealth, the reality is different. In the first months of the new venture, as the cash flows are still negative, the entrepreneur may not be able to pay himself (in the form of wages or dividends). Sometimes, the entrepreneur will have to bring new money into the venture. Fifthly, the entrepreneur must work very hard at the beginning to develop the venture. For all this additional time spent in the venture, there are opportunity costs that need to be understood and assumed by the entrepreneur.

Whatever are the reasons for starting your own business, the entrepreneur must start with a clear set of questions to which he has the correct answer. Longenecker et al. (2010, 28) propose a list of control questions useful in the decision to start your own business:

- What different types of business start-up ideas are there? Are they worth considering?

- What additional sources of ideas could be found and where they could be accessed?
- How can an opportunity be identified that promises to provide attractive financial gains for the business?;
- How could this business idea be improved?
- What are the strategies that can increase the chances of the business being successful?
- What competitive advantage will the business have over existing competitors?

The motivations for starting a **green business** have been scarcely researched so far. Kirkwood and Walton (2014) argued that "the passion for the environment" is the key difference between green entrepreneurs and conventional entrepreneurs. The green entrepreneurs consider that the environmental values represent a competitive advantage of their venture and a key component of their firm identity (Allen & Malin 2008). One study focused on transition economies from Central and Eastern Europe reveals the following conclusions (Silajdzić et al. 2015):

a) the entrepreneur's passion for the environment together with his (healthy) lifestyle are important determinants for his business idea;

b) most of the ventures are the results of opportunity-driven entrepreneurship;

c) all ventures reached their goals without any support from the public authorities;

d) personal motivation and environmental values are the key traits in green entrepreneurship;

e) good networking with local communities and governments is vital for venture success.

Based on his experience as an entrepreneur and business angel, Marius Ghenea identifies a broader set of qualities needed for a successful entrepreneur (Ghenea 2011, 47-60):

1. "entrepreneurial vision;
2. intelligence and creativity;
3. knowledge of the field of activity;
4. perseverance and determination;
5. charisma and persuasion;
6. responsibility towards his person, his family, and all the persons involved, directly or indirectly, in the business he develops and manages (stakeholders);
7. be a quick and efficient decision-maker;
8. to find solutions where problems occur (problem-solver);
9. gut feeling;
10. positive thinking;
11. passion for own business;
12. personal ethics;
13. trust in people;
14. assertive attitude".

3. Entrepreneurial opportunities in the green economy

Numerous authors have tried to define and classify entrepreneurial opportunities. Sarasvathy et al. (2003, 142) argued that "entrepreneurial opportunity is a set of ideas, beliefs, and actions that enable the creation of future goods and services in the absence of current markets for them". According to Leach and Melicher (2012), entrepreneurial opportunities can be defined as "ideas that have the potential to create value through new or repackaged products, markets, processes and services" (Leach & Melicher 2012, 9).

The next question that may arise is: All the ideas have the potential to become an entrepreneurial opportunity?. Some authors argue that discovering potential opportunities "does not necessarily involve new ideas, but in many cases, it does" (Baron 2017, 123).

An empirical study on high-growth firms (HGFs) shows that 12% of entrepreneurs consider that their ventures' successes can be explained by extraordinary ideas, while the rest 88% feel that they are due to extraordinary execution of common ideas (Leach & Melicher 2012).

One must understand the type of opportunity that an entrepreneur wishes to pursue. There are two main types of opportunities: discovery opportunities and creation opportunities (Alvarez 2011). In the first case, the entrepreneur fills a market void, while in the latter the entrepreneur forms the market void.

There are some significant differences between these two types of opportunities related to market, demand, competition, and regulation as depicted in table 4.1.

Table 4.1. Discovery versus creation opportunities

	Discovery opportunities	Creation opportunities
Markets	The demand can be forecasted	The demand is not yet known
Competitors	There is competition	The competitors are emerging
Governments	The regulations are stable	There are currently no regulations. There is a delay between market development and regulations

Source: Alvarez (2011).

Baron (2017) argued that "depending on the environments in which entrepreneurship occurs, opportunities are both discovered and created" (Baron 2017, 123).

In the green economy, entrepreneurs are responsible for the development and commercialization of ideas. Picking the right opportunity and developing the appropriate product/service are very important for the success of the venture. Also, the timing is very important in the changing business environment. Empirical evidence shows that green entrepreneurs can have a significant competitive advantage when forming the market void.

Following Schumpeter, the green entrepreneurs can find the opportunities by Mariotti & Glackin (2016, 39):

- employing new technology to produce a new product/service (e.g., green technologies);
- employing an extant technology to make an environmentally friendly (new) product;
- employing an extant technology to make an old product in a new way;
- finding new raw materials (or new supply of resources);
- developing a new market or niche market for an existing product;
- new ways of organizing venture activity.

How can we recognize business opportunities? Mariotti & Glackin (2016) suggest that two steps are necessary for becoming an entrepreneur. The first one is to train your **mind** to recognize easier business opportunities. The authors suggest the following questions in order to develop the aforementioned skills:

- "What frustrates me the most when I try to buy something?
- What product or service would really make my life better?
- What makes me annoyed or angry?
- What product or service would take away my aggravation?" (Mariotti & Glackin 2016, 40).

The second step is to use your **imagination** for developing products or services that fulfill some (new) needs. The (potential) entrepreneurs should ask himself or family and friends the following questions:

- "What is the one thing I would like to have more than anything else?
- What would it look like? What would its other attributes be like?
- What would it do?

- What innovative product or service idea have I been mulling over in my mind?
- What problem have I encountered in everyday life and thought: <There has to be a better way to do this?>" (Mariotti & Glackin 2016, 40-41).

Individuals with a higher level of creativity are more likely to identify business opportunities (DeTienne & Chandler 2004; Shane & Nicolaou 2015). Creativity has two components: divergent and convergent thinking. Each of them has a different impact on entrepreneurial success in each stage (phase) of the entrepreneurial process (prelaunch, launch, and postlaunch). Divergent thinking will generate business opportunities, while convergent thinking will assess them (Lex & Gielnik 2017).

Marius Ghenea, a Romanian successful entrepreneur and business angel, considers that there are four ways to recognize entrepreneurial opportunities: education (both formal and informal), (work) experience, information (feedback) from social networks, and gut feeling (Ghenea 2011, 86-92).

There are several megatrends suggesting possible entrepreneurial opportunities. These megatrends represent significant societal, environmental, or technological changes that are forming slowly, but they last for many years once defined. Among the most important megatrends are the following:

- climate change;
- public policies for the protection of the environment;
- crises and government stimulus;
- digitalization.

However, the entrepreneurs should consider other trends that can appear and bring new entrepreneurial opportunities in the green economy.

a. Climate change

Climate change and the (almost global) response to its effects represent a key trend suggesting possible entrepreneurial innovations and/or opportunities. Geman (2020) has argued that U.S. citizens are more concerned regarding global threats (e.g., climate change) after the coronavirus crisis. Thus, the transition to a low-carbon and circular economy offers to the existing (or the new) entrepreneurs the possibility to innovate and to develop green goods and services (OECD 2013). Furthermore, entrepreneurs can also contribute to the green transition by developing new business models.

Already, several studies reported that individuals prefer green products/services being more conscious of climate changes and their long-term effects (Osterwalder & Pigneur 2010). A good example of this trend can be the development of hybrid and electric vehicles that are more and more preferred by customers in developed countries. Despite the positive evolution in this sector, there is still tremendous potential for innovation and investment (OECD 2020) in this sector. In many countries, the policy measures implemented by the governments in the last years have supported the level of sales. For example, in Norway, the number of electric cars sold in 2020 has surpassed for the first time the number of conventional cars (powered by petrol, diesel, and hybrid engines), reaching 54% market share. To put this number into perspective, the market share of electric cars was only 1% a decade ago. This evolution is determined mainly by the exemption of fully electric vehicles from taxes (purchases and road tax).

b. Crises and government stimulus

The latest global financial crisis (started in 2008) and also the COVID-19 crises show that entrepreneurs are taking the risks and develop new products or services in a short period to fulfill new needs. For example, in the last year, we have seen numerous ventures focusing or reorganizing their activities towards new needs such as developing hygiene or digital work solutions, producing protective face coverings (masks), and so on. Also, the new trends and behavior after the COVID-19 crisis will bring new entrepreneurial opportunities (Kuckertz et al. 2020).

During and after an economic crisis, many governments have employed recovery packages to support economic recovery. One key coordinate of this program relies on support for entrepreneurship and SMEs (Anton & Onofrei 2016) in form of loan guarantees, tax incentives, grants, and subsidies.

As OECD (2011) highlighted, numerous countries are partially targeting these programs for environmentally-friendly investments, the crisis being considered an opportunity to act (Georgeson et al. 2017). For example, United Nations Environmental Program (UNEP 2009) reported that, as a response to the latest global financial crisis, several countries oriented a significant part of the economic stimulus package towards "green activities". A good example in this regard is South Korea which invested around 80% of its total economic stimulus package (7% of its GDP) in "green activities" in 2009.

Also, recently, as a response to the COVID-19 crisis, many public authorities (e.g., Austria, Canada) have employed "green" recovery measures in their fiscal stimulus and investment programs. However, the proportion of green measures in overall support provided varies from one country to another. In the case of the EU recovery package, around 37% of the available funds are allocated to climate protection (International Monetary Fund 2020). Also, the tools used are different from one country to another. For example, Austria used some tax incentives for corporate investment in green and digital technologies.

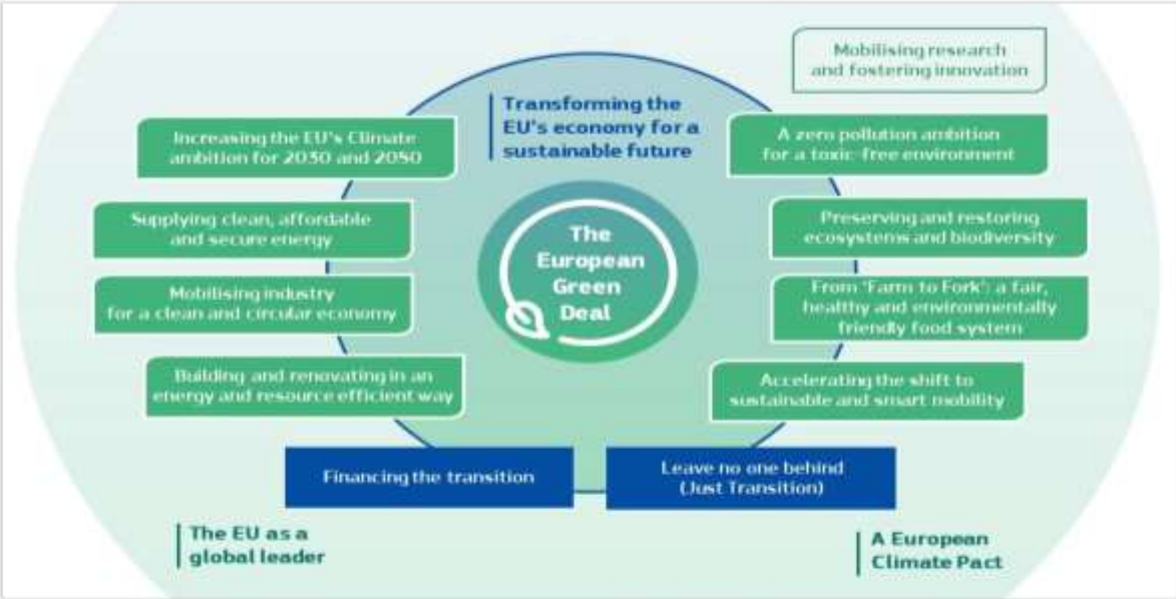
c. Public policies for the protection of the environment

At the EU level and/or at the country level, public authorities have adopted policies for the protection of the environment as environmental challenges have become more obvious for many people.

For the EU countries, the European Green Deal sets the goal and measures for attaining climate neutrality by 2050 (see figure 4.2 below). As already highlighted, the green economy is widely considered in national policy frameworks in both developed and developing countries (Bailey & Caprotti 2014; Georgeson et al. 2017). Indirectly, these policies provide opportunities for supplying new green products/services and thus facilitate new firm creation or investments for the production of these products. Several examples from the developed countries are worth mentioning.

Given the shortage of freshwater, Israel has implemented several measures to stimulate reduced consumption and recycling of water. As a result of these policies, the number of start-up ventures increased, the research and development funding increased, and Israel became an exporter of water and water technology (e.g., water-efficient irrigation technology or monitoring and water meters) (OECD 2010).

Figure 4.2. The European Green Deal



Source: European Commission (2019). The European Green Deal, available online at https://eur-lex.europa.eu/legal-content/EN/TXT/HTML/?uri=CELEX:52019DC0640&from=ET

Another example is related to the energy policies implemented at the European Union level. Supporting renewable energy consumption has been a key priority of the Europe 2020 strategy for smart, sustainable, and inclusive growth. To achieve to target for 2020 – 20% of its gross final energy consumption from renewable sources – numerous programs and funds have been allocated over time from the EU budget and also by multinational development banks. In the latter case, the European Bank for Reconstruction and Development (EBRD), and European Investment Bank (EIB) have included the transition to green energy among their priorities and have allocated a large amount of funds to investments in green energy. Therefore, numerous firms/entrepreneurs spotted clear market opportunities. These entrepreneurial opportunities were related not only to the production of renewable sources but also to storage and new transport technologies. Jones (2017) argues that the collaborations between government and business were very important for the development of waste management and renewable energy in the United States and Europe, noting "governments became shapers of markets and co-creators of the rapidly expanding recycling and renewable energy industries" (Jones 2017, 311).

We can also include here new regulations concerning environmental sustainability that influence market development, business models, and customer demand. Horisch et al. (2017) found a direct link between the government support for green entrepreneurship and the environmental orientation of entrepreneurs/incentives for existing ventures to become greener.

d. Digitalization

IT&C developments offer many opportunities to start a business and reduce barriers to entry because young people have more digital skills and competencies than their predecessors, and geographical barriers have been virtually removed (Anton et al. 2018). The digitalization of firms and their business models represents one of the **strongest trends** reshaping the global economy of today. Digitalization has been defined as "the sociotechnical process of leveraging digitized products or systems to develop new organizational procedures, business models, or commercial offerings" (Saarikko et al. 2020, 828; Brynjolfsson & McAfee 2014).

World Bank argued that ”digital technologies allow firms to scale up or down quickly, blurring the boundaries of firms and challenging traditional production patterns” (World Bank 2019, 3). Matzler et al. (2016) consider that digitalization brings numerous opportunities to create new products and services, respectively innovative business models. Also, as it is easy to promote and sell green products through the use of platforms (e.g., Alibaba, Amazon), (new) ventures can reach more customers more quickly than ever before.

Digitalization seems to have the highest potential for transforming the economy into a green one. The first reason is related to the rapid development of these technologies and the wide range of sectors in which they can be implemented. For example, Abanda & Tah (2017) provide empirical evidence that the Internet of Things can decrease energy consumption by developing new concepts such as intelligent buildings and smart cities. OECD (2021) reported that blockchain applications can be used now in multiple sectors, including the environment. Also, digital technologies may allow distance monitoring of air and water pollution, or monitoring and optimizing how renewable energy is used. Anastasiadis et al. (2018) provide several examples of how digital technologies can be used in the agri-food sector, regardless of the degree of development of the economy, with benefits for consumers, producers, and public authorities. These examples from one country/region can be easily extended to other countries or in other stages of the agri-food supply chain. The second reason is related to the public policies/programs already implemented or planned to support digitalization in developed countries (see, for example, the Recovery and Resilience Facility at the European Union level).

4. Conclusion

The **green economy** has a key contribution to sustainable development, poverty reduction, and better life quality (UNEP 2011). The expectations from the green economy are high. Wennekers & van Steel (2017, 63) consider that “while such an economy is expected to pervade and transform all sectors and domains of society, it also creates many new industries and niches”. The development of the green economy has been driven by a mix of green entrepreneurship (O’Neill & Gibbs 2016) and policymaker actions aimed to mitigate the negative impact of climate change. Numerous products and services have been developed by green entrepreneurs as a reaction to the environmental issues that appeared in the last decade (Melay & Kraus 2012).

Recognizing or creating opportunities, together with their exploitation, stay at the heart of entrepreneurship (Krueger 2003; Shane & Venkataraman 2000). Green entrepreneurs consider both economics and environmental sustainability when they recognize **entrepreneurial opportunities**. Most of the entrepreneurial opportunities have been determined by public policies implemented at various levels (international, national, and regional) to support the transition to a low-carbon economy. The policies implemented in the developed economies are the best examples in this regard. Also, the success of some green businesses has been supported by the increasing consumer preferences for environmentally friendly products. Digitalization of businesses is another trend, accelerated by the COVID-19 crisis (OECD, 2021), that has the potential to spur innovation and entrepreneurial activities in the green economy.

As several times crises have created a “window of opportunity” (Georgeson et al. 2017) for green investments, the current economic crisis and the recovery packages implemented by numerous countries represent additional opportunities. As there is still a long way to climate-neutral economies (the aim of the European Greed Deal for 2050), numerous entrepreneurial opportunities will appear. Thus, the (potential) entrepreneurs need to identify these opportunities on time and acquire the necessary resources (human, financial, and so on) to exploit the green opportunities.

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Appendix A4 – Definitions of key terms

Green economy – is an economy that responsibly uses resources, reducing the environmental risks and ecological scarcities. Thus, it contributes to economic development, environmental protection, and social well-being.

Green entrepreneurship – is the identification, assessment, and exploitation of opportunities in a green economy.

Entrepreneur – is an individual that identifies opportunities, takes risks, and gathers and manages resources in order to create value.

Green entrepreneur – is an entrepreneur developing a green product/service or making his/her business green. He runs a business having in mind both profit and environmental goals.

Entrepreneurial opportunities – ideas regarding new products and services that, once they are accepted on the markets, generate value for the firm.

Megatrends– represent significant changes in society, environment, and technology.

Ch.4

ENTREPRENEURIAL OPPORTUNITIES IN THE GREEN ECONOMY

Understanding green economy and green entrepreneurship

OBJECTIVES:

- The students will be able to understand the main characteristics of the green economy and green entrepreneurship
- The students will be able to define and identify entrepreneurial opportunities
- The students will be able to identify some megatrends suggesting possible entrepreneurial opportunities in the green economy at the European level

SKILLS:

- Critical thinking on the issues regarding the green economy and green entrepreneurship
- Challenges the pros and cons of becoming an entrepreneur
- Managing information about megatrends suggesting possible entrepreneurial opportunities in the green economy at the European level

QUESTION 1 (PLEASE CHECK THE CORRECT ANSWER)

The main characteristics of the green economy are:

☐ it improves human well-being and social equity, while significantly reduce the environmental risks and ecological scarcities

☐ it is a resilient economy that provides a better quality of life for all

☐ it is a low carbon, resource-efficient, and socially inclusive

☐ it improves human well-being and social equity, but the environmental risks are not important

QUESTION 2 (PLEASE CHECK THE CORRECT ANSWER)

The main types of entrepreneurial opportunities are:

☐ discovery opportunities and creation opportunities

☐ green opportunities and creation opportunities

☐ discovery opportunities and green opportunities

QUESTION 3 (PLEASE CHECK THE CORRECT ANSWER)

Which of the following is a megatrend suggesting entrepreneurial opportunities in the green economy:

☐ climate change

- ☐ public policies
- ☐ crises and government stimulus
- ☐ digitalization

QUESTION 4 (PLEASE CHECK THE CORRECT ANSWER)

Which of the following is not a quality needed for a successful entrepreneur:

- ☐ entrepreneurial vision
- ☐ creativity
- ☐ ethics
- ☐ negative thinking

QUESTION 5 (PLEASE CHECK THE CORRECT ANSWER)

Which of the following is a reason for becoming an entrepreneur:

- ☐ control over time
- ☐ control over compensation
- ☐ financial insecurity
- ☐ hard work

PRACTICAL APPLICATION OF THE PREVIOUS CHAPTER
IDENTIFY AN OPPORTUNITY EXPLOITED BY A GREEN ENTREPRENEUR IN YOUR CITY/COUNTRY. WHAT PRODUCT/SERVICE DOES HE/SHE BRING TO THE MARKET?

5. Entrepreneurial initiative in organic agriculture: case studies among young people in Eastern Romania

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Abstract: In this chapter, the availability to approach an entrepreneurial activity in the field of organic agriculture among young people European Union in general and Northeastern Romania in particular was investigated. Some examples of successful people (young entrepreneurs in the European Union) in this field were detailed. In order to analyze the entrepreneurial options of young people in Northeast Romania, a case study was conducted, based on the administration of a questionnaire among students and graduates from several universities in the city of Iasi. 250 respondents expressed their point of view on organic farming in general, provided information on their level of knowledge in the field, on future intentions regarding organic farming, and on their perception of how the received education could help them in starting a possible business in the field.

Keywords: education, entrepreneurship, European Union, organic farming, organic products, young people.

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1. Introduction

Organic farming has taken a growing lead in recent decades, healthy eating enjoying a growing popularity. Increased demand for organic products leads, implicitly, a rapid development of the production sector for these goods. From an occupation considered not very profitable 15-20 years ago, organic farming is now an attractive opportunity to start a new business.

Also, organic agriculture is a solid basis for the sustainable development of the rural environment (Pugliese 2001). Because it is suitable for small farms, it can be a source of well-being for many members of rural communities. By increasing the capacity to produce local organic food, the quality of life and health of the population can be improved both in rural areas and in nearby cities, which can serve as markets for these products (Rahmaniah et al. 2000).

In recent years, more and more young people who want to start a career in entrepreneurship are turning to this sector (Dias et al. 2018). Unemployment affects young people quite seriously, both in the European Union and in Romania. For this reason, starting a personal business, even a small one, is an alternative for many young people and a way to earn an income (more or less constant) from which to support themselves (Dvouletý et al. 2018). Small businesses in agriculture seem to be quite attractive, especially in Eastern Europe, and implicitly in Romania, where there are agricultural lands that can still be purchased at advantageous prices.

Romania has an important development potential in the direction of organic agriculture. This is also due to the reduced use of pesticides in small farms, that are widespread in the country (Aceleanu 2016).

This study is based on the analysis, synthesis and comparison of information from the literature, as well as its own study on the availability of young people in the southeastern region of Romania to develop an entrepreneurial activity in the field of organic agriculture.

2. The situation of organic agriculture in European Union and the entrepreneurial activity of young people in recent decades

According to Eurostat information, the agricultural land areas dedicated to organic agriculture in Romania place us on one of the last places in the European Union (after Malta); thus, in 2018 in Romania only on 2.4% from the cultivated lands organic agriculture is practiced. At the same time, the European average is 7.7%, and among the leaders are Austria, Estonia, Sweden and Italy.

Despite a slight increase from 1.9% to 2.4% of organically cultivated land, the place occupied by Romania in the hierarchies of European countries worsened in 2018 compared to 2017 (according to Eurostat data) and our country did not keep up with the European average growth of 0.7%.

The European Commission continues to support the expansion of land for organic farming in EU countries; the current programs have the role of contributing to the consumers' awareness on the benefits of organic products, the increase of the demand having as direct effect the increase of the offer of ecological products.

However, the involvement of young people in organic farming is low in Europe, in general. A recent study (Chatzitheodoridis & Kontogeorgos 2020) shows that in the EU only 5.94% of agricultural farms are owned by young people (people up to 35 years) and almost 10 times more farms (about 55%) are owned by older people. At the same time, there is a decrease in the transfer rate of these farms, from the old generation to the young, especially in countries such as Romania, Greece, Italy and Portugal.

The lack of young people in agricultural activities may lead in the future to a decrease in the competitiveness of this sector. In Romania, this problem is closely related to the accentuated migration of the young labor force (especially in the last 2 decades) to the countries of Western Europe, as well as to the migration of the population from villages to big cities.

The data provided by the European Commission indicate a number of over 250,000 organic farms in Europe in 2017 (EC 2019); this sector is still growing dynamically. For next year (2022), the European Union is preparing a legislative package to encourage organic farming, and which provides, among other things, to facilitate the transition of small farms to organic production, expanding the range of products that can be marketed as organic etc.

At the same time, in order to ensure a market for this sector, there are European programs designed to increase consumer confidence in organic products. Increasing the population's interest in consuming organic products is vital to ensure a sustained increase in the percentage of organic farming in general agriculture (EC 2019).

In small farms most of the production is sold locally (Larsson 2012). In this way there is a strong beneficial influence of organic agriculture on the local community (of the general health of the inhabitants), but also the latter must support entrepreneurs through a constant demand for their products. In the same time, the smallest farms were the most agroecological (Pepin et al. 2021). At the opposite pole is the large organic farms that produce organically; these singles have contracts with large chain stores and supermarkets, to which they constantly supply large quantities of organic food (Ras and Vermeulen 2009).

Currently, the countries with the highest organic productions (Italy, Spain, Austria and Sweden) are not among the largest consumers and they produce for export (EC 2019). And the long-distance export of organic products can generate important logistical problems, due to the particular way in which they must be transported (they cannot be harvested raw and baked artificially during transport, they cannot be subjected to chemical or ozone treatments that make them resistant to transport conditions).

Entrepreneurship in agriculture (in the European Union) is influenced by various factors (Martinho 2020). Understanding the mechanisms involved in this process can facilitate the implementation of plans to relaunch entrepreneurship in agriculture.

Among the factors that can favor entrepreneurship in agriculture in general we list:

- access to funds and financing (at least partially non-reimbursable);
- technical and specialized competencies regarding the procedures in agriculture;
- share capital and access to information;
- local culture and the positive attitude of the community towards entrepreneurs.

Young entrepreneurs who want to start a business in organic farming are of two categories:

- those who already have a farm and want to convert it to organic farming;
- those who start a business in agriculture directly with organic farming.

Entrepreneurs who already own a farm must go through a process of "converting" it from a conventional farm to an organic one. Depending on the specifics of the activity, the conversion process can take between 1 and 3 years. This period can be difficult for the farmers, in the absence of pesticides and fertilizers the production obtained will be lower, but the farmer will have to sell it at a lower price, similar to that for conventional agricultural products. For this category of entrepreneurs there are the so-called "conversion grants", meant to cover at least partially the losses during the transition period.

European Agricultural Fund for Rural Development (EAFRD) supported between 2014-2020, through measures 11.1 and 11.2 the conversion to organic agriculture, respectively the maintenance of organic practices and measures. These two measures comprised 6.4% of the funds allocated by EAFRD during this period. Subsidies are granted per hectare for a certain period of time (depending on the type of crop) and vary from 900 Euros / ha (for 3 years) for tree crops, to 600 Euros / ha for vegetable crops and 125 Euros / ha for permanent grassland. These subsidies help organic farmers to bring better products to market, with certain benefits on human health, but also whose production is environmentally friendly, at competitive prices (EC 2019).

National policies have a major role to play in encouraging organic farming; in some states the governments support the consumption of organic products and, implicitly, the market demand to ensure a continuous development of this sector. European Union reports (EC 2019) mention interesting data in this regard: for example, the German government has proposed a 20% increase in land cultivated in organic agriculture in 13 years (from 2017 to 2030). In Denmark and Sweden, the growing share of organic farming in domestic agriculture is encouraged by the increasing use of organic products in food provided by public institutions (thus, in Copenhagen, almost 90% of food used by public institutions is organic, in while Sweden expects an increase in their quantity by 60% by 2030) (EC 2019).

3. Young entrepreneurs in the European Union

Because the power of example is always important and should not be underestimated, we present below some examples of young people (from European Union countries) who have managed to develop successful businesses in the field of organic farming. Whether they have taken over and developed a family business, or started a new business, they are examples to follow and living proof that when there is will and determination, but also availability for work and a series of absolutely necessary skills, success can be achieved.

Elisa Mattioli is a young entrepreneur from Italy (Emilia-Romagna province); she started a business with fruits (apples, cherries, strawberries) and vegetables that she wanted to transform it into organic production. She benefited from conversion funds, between 2016 and 2020. The business made a profit in the first 2 years, Elisa is selling fruit to stores in Bologna as well as in a private group of customers, near her farm. In the development of the business, Elisa also benefited from the expertise of her father, an experienced organic farmer, as well as from the support of the local farmers' associations (EAFRD-funded projects, 2021)

The young ***Elena Cosmina Socea*** is the Marketing Manager at "Poieni Fructe de Padure SRL" Poieni, Neamţ County, Romania. She started a business cultivating organically hazelnuts on an area of 10 ha, of which 7 are nurseries for shrubs with ecological certification; in order to complete her studies, the young entrepreneur enrolled in Horticulture courses, offered by the University of Agricultural Sciences and Veterinary Medicine Iasi. She obtained European funds for this culture, which intends to expand in the coming years. They sell both hazelnuts (from 3 high quality Italian varieties) and also young plants, for those who want to set up their own plantation; for the latter ones, specialized consultancy is also offered (Lumea Satului, 2021).

Young entrepreneur ***Balázs Berta*** from Hungary benefited from Rural Development Program (RDP) funds to develop a small spice and vegetable farm in Fajsz. After graduating as an agricultural engineer, he started a business on a land of only 1.5 hectares. In four years (since 2009) he has expanded the farm to 10 hectares and managed to have two permanent employees and practice sustainable agriculture. The object of the initial business was extended to animal husbandry, so that the small organic farm has activity throughout the year (EAFRD-funded projects, 2021).

A group of 11 students from the University of Agriculture in Lile (ISA) started a business in organic agriculture in 2015. Using the knowledge gained during their years of study, they built a complex farm where cows, goats and pigs grow, and they cultivate cereals (needed to feed animals but also to make a small amount of beer) and grow vegetables in greenhouses. In two years, using several sources of European funds, they converted their farm into an organic one and also created 17 new jobs (EAFRD-funded projects, 2021)

A very good example of a business in the field of organic agriculture, which was inherited from the family (and which made the transition from conventional to organic) is that of ***young entrepreneurs who own Norofert*** (Norofert, 2021). The organic fertilizer company was originally a company that produced conventional fertilizers; in 2015 they entered on organic market. They became from importing producers, even the first producers in Romania of ecological fertilizers and pesticides. In order to be able to offer competitive products, Norofert used the expertise of agricultural researchers, thus managing to develop products that are easier to transport and store.

The Pivk family from Slovenia decided to rehabilitate an old apple orchard that they had purchased from a close relative. They initially planted a number of 3000 new trees, built storage spaces for agricultural equipment and for the obtained harvest, and after 5 years they doubled the number of trees in the orchard to 6000 (in the period 2009-2014). The investments, of over 200,000 euros, were partially financed by the Rural Development Program, through Measure 121 and 123.

The obtained production is entirely organic and enjoys a good appreciation on the local market; apples are also sold at nearby schools, and students are invited to the farm to learn about the production processes (thus encouraging the consumption of organic products by the younger generation).

Subsequently, the parents transferred the management of the farm to their daughter, who can still access European funds as a young entrepreneur (EAFRD-funded projects, 2021).

Osterc family are farmers from Slovenia (village of Vučja Vas) for 5 generations (grow vines, agricultural plants, raise pigs and cattle). In 2016 they set up an organic lavender plantation (*Lavandula angustifolia*). The lavender plantation obtained European funds from the Rural Development Program.

The lavender plantation is not large (about 1350 plants, from certified organic producers); farmers have alternated rows of lavender with white clover, which has the role of attracting pollinating insects and providing organic matter (being legumes in symbiosis with nitrogen-fixing bacteria). Lavender is harvested by hand, and the essential oil is obtained by hydrodistillation. It has many uses in cosmetics, pharmacy and kitchen; dried plants can be used to make decorative objects, scented bags, etc.

The vegetable residues resulting from the extraction of the oil were not thrown away, they can be dried and the farmers used them for the bedding of their pigs (which they raised on the farm); Lavender has been shown to have a calming effect on animals. To ensure the pollination of lavender flowers, a number of 27 bee families were placed in the plantation, from which lavender honey was obtained. The investment for setting up the plantation was 30,000 euros, and the profit is expected in 5 years from the initiation. The family of farmers carries out an active marketing for its products, participates in festivals, organizes workshops, cooking classes and meditations sessions, which attract tourists to the region (EAFRD-funded projects, 2021).

Justine Rossi is the daughter of farmers in the Occitan region (southwestern France); they raised over 200 sheep on 257 ha of land and forests. Justine attends qualification courses where she learns to make organic bread and opens her own business in 2014. In the first 2 years she creates a distribution network that allows her to sell approximately 70 kg of bread / week.

Justine obtains financing from the European Agricultural Fund for Rural Development, with which she purchases various equipment necessary for organic bread processing, but also builds a suitable oven with a baking area of 5 square meters. The grain needed to make bread comes from Justina's parents' farm. Until 2017, the bakery doubled its production (now 30 kg of bread / week I arrive at the school canteen in the locality to feed the children of the village). The opening of the bakery (which also has a small terrace for customers) was also beneficial for the local community; the density of houses in the area being low, the members of the community from the village are now meeting for socializing at the bakery (EAFRD-funded projects, 2021).

4. The importance of education in preparing future entrepreneurs

The education of the young generation has a major role in the future of organic agriculture. Their education must have two components:

- firstly, it is necessary to provide them a solid theoretical and practical basis, for the situation in which they will choose an entrepreneurial activity in the future;
- secondly, it is especially important to educate the population, as consumers of organic products (Lernoud 2014).

Regardless of the support that governments or the European Union would give to organic farming, it is important to ensure a constantly growing market – this is the only way through which this activity can be sustainably increased.

Acquiring entrepreneurial skills during the educational process is a factor that positively influences a possible orientation of graduates to open a business (Schwindenhammer 2017). But equally important to start an activity in organic farming, are the knowledge acquired by young people in school in the fields of biology and agriculture.

EIP-AGRI (European Innovation Partnership for Agricultural productivity and Sustainability) classifies the entrepreneurs in agriculture into three categories (Dobryagina 2019):

- entrepreneurs who inherited the family business;
- early retired persons, who have started an entrepreneurial activity based on the previously accumulated expertise;
- new entrepreneurs who have not previously been involved in the field.

Of the 3 categories of entrepreneurs, the last, those who enter in the business without previous experience ("ex novo") are the main beneficiaries of education in entrepreneurship and agriculture. But also, the entrepreneurs from the first category attend more and more often to specialization courses or even complete university courses in order to acquire the necessary expertise for their activity.

Entrepreneurs in the second category, as a rule, already have an expertise accumulated in their active life, which they decide to use after retirement, in order to obtain an additional financial gain.

Usually, the path taken by new entrepreneurs in agriculture are (Kahan 2012):

- obtaining food products from agriculture for the consumption of one's own family;
    - capitalization on the market of the products obtained in surplus;
        - obtaining food products for capitalization on the market (a small part being used for own consumption);
            - practicing agriculture exclusively for the market.

In this way, farmers become entrepreneurs, and they achieve this necessary transformation to accumulate expertise and skills, which allow innovative activities to ensure business success.

In rural areas, where economic opportunities are limited, entrepreneurship in organic agriculture is one of the main drivers of progress, development and innovation (Terziev 2016).

Schools, and especially universities, must offer both in the current programs, in optional packages and in education programs for farmers disciplines whose content can be adapted for the development of skills necessary for the activity of future entrepreneurs in organic agriculture. Increasing the competitiveness of young graduates will increase their chances of succeeding in their own business, using the technological achievements resulting from research activities.

Through the theme of the courses offered by the universities, both in the compulsory and in the optional programs, through the student contests and competitions, the necessary skills can be developed for the young people to face the competitive market (Papagiannis 2018).

Entrepreneurial activities in organic agriculture in rural areas have only beneficial effects, both on the environment and on local populations:

- by engaging people in production activities, unemployment can be reduced in certain areas;
- attracting foreign investors and raising the living standards of locals;
- a reduced pressure on the environment (because organic agriculture is not intensive);
- improving the health of local populations because part of the organic production is consumed locally.

These aspects are captured in the definition given by IFOAM (International Federation of Organic Agriculture Movements): "Organic Agriculture is a production system that sustains the health of soils, ecosystems, and people. It relies on ecological processes, biodiversity and cycles adapted to local conditions, rather than the use of inputs with adverse effects. Organic Agriculture combines tradition, innovation, and science to benefit the shared environment and promote fair relationships and good quality of life for all involved" (IFOAM General Assembly 2008).

5. Case studies among young people in eastern Romania regarding entrepreneurial initiative in organic agriculture

The expansion of organic farming is a significant goal in current European Union policies. But a sustainable development of this important branch of agriculture cannot be possible without the constant support and motivating of young people to start their own business in this field.

It is also necessary to support young people to face competition in a market where non-organic products are still dominant, thus making their business profitable.

In order to be able to implement coherent policies to support young entrepreneurs, it is necessary to analyze periodically how they perceive organic farming, the level of information and how market opportunities are seen at a given time.

A study on the availability of young people to pursue an entrepreneurial activity in the field of organic agriculture was conducted on young people in the SE area of Romania at the beginning of the year 2021. To conduct the study, a questionnaire including 10 questions was administrated.

5.1. Methods

The methods and techniques used were:

1. quantitative research: questionnaire-based survey (the questionnaire was applied online using the Google Forms platform); the content of the questionnaire was established in accordance with the objectives of the present study.
2. descriptive analysis of the data collected in the survey.

5.2. Objectives

The purpose of the questionnaire was:

- to identify the level of information of the participants in the field of organic agriculture;
- to find out to what extent the respondents are interested in carrying out an entrepreneurial activity in the field of organic agriculture;
- to find out if the school training done so far (at different levels) has prepared them for this type of activity;
- to identify to what extent they would be willing to improve in the field of entrepreneurship in organic agriculture and how this could be done.

5.3. Interpretation of the results obtained following the application of the questionnaire

The questionnaire was sent for completion to students (bachelor, master and doctorate) and graduates from Alexandru Ioan Cuza University of Iasi and the University of Agricultural Sciences and Veterinary Medicine Iasi. From these, 250 answers were obtained; the collected answers were anonymous.

The first part of the questionnaire defined the profile of the respondents, gathering data about:

- the age of the respondents and their gender;
- type of community in which they live: urban or rural;
- level of education (the last school graduated was specified);
- current status on the labor market (employee, entrepreneur, without occupation, I still follow a form of education);
- current field of activity / studies (e.g., biology, chemistry, economics etc.).

The participants in the questionnaire were mostly between 18 and 20 years old (40%); those between 20 and 25 years old represented 31.6%, between 25 and 30 years old 10.4%, between 30 and 35 represented 7.6% and between 35 and 40 years old 10.4%. Given that this questionnaire was addressed by university teachers through social media to current students and graduates with whom they were still in contact, it is justified the high percentage of respondents between the ages of 18-20 and 20-25 (they being current students).

Regarding the gender of the respondents, women (79.2%) clearly predominated compared to men (20.8%). This is explained by the existence of a similar structure by gender among students who were the main respondents (Faculty of Biology).

The environment of origin was represented balanced, 50.8% were respondents from urban areas, and 49.2% from rural areas. And this report is similar with the one found among university students.

To the question regarding the last school graduated, all the respondents answered that they graduated at least high school (there are no answers registered at secondary school, which is to be expected considering the fact that this questionnaire was addressed to students and graduates). 55.6% graduated high school - these are undergraduate students, 31.2% graduated from the University, 0.8% graduated vocational school and 12.4% completed postgraduate studies (master's and doctorate).

Regarding the current status in the labor market, most respondents still follow a form of education (68.4%) - this is correlated with their predominant age 18-25 years (71.6%).

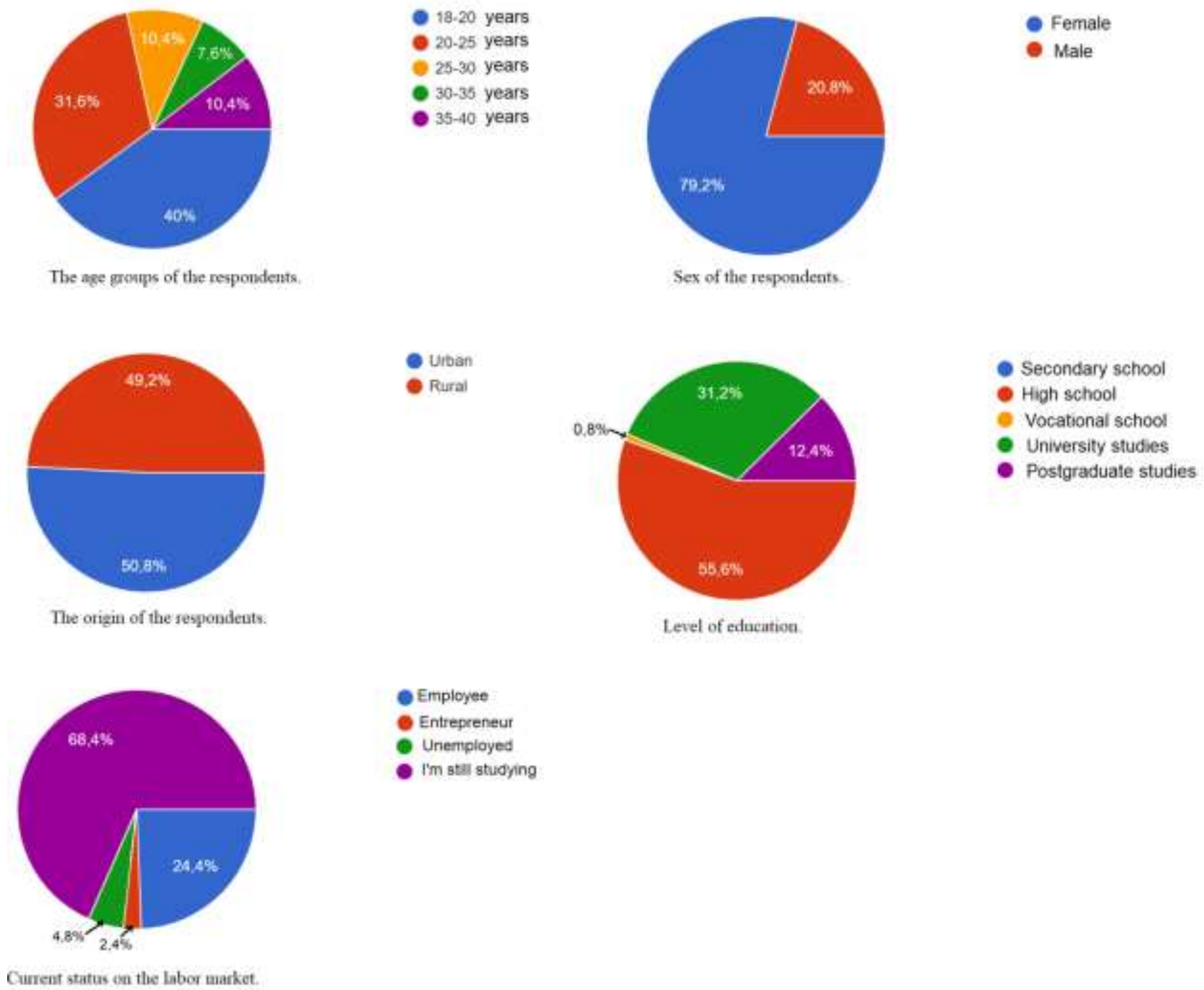
24.4% of study participants already have a job, 4.8% are unemployed and only 2.4% are entrepreneurs. If we exclude from the respondents those who still follow a form of education, the percentage of entrepreneurs represents 7.6% of the number of university graduates - a number that we consider to be very low.

The fields of activity or studies declared were quite varied:

- Biology (168 respondents),
- Biochemistry (14 respondents),
- Landscape Architecture (10 respondents),
- Ecology (9 respondents),
- Veterinary Medicine (7 respondents),
- Medicine (5 respondents),
- Horticulture (3 respondents),
- Economics (5 respondents),
- Food engineering (4 respondents),
- Agriculture (4 respondents),
- Animal husbandry (3 respondents),
- Engineering (3 respondents),
- Chemistry (3 respondents),
- Public alimentation (1 respondent),
- Psychology (1 respondent),
- Sales (1 respondent),
- Tourism (3 respondents).

A graphical representation of these data can be found in Figure 5.1.

Figure 5.1. General profile of the respondents to the questionnaire



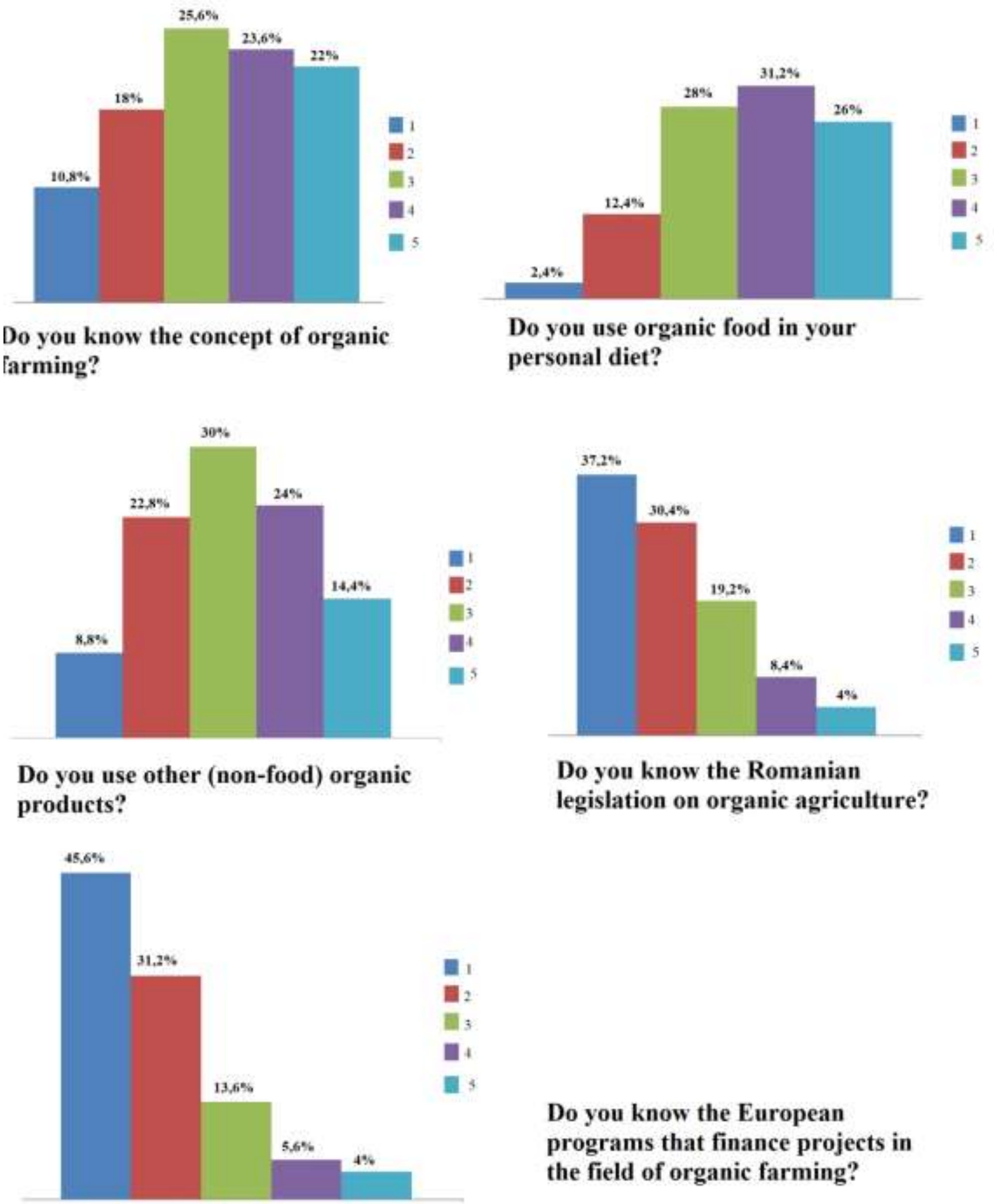
Source: Authors own interpretation

The second part of the questionnaire followed:

- the awareness of respondents with the concept of ecological agriculture and utilization of organic products;
- the possible involvement of the respondents in an entrepreneurial activity in the field of organic agriculture as well as the role of the educational system in obtaining the necessary competencies for this approach.

Five-point Likert scale (1 - strongly disagree, 2 - disagree, 3 - neither agree nor disagree, 4 - agree, 5 - strongly agree) was used to measure the extent to which respondents agree or disagree with the content of the 5 questions that were asked in the second part of the questionnaire (Figure 5.2).

Figure 5.2 . Graphic representation of the answers given to the second set of questions in the questionnaire (1 - strongly disagree, 2- disagree, 3 - neither agree nor disagree, 4 - agree, 5 - strongly agree)



Source: Authors own interpretation

1. To the question "Do you know the concept of organic farming?" less than half of the respondents considered that they have sufficient theoretical knowledge regarding this notion. 30 participants said they have no knowledge of this concept; of these, 29 are high school graduates, currently undergraduate students.

   The level of information on the concept of organic farming is quite low, given that the target group consisted of people with higher education or people currently pursuing this category of studies, their specializations having some connection with agriculture.

This suggests the need to introduce in university curricula of disciplines to provide future graduates more theoretical and practical knowledge on organic agriculture.

2. Two questions were aimed to find the degree of use of organic products in general in everyday life: "Do you use organic food in your personal diet?" and "Do you use other (non-food) products of organic origin?".

   In this case, the majority of survey participants state that they use organic products; over 150 people out of 250 interviewees frequently use organic products in their personal diet; this confirms the general trend in the European Union of increasing people interest in their own health, especially among youngsters with higher education (Hansmann et al. 2020). The role of organic food in the general management of individual health is perceived as increasingly important (Muller et al. 2017).

   The use of non-food organic products is less widespread, with less than half of respondents stating that they frequently buy such things (22 do not buy / use them at all). This result was expected, in the budget management, the part allocated to food, which influences health, is greater than that given to non-food products (which not having a direct impact on the body and may be of a lower category).

   The large number of consumers of organic products among young people is able to indicate an optimistic forecast of the market evolution in the coming years. Farmers' orientation for organic agriculture is closely correlated with market requirements, especially on the local market (due to increased perishability of products).

3. The last two questions in this set were about complying with the legislation in the field of organic agriculture: "Are you aware of the Romanian legislation on organic farming?" and "Do you know the European programs that finance projects in the field of organic farming?".

   The answers to these questions revealed an extremely low degree of knowledge of these categories of information. Out of the total of 250 respondents, only 23 know well and 10 very well the Romanian legislation in the field, and only 14 know well and 10 very well the European projects that offer financing for organic agriculture.

   Respondents who stated that they know very well both national and European legislation are employees (4) or students (6). The interviewed entrepreneurs stated that they know this legislative field well and less well.

The third set of 5 questions focused on the willingness to get involved in an entrepreneurial activity and the role of the educational process in this activity.

1. To the question „Do you intend to carry out an entrepreneurial activity in the next 3 years (even at family level)?" participants answered:
   - 59 – yes, for sure;
   - 98 – possible, depending on the evolution of the economic context;
   - 13 – no, certainly;
   - 80 – I'm not decided now.
2. To the question "Do you think that the information related to this field, received during your university studies, would be enough for you to start an entrepreneurial activity in the field of organic agriculture?" participants answered:
   - 42 – yes, certainly,
   - 87 – yes, to a large extent;
   - 75 – to a small extent;
   - 20 – no, certainly;
   - 26 – I can not appreciate.

3. To the question “Have you taken any entrepreneurship training courses?” participants replied:
   - 8 – yes, in the University where I studied;
   - 43 – yes, in another institution.
   - 199 – no.
4. To the question “Would you be willing to take courses on entrepreneurship education with applications in organic farming?” participants answered:
   - 83 – yes, for sure;
   - 42 – yes, in a form of education that I follow;
   - 87 – yes, if they were free;
   - 15 – probably not;
   - 5 – no, definitely not.
   - 18 – I don't know / I don't answer.
5. To the question „What courses do you think would be useful in the event of starting an activity in the field of organic farming?” participants responded:
   - 76 – Agriculture;
   - 45 – Marketing;
   - 101 – Entrepreneurship;
   - 20 – Management;
   - 8 – Other.

The analysis of the third set of questions leads to important conclusions for future planning in the university curriculum and the range of courses to be offered to students.

Despite the fact that a large part of the respondents state that they would be willing to start an entrepreneurial activity in the field of organic agriculture in the near future (157), however the number of those who are familiar with the legislation in the field (national and international) is very low (33, respectively 24). Success in developing a business, regardless of the field of activity, cannot be achieved without sufficient information on the appropriate legislative context.

Among the 250 respondents, we find that the vast majority (199) did not even take an entrepreneurship course during their university studies. This indicates an educational gap that needs to be remedied. Higher education institutions must be aware that, regardless of their profile, a minimum entrepreneurial education must be offered to students from all specializations, because after graduation a large part of students want to start a personal business. However, without a solid knowledge base and skills, it is likely that they will not succeed too much in this endeavor. Instead, the majority (212 out of 250) expressed their willingness to take such a course either at the university where they study or in another form (if they were free).

3. Conclusion

Organic farming is a field that can become more and more attractive for young entrepreneurs eager to start a business. Encouraging organic practices has a positive effect on the environment, preserving an increased diversity of plant and animal populations (by reducing pollution and soil degradation), and on human health, by consuming healthy foods that do not contain pesticides or other toxic chemicals. At the same time, the positive effect on local communities should not be neglected, whose development (especially in rural areas) can be strongly influenced by local agriculture. Increasing the employability, of young people especially, improves the living standards of the community.

The case study applied to a group of young students and graduates from several universities in Iasi revealed important aspects regarding their perception on organic agriculture and its products as well as on a possible activity in this field in the near future. There was an urgent need to provide students with more opportunities to develop the knowledge and skills needed for entrepreneurial activity in the field of organic agriculture. They have a relatively high availability to initiate entrepreneurial activities, but they lack a lot of basic information and knowledge of the legislation in the field is deficient. The availability of young people to take entrepreneurship, agriculture, marketing and management courses in or outside universities (especially if these programs were free) was also noted.

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Appendix A5. Definitions of the key terms

Organic Agriculture – agricultural activities developed by respecting the environment and the local community, while complying with the rules of organic farming, such as: the absence of pesticides and fertilizers, the products cannot be harvested raw and baked artificially during transport, the products cannot be subjected to chemical or ozone treatments that make them resistant to transport conditions, etc..

Young entrepreneur – A person aged up to 35 years old, who aims to have his/her own business.

EIP-AGRI - European Innovation Partnership for Agricultural Productivity and Sustainability

Ch.5

ENTREPRENEURIAL INITIATIVE IN ORGANIC AGRICULTURE: CASE STUDIES AMONG YOUNG PEOPLE IN EASTERN ROMANIA

Young people in organic farming entrepreneurship

OBJECTIVES:
- to understand the role that young people have in entrepreneurship organic agriculture;
- to find out examples of young entrepreneurs who have succeeded in this field.

SKILLS: Students gained knowledge on the role of young people and their position on entrepreneurship in organic agriculture.

QUESTION 1 (PLEASE CHECK THE CORRECT ANSWER)

How is the involvement of young people from European Union in organic farming?

- ☐ Low.
- ☐ Significant.
- ☐ High.
- ☐ Unimportant.

QUESTION 2 (PLEASE CHECK THE CORRECT ANSWER)

How do EU-funded programs encourage entrepreneurs in organic farming?

- ☐ Facilitate the transition of small farms to organic production.
- ☐ Facilitating the transport of organic products by air.
- ☐ Expanding the range of products that can be marketed as organic.
- ☐ Financing the studies of young entrepreneurs.

QUESTION 3 (PLEASE CHECK THE CORRECT ANSWER)

Where small farms usually sell organic products?

- ☐ They sell them for export.
- ☐ In the local community.
- ☐ They deliver them to supermarkets.
- ☐ I'm not selling them at all.

QUESTION 4 (PLEASE CHECK THE CORRECT ANSWER)

What kind of entrepreneurs want to start a business in organic farming?

- [ ] Those who already have a farm and want to convert it to organic farming.
- [ ] They come from large dismantled farms.
- [ ] There are people with higher education.
- [ ] Those who start a business in agriculture directly with organic farming.

QUESTION 5 (PLEASE CHECK THE CORRECT ANSWER)

What categories of organic products often use young people in southeastern Romania (participants in the questionnaire)?

- [ ] Organic food products.
- [ ] Non-food organic products.
- [ ] Both product categories alike.
- [ ] None of these categories.

PRACTICAL APPLICATION. LIST THE BENEFICIAL EFFECTS OF ORGANIC FARMING ON LOCAL COMMUNITIES IN RURAL AREAS AND ON THE ENVIRONMENT.

6. Sustainable Development Strategies in the Food Business

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Abstract: Sustainable development has gone beyond a concept or wishful thinking and has turned into the last resort for ensuring a future on this planet. Therefore, to act in accordance with the sustainable development cannot be pinned as the responsibility of a specific stakeholder, but as a common responsibility from policy makers, businesses, and consumers, together. The matter of who should do most is not yet defined, but it may be simply resumed to doing the most possible by each of the stakeholders. Thinking in business terms, how to develop in a sustainable way must be understood, calculated, and planned, so to see its long-term costs and benefits. Considering the food sector, it may seem that the businesses in this area are safe from such change, since they work with an indispensable product. Nevertheless, competition is present in the food market as well, so to remain in the preferences of the investors and consumers, food business should also adapt to sustainability. The present chapter clears up the meaning of sustainability for the food business; ways of evaluating it and presenting it to the public so to stay competitive and best practices from food business that have already understood the importance of such a strategy.

Keywords: sustainable development; food business; business strategy; sustainable strategy; best practice

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1. Introduction

The current times pose important challenges for everyone. The world has to move forward, to develop, but in ways that consider more than the economic component. The social and the environmental components have become indispensable aspects, along with the economic aspect when thinking about plans for the future. This type of complex and considerate planning is largely known as "sustainable development" (Elkington 1997).

Who shares the highest responsibility for this future planning?

As the recent history proves, there is not a specific stakeholder with a higher percentage of responsibility for this sustainable development than others, but every stakeholder involved (from the smallest, e.g., an individual person, to the largest, e.g., a state or from public entities e.g., city halls to private entities, e.g., businesses) everyone should understand and act in accordance with the common objectives of sustainable development (UN 2015).

Are there any domains which should turn to sustainability sooner than others?

At the pace of environmental degradation that is currently registered (OECD 2020), all domains are a priority for turning to sustainable activities. The food supply-chain is particularly special in this case because all leaving creatures need to eat, while humans are those who also have the power to decide which food is better and why. Therefore, all humanity is brought together in the food domain, eighter through the consumption of food or the production of food.

The current chapter aims at presenting some aspects of having a sustainable development strategy in business and takes the food business as a case study, due to the importance of the domain, given that it is unanimously known. Extracting some best practices for other food business actors is also intended.

Through a series of quantitative and qualitative analyses, the level of involvement in sustainable development of Romanian food businesses and their most used actions in this regard will be determined and presented. Then, some concluding remarks will be drawn.

As this chapter presents, in the following paragraphs, there is no standard recipe for success that balances both the economic development and the environmental and social development. Nevertheless, the choices of each stakeholder, including those in the food business, contribute to the existence of a future in which to function.

2. Theoretical background

2.1 Understanding sustainability and its components

The idea of sustainable development is not old, it was first used in the Brundtland report in 1987, a document issued by The World Commission on Environment and Development after a series of catastrophic events such as the Cernobîl. The document stated that "a sustainable development is the one pursuing the current generation needs, without compromising the possibility of future generations to pursue their own needs" (The Brundtland Report 1987). It is important to notice that the definition did not exclude the economic aspect of development, but it brought to attention the need to consider other aspects along with it.

As the studies that followed the issuing of this document showed, there are multiple interpretations of the aspects that should be included in the sustainable development concepts, but the one that proved to have most sense and practical application for the business environment is "the triple bottom line" designed by John Elkington (1997).

Referring directly to the business area and the possibilities that companies might have for adopting a sustainable development strategy, Elkington (1997) considers the economic prosperity, the social justice, and the environmental quality as the "the triple bottom line" that should be considered by companies in their pursuit for a sustainable development strategy.

The economic bottom line is the one considering the conventional aspects of development of a company such as the profit figure or profit per share, most likely assessed through analysing the companies' numerical information (through accounting). Being the one that was first considered, the assessment of the economic bottom line served as model for assessing the other two aspects.

The environmental bottom line refers to activities and costs of a company in relation to carrying for the environment, and it mostly revolves around reducing the impact on the environment through reducing the use of natural resources and reducing the emissions of any kind generated by their production activity.

The social bottom line considers the company's activity and policy related to the social capital, referring either to the working capital (the employees) or the communities within they work.

The idea of the triple bottom line has multiple graphical representations, one of them is the one in figure 6.1, in which sustainability is placed at the intersection of all three aspects, while the intersection of two-by-two aspects is also pointed out.

Figure 6.1. Graphical representation of sustainability through the triple bottom line

Source: https://www.cleanpng.com/png-cannibals-with-forks-the-triple-bottom-line-of-21s-6182812/download-png.html, 2020

As Elkington (1997) presented at that moment, the environmental aspect generated more interest, even if it was the newest, since it offered an alternative from the debates surrounding the social issues of fair wages, child labour and working conditions.

The triple bottom line has proved its strengths as a methodology for accounting the sustainability of companies, no matter their specific, and as several authors demonstrate (Elkington 1997; Goel 2010; Alhaddi 2015) they are only relevant if assessed together, not separately. Each company will design a strategy that places it somewhere between the three lines, but if one aspect is left out, the company cannot be accounted for its sustainability.

The current matter does not debate what motivated the companies into considering the social and the environmental aspects in their activity, since there are multiple factors that could be included here, such as the development of environmental and social policies at international level, that are most recently and synthetic represented by the 17 Sustainable Development Goals proposed by the United Nations (2015), the new regulations related to social aspects (e.g., minimum wages (EU Commission 2020a)), environmental aspects (e.g., water use (EU Commission 2020b) or CO_2 emissions (EU Commission 2019)), which in practice are translated into fines for not following these regulations or investments in new technology that helps following the regulations. Other factors might be related to the market demand, the consumers have become more aware of the differences between sustainable and unsustainable products and choose the first option despite possible higher prices (Luna-Reyes et al. 2014; Biswas and Roy 2015).

The current paper debates some proposed methodologies for assessing the sustainability of companies. Ever since Elkington (1997), research has provided with different indexes and standards used in assessing the sustainability of any company through the lenses of economic performance and environmental and social commitment.

2.2 Importance of the food sector for a sustainable development

While all types of businesses are pushed towards being more inclusive, considerate or clean through the internationally accepted strategies such as Agenda 2030 or the Sustainable Development Goals (Schoneveld 2020), the business functioning in the food sector face a particular pressure which they must understand, accept and act in accordance with, the pressure of producing more food in a sustainable way (Wu and Huang 2018).

The food sector or the food supply-chain most often refers to business functioning in food and beverage production and retail, including the all the logistics implied (Lodorfos et al. 2018).

The existence of food is a precondition for the existence of life (Berry et al. 2015), meaning that when there would be no food left, the existence on Earth as we know it until today would cease to exist. Therefore, since the number of people is rapidly growing, reaching almost 8 billion (Worldometer 2020), the food producers face a terrible pressure of providing more food. FAO (2020a) estimates that by 2050 the food availability has to increase by 70%. Meanwhile, providing food security is not the only objective that should be considered. The more food is produced, the higher is the pressure of agriculture on the environment, contributing significantly to climate change, natural resource consumption, soil and water degradation and threating the biodiversity (Clay 2013). Therefore, the sole thought of producing more food is doing more harm than good. In this case, a second pressure is directed at the business functioning in the food sector, the one of producing sustainably.

As other studies show, the current food production and consumption pattern are represented by a high amount of food loss and food waste, around 30 % of the total food produced (FAO 2020b). Therefore, a first step into becoming more sustainable in the food sector might mean reducing the quantity of the food loss and food waste, even if the waste is mostly in the responsibility of the consumer.

Some important measures that have been proposed so far as useful for turning the food supply chain towards sustainability include organic agriculture, use of local resources, and consider local characteristics of the environment and community, returning to traditional local croplands, recycling of organic waste, sustainable packaging, increasing storage and transportation efficiency, training for food workers, wage equity or consumer education (Sarkar et al. 2020).

While the situation for the actors on the food supply-chain appears dramatical, there are some aspects that may turn it into an opportunity for development.

First, the sustainability related actions are still only mildly regulated, so companies may choose their own sustainable development strategies, focusing on the aspects they find more useful to them, environmental, social or a combination of the two (Lodorfos et al. 2018). Second, including such sustainability related objectives in the business strategy does imply costs, but these costs are investments for ensuring the future survival of the company on the market. Consumers are becoming more aware of sustainable food and their choice is starting to place sustainable producers in front of the regular producers (Vermeir et al. 2020), while investors are also searching for long term profits, and therefore are paying attention to the sustainability strategies of companies (FoodDrinkEurope 2020). Therefore, the economic aspect of sustainability is supported on long-term by considering the environmental and social aspects when deciding the company's strategy.

A business strategy is the set of objectives and actions in a certain period of time, that are chosen by a company as the best option for its development. As Porter (1996) mentions, a business strategy is what differentiates the company from other similar entities and generates an unique set of values for that company. Including environmental and social objectives in the business strategy and having a conscious positive impact on them is commonly known as Corporate Social Responsibility (CSR) (Sheehy 2015).

Large multinational companies have started to include sustainability actions in their strategies and to increase the awareness of consumers on this particular choice through specific labels applied on their products, for example the UTZ label on cocoa, coffee, tea and hazelnut products, that ensures consumers of their ecological production (Rainforest Alliance

2020), the European organic agriculture label, the Marine Stewardship Council label for aquaculture products (MSC 2020), and other similar labels that announce the consumer of the fact that they chose to invest in carrying for the environment or the agricultural communities, therefore their products may cost more, reflecting their investment. Other types of communicating the sustainability performances are through yearly reporting of their sustainable progress (The Nielsen Company 2019) or by entering external evaluations based on sustainable development indexes, as those presented in section four of this chapter.

3. Methodology

The research considered for this chapter is based on quantitative and qualitative analysis of available information on sustainable business strategies in the food sector, therefore a mixed method approach. Yet this descriptive research is empirical, based on examples that offer ideas and best practices, but cannot be generalized.

A quantitative analysis is useful in exploring, describing or examining specific trends or evolutions within the analysed data, through statistical methods and graphical representations (Saunders et al. 2009). In a simpler way, quantitative analysis represents finding meaning within numbers. While a qualitative analysis represents finding meaning within textual data by extracting motivations, opinions and choices that may underpin a given situation. The qualitative data are analysed through coding of similar responses or ideas within the analysed data (Saunders et al. 2009).

The quantitative analysis is based on collecting and synthesising secondary data from the Romania CSR Index during 2015 - 2020 in order to identify the evolution of food companies in Romania in relation to their involvement in sustainability.

Secondary data represent data that were initially gathered for another purpose but may offer important information if analysed from a new perspective. Secondary data may be both quantitative and qualitative and may be used in explanatory and descriptive research (Saunders et al. 2009).

The qualitative method is approached by using the corpus-based analysis with AntConc software (Anthony 2018), which allows for investigating the content of sustainability-related reports of food companies in terms of the most frequent words, themes, and correlations. This approach allows for structurally and objectively comparing the main strategic themes of the top Romanian food companies according to the Romania CSR Index (The Azores Sustainability & CSR Services 2020).

4. Sustainable development indicators

The indexes that evaluate sustainability are used as instruments that measure the responsibility of a company regarding its involvement in social and environmental aspects. The more a company takes these aspects into account when developing their business, the higher the score obtained by the company will be (BBVA 2020).

What needs to be mentioned is that none of the following indexes have a regulatory role, but they come as a volunteer evaluation effort from the companies, as they enter in the evaluations on their own request, and the results may be used in their development strategies both for marketing and for setting up future objectives.

4.1 Examples of Sustainability Indices

The Dow Jones Sustainability Indices:

Soon after the launching of the triple bottom line concept (Elkington 1997), in 1999 the Dow Jones Sustainability Indices appeared (S&P Global Switzerland 2020). The Indices are used by companies who want their efforts to include sustainability criteria in their development strategies to be acknowledged.

All industries are included in this evaluation and the companies answer a questionnaire with a mix of 80 to 100 cross-industry and industry-specific questions. The questions are updated along with the new discoveries and trends on sustainability. The companies receive a score from 0 to 100 based on their answers, evaluated through the lenses of the financial relevance of their sustainability actions in the three lines (economic, environmental, and social).

As the open to public results include only the "best-in-class" after the yearly evaluations, more and more companies request their evaluation for benchmarking their sustainability position in relation to the competition (S&P Global Switzerland 2020).

The FTSE4Good Index Series:

The series of indexes also consider three aspects of sustainability: environmental, social and governance practices (including economic) and evaluate the performance of companies in these three pillars, with several aspects included in each of the three pillars (e.g., labour standards, climate change or supply chain). It was launched in 2001 (FTSE Russell 2020). Unlike the Dow Jones Indices, the FTSE4Good presents the results not only for the best in their category, but for all evaluated companies. This Index covers 23 developed countries and 20 developing countries (FTSE Russell 2020). The scores go from 0 to 5 for each of the criteria evaluated.

The Index is seen as a tool benefiting the investors searching for companies with sustainable practices in which to invest, and also for benchmarking the sustainability related position of a company in relation to others in the same industry.

While the above-mentioned indexes are known more to the Europeans, there are others, such as the *Domini 400 social index* that was launched in 1990 (MSCI 2020) that is only used to evaluate the United States companies but following similar criteria as the European preferred ones, meaning they consider different criteria related to the environmental, social and governance (including economic) choices of the evaluated companies. While other are known at local or regional scale, such as:

- *The Green Business Index*, which evaluates the environmental responsibility of the Romanian companies since 2010 (Green Revolution Association 2020). The participation for companies interested in the evaluation is free in this case and the NGO performing the evaluation also offers workshops and seminars for the businesses interested in improving the results. The seven areas of interest for this index are: sustainable development; use of resources; environmental impact; waste management; green buildings and spaces; green acquisitions; green transportation (Green Revolution Association 2020).
- *Sustainable Brand Index* is a European located method of evaluating brands, and not companies as a whole (SB Insight 2020). Nevertheless, brands represent companies so the comparison with the other indexes is feasible. It analyses how the sustainability related measures affect the branding, communication, and the development of a business (SB Insight 2020). It functions since 2011 and approaches a consumer perspective in relation to the evaluated brands.
- *Romania CSR Index* is a locally developed tool for assessing the sustainability efforts of companies located in Romania. It encompasses the three areas recalled before, social, environmental and governance (including economic). The first published index was published in 2015, based on company data from 2014, and it presents a yearly top of the most sustainable companies in different industries (The Azores Sustainability & CSR Services 2020). The initial number of considered indicators of sustainability was 36 split into nine categories and it reached 64 split into 10 categories in the next years of evaluations.

4.2 Evolution of food business sustainability through the lens of Romania CSR Index

Considering *The Romania CSR Index* for studying the involvement in sustainable development of the Romanian companies was chosen for this short analysis for multiple reasons. First, for its complexity, being similar to the methodology used for the Dow Jones Sustainability Indices and for its correlation to this international index. Second, because it resumes to companies functioning on the same market, the Romanian one, so they must follow the same regulations, face the same changes of the socio-economic environment, so the comparison is more relevant than between companies from different countries.

According to The Azores Sustainability & CSR Services (2020), the provider of this evaluation, the scoring received by the participating companies is composed by ten different categories and 64 indicators, each category having a different number of indicators allocated. Companies receive 0, 1 or 2 points for each indicator based on the qualitative and quantitative information on their sustainability performance for the evaluated year, information they provide to the organizers of this Index through a questionnaire. The scoring of one year is based on the information of two years before it, so the results of the activities performed may be quantifiable.

Also, the scoring of a company depends on its peers' activity in the same industry. To be precise, if a company in a specific industry published data on a specific indicator from the list of 64, all participating companies from that industries will receive 0, 1 or 2 points for that indicator. If none of the companies in a specific industry have published data for an indicator, then the indicator would not be counted in the final scoring.

Each industry is evaluated differently based on its specific activities and possibilities for considering sustainability and the final score considers other indexes, such as the Dow Jones Sustainability Indices. Each category has a specific percentage in the final scoring each year, and each indicator has a specific percentage withing the category.

The ten categories of indicators considered for evaluation through the Romania CSR Index are:

1. Corporate governance – including aspects related to internal company rules and policy, the relations with stakeholders, internal evaluation of the activity, economic management.
2. Diversity – related to the policy approaches on gender and ethnical equality and equity.
3. Economic impact – related to the investments in environmental and social involvement activities.
4. Environment – includes recordings of the evolution of environmental impact of the company.
5. Human Rights and Policy against corruption – relates to policy approaches of the company in relation to respecting human rights inside the company, management of possible corruption situations and their public position on the two matters.
6. Employees – relates to respecting the rights of the employees and the support offered for development of the employees.
7. Marketing and Creating Awareness – relates to involvement in campaigns of creating awareness on ethical and social issues, that contribute to the general knowledge creation.
8. Investing in the Community – relates to projects for improvement the environmental and social quality of the community in which they are located.
9. Supply-chain – relates to the selection process of suppliers based on environmental and social reasoning, not only economic reasoning.
10. Material aspects: improvement, assumed objectives and reached objectives (since 2019).

While all 64 indicators may be included in the three bottom lines or pillars of sustainability, only some of the indicators, that the authors consider to be more general, so other companies may include them in their internal evaluation, will be presented, for each of the lines. The final scores obtained by each company places it somewhere between the three bottom lines, probably closer to one of them. To get closer to the intersection of the lines (or to sustainability), see figure 6.1, the companies would then know what aspects of their strategy needs more improvement.

For the economic bottom line:

- Total amount invested for contributing to community development;
- Percentage of inputs purchased from local producers;
- Ensuring equity in wages for all genders;
- Investing in education and skill development for local communities;
- Risk management, stakeholder involvement in sustainable development.

For the environmental bottom line:

- Total energy consumption of which renewable energy;
- Total greenhouse gas emissions;
- Total water use of which recycled or reused;
- Total amount of waste generated of which recycled or reused;
- Soil and biodiversity protection.

For the social bottom line:

  - Inside the company:
- Health and safety at work;
- Training and development programs for employees;
- Number of working hours per employee;
- Freedom of association and negotiation for the employees;
  - For the community:
- Philanthropic and sponsorship activities and initiatives;
- Corporate Social Responsibility projects;
- Community dialogue;
- Employee volunteer activities;
- Following social standards.
  - On the supply-chain:
- Choosing input suppliers based on social criteria;
- Identifying social risks on the supply-chain;
- Ethical promotion for the company products;
- Marketing campaigns where social or environmental responsibility elements were used.

The Romania CSR Index (The Azores Sustainability & CSR Services 2020) has had five editions so far, each of them different from the previous one through the number of indicators analysed and the number of companies that were evaluated which also generated differences in the categorization by industry. The evolution of the number of indicators, categories and evaluated companies may be seen in table 6.1.

Table 6.1. Evolution of the evaluation methodology for the CSR Index (number)

Year of publishing the index	Categories evaluated	Indicators evaluated	Companies	Reasoning
2015 (data since 2014)	9	36	top 100	most valuable companies
2017 (data since 2015)	9	43	top 100	most valuable companies
2018 (data since 2016)	9	49	696	companies with more than 500 employees, which must publish a non-financial report yearly
2019 (data since 2017)	10	57	712	companies with more than 500 employees,

Year of publishing the index	Categories evaluated	Indicators evaluated	Companies	Reasoning
				which must publish a non-financial report yearly
2020 (data since 2018)	10	64	700	companies with more than 500 employees, which must publish a non-financial report yearly

Sources: Romania CSR Index 2015, 2017, 2018, 2019 and 2020.

The number of indicators and categories of evaluation evolve along with new considerations of business sustainability and also with specific actions took by companies towards turning their business into a more sustainable one. As it may be seen in table 6.1, the number of indicators raised from 36 in 2015 to 64 in 2020, while the number of companies eligible for evaluation started from the top 100 most valuable in 2015 (Ziarul Financiar 2020), while, after 2018, the selection included all companies with more than 500 employees, which have to publish a non-financial report of their activity (The Azores Sustainability & CSR Services 2020). Also, the way in which the industries have been categorised depended on the specifics of the businesses in the evaluation. Therefore, if at in first edition agriculture had a separated category, while consumption goods and retail were general categories, in the last editions, the food industry or sector received its own specific subcategories: food products; food retail and beverages, while the agriculture category disappeared.

Based on the public information of the CSR index in the period 2015-2020 (The Azores Sustainability & CSR Services 2020), the evolution of the food companies that have been evaluated is presented in table 6.2.

Table 6.2. Evolution of the food sector companies through the Romania CSR Index 2015-2020

Company	Category	2015 (%)	2017 (%/position in category)	2018 (points/ position in category)	2019 (points)	2020 (points)
Coca-Cola HBC Romania	Beverages	87.14	94.56	94	98	98
Ursus Breweries	Beverages	69.12	82.56	72	91	72
Heineken Romania	Beverages	61.76	66.28	third position	-	-
Auchan Romania	Retail	33.33	-	third position	-	-
Kaufland Romania	Retail	-	second position	94	98	98
Lidl Romania	Retail	-	-	79	-	85
Carrefour Romania	Retail	-	third position	-	-	-
Mega Image	Retail	-	first position	-	-	-
Procter & Gamble	Food production	-	second position		-	-
Transavia	Food production	-	third position	-	-	-
Aeropa Grains	Agriculture	-	first position	-	-	-
Smithfield Ferme	Agriculture	-	second position	-	-	-
Nestle	Food production	-	-	first position	-	-
Albalact	Food production	-	-	second position	-	-
Ana & Cornel	Food production	-	-	third position	-	-

Sources: Romania CSR Index 2015, 2017, 2018, 2019 and 2020.

Note: the "-" does not mean the company was not evaluated, but as the scoring presents the best-in class of each year and the categories have suffered modifications, each year results were presented differently and the table represents a synthesis if the yearly reports of the Romania CSR Index

Yet, the constant adjusting of the public form of the yearly report for the Index does not allow a proper quantitative analysis, but only the observation of some quantitative aspects.

As it may be seen in table 6.2, the first years presented the results in percentages, while the later three editions are presented as total number of points. Even more, the 2015 Index reports the top ten companies, within all industries, of which only four are related to the food sector: Coca Cola HBC Romania, Ursus Breweries, Heineken Romania and Auchan Romania. The 2017 Index presents both the top ten overall companies, of which only three are related to the food sector: Coca Cola HBC Romania, Ursus Breweries and Heineken Romania, and a top three per each industry, where three categories are related to food: production, retail and agriculture, but the companies presented here come only by name and not by percentage or score. In 2018 the Index is also presented as top ten overall industries and top three per each industry, following the same pattern: top ten presents scores, top three only names. There are four companies related to food in the top ten: Coca Cola HBC Romania and Kaufland share the first position with 94 points, Lidl Discount gatherers 79 points and Ursus Breweries 72 points. For the first time, in top three for the food production category, there is one national company: Ana&Cornel. In 2019 the top ten overall industries has three food representatives: Coca Cola HBC Romania and Kaufland with 98 points and Ursus with 91 points. The 2020 top ten overall has four food representative companies: Coca Cola HBC Romania and Kaufland with 98 points, Lidl with 85 points and Ursus with 72 points.

It is important to notice that there are two companies in the food sector, beverages producers, to be more precise, that are present in top ten in all five editions of the CSR Index: Coca Cola HBC Romania and Ursus Breweries.

Kaufland Romania, a food retailer, has rapidly understood the importance of sustainable development strategies and in the last three years has not only entered the top, but it placed itself on the first place, with an equal number of points as Coca Cola HBC Romania.

Ana&Cornel creates a distinctive point among the other companies, being the only one that is a national company and not part of a multinational conglomerate. Even if they are present only in the 2018 top three for food production, their presence represents that national companies have also understood the importance of pursuing a sustainable development strategy and they are willing to invest in such strategies so to remain competitive in the future.

In order to find out what are the main objectives and activities that generated the understanding as a sustainable company for those presented in the Romania CSR Index, in the following section, the 2019 reports of seven companies will be analysed and compared, in order to extract some best practices that may be considered by other food-related companies.

5. Sustainable development strategies in the Romanian business reporting

5.1. Short description of the selected companies

Full public information about the detailed Romania CSR Index was found in 2018 report by mentioning top three food companies by field, as follows (The Azores Sustainability & CSR Services 2020):

- Food products: 1. Nestlé; 2. Albalact; 3. Ana & Cornel.
- Food retail: 1. Kaufland; 2. Lidl Discount; 3. Auchan.
- Beverages: 1. Coca-Cola HBC Romania; 2. Ursus Breweries; 3. Heineken.

However, 2019 was chosen as the content analysing year, because it is the most recent and reported full-year by all companies.

When searching for sustainability-related reports, only the following companies communicate information strictly for Romania: Coca Cola Romania (2020), Kaufland Romania (KPMG Advisory SRL 2020), Lidl Romania (2020), Lidl Discount (2020), and Ursus Breweries (2020), while the following ones present the information only at the international group level in English: Auchan Holding (2020), Heineken (2020), and Nestlé (2020). We have considered six of these, without Nestle, in the following analysis, because Nestle had published a secured document which was unable to be transferred to .txt as requested by AntConc. However, we manually compared it with the others' main topics.

Lidl Romania started to publish sustainability reports in 2016, while in 2019 they also posted a non-financial report for Lidl Discount.

The Coca Cola presents sustainability reporting information on their website starting from 2011, while Heineken since 2009.

The Ursus Breweries presents sustainable development reporting information starting from 2013, but they only published a non-financial synthesis of company's sustainability practices for 2019.

Auchan Holding is formed of Auchan Retail Group, Ceetrus and Oney. Auchan Retail Group (2020) focuses on three major commitments: economic responsibility, qualitative and healthy food, and environmental responsibility, such as sustainable use of resources, sustainable production and consumption, as well as waste reduction.

Two companies were not included in the corpus-based analysis because they do not publicly report sustainability-related information. They present only some aspects of the business related to sustainability. For example, Albalact SA (2020), being part of the Lactalis group, mention on their website only the existence and compliance with the international standards related to quality, safety, work environment and environmental management system. Similarly, Ana & Cornel SRL (2020) present their implemented standards, which are related to quality management, food safety and security, and environmental management, also on their website. However, in addition, they present the social responsibility campaigns developed over time.

5.2. Sustainability strategies of seven food-related company's reports for 2019

In the 2019 Auchan Holding report (2020), the most frequent words with over 100 occurrences are: financial, retail, assets, holding, income, statements, value, employees, liabilities, rate, cash, risk, product, tax, management, property, recognised, store, group, performance, impairment, share, fair, sale, waste, expenses, countries, number, business, operations, food, impact, exchange, subsidiaries, accounting, equity, interest, activity, change, debt, and local. Further, 42 words were found to be part of the lexical family of "sustainab*", such as sustainability and sustainable, while the most frequent sustainab*-related clusters with over 1 occurrence are sustainable development, sustainable consumption, sustainable agriculture, sustainable sourcing, and sustainably managed. In addition, the food and foods terms appeared 119 times, registering the highest frequency for the clusters: food waste, food product/s, food chain, food preparation, food sector/s, food donations, food purchases, food banks, food hygiene, food offering, and food safety, with over 1 occurrence each. Only one drink word was mentioned. The report has 5717-word tokens (total number of words) and 1954- word types (total number of different words).

In the 2019 Kaufland Romania report (KPMG Advisory SRL 2020), the most frequent words with at least 10 occurrences are: suppliers, euro, billions, and projects. Also, beneficiaries, contribution, investments, stores, market, value, work, products, retail, employers, associates, expenses, development, economic, gardens, partners and promotion, with over 5 occurrences of each term. Further, only 4 words were found to be part of the lexical family of "sustainab*", namely sustainability, sustainable development, sustainable social enterprise, and sustainable relations with local producers. In addition, the terms from the food-related lexical field appeared 7 times, in clusters such as food products, healthy food, and food shopping. The report mentioned 4 terms related to drinks or beverages. The report has 2440-word tokens and 883-word types.

In the 2019 Lidl Discount Romanian report (2020), the most frequent words with at least 10 occurrences are: employee/s, work, financial, sustainability, development, plastic, environment, clients, stores, measures, education, professional, health, company, compliance, society/ies, product/s, risk/s, and program. Also, activity, training, internal, colleagues, energy, impact, leadership, management, medical, personal, projects, social, business, deposits/warehouses, food, anti-corruption, good behaviour (conduct), measures, responsibilities, results, satisfaction, security, have over 5 occurrences for each term. Further, 26 words were found to be part of the lexical family of “sustainab*”, namely sustainability, sustainable acquisitions, sustainable alternatives, sustainability certificate, sustainable embassy, sustainable cocoa, sustainable management, sustainable products, sustainable textile. In addition, the terms from the food-related lexical field appeared 12 times, in clusters such as food banks, organic food, food loss, and food retail. No mentions about terms such as drink or beverage were found. The report has 9471-word tokens and 2659-word types.

In the 2019 Coca-Cola Romania report (2020), the most frequent words with at least 10 occurrences are: work, system, management, environment, materials, employees, company, packaging, assessment, suppliers, market, safety, development, local, factory, policy, project, business, products, youth, waste, energy, limits, health, components, actions, water, reduction, impact, human, social, quality, compliance, partners, performance, production, programs, marketing, activity/ies, beverages, local, consumers, economic, collection, communities, emissions, ethics, process, protection, sugar, requirements, women, global, place, professional, risks, rights, information, responsibility, sustainability, good behaviour (conduct), consumption, team, efficient, events, legislation, measures, ministry, results, training, initiatives, bribe, mountain, objective, platforms, school, time, calories, bottling, recertification, recyclable, sustainable, support, youth, commitment, regulations, consumption, control, data, plastic bottle, social, value, life, association, CSR, standards, volunteers, climate, portfolio, stakeholders, food and water. Further, 61 words were found to be part of the lexical family of “sustainab*”, namely sustainability, sustainable development, sustainable management, sustainable agriculture, sustainable future, sustainable supply, sustainable cultivated, sustainable sources, sustainable company, corporate sustainability. In addition, the terms from the food-related lexical field appeared 32 times, in clusters such as food products, healthy food, and food shopping, while the beverage-related terms appeared 39 times, such as soft drinks, carbonated drinks, bottled drinks, alcoholic drinks, and vegetable drinks. The report has 30504-word tokens and 5091-word types.

In the 2019 Heineken report (2020), the most frequent words with over 100 occurrences are: board, financial, executive, company, tax, million, water, assets, supervisory, shares, value, risk/s, profit, operating, business, cash, performance, income, statements, management, liabilities, information, remuneration, audit, members, interest, accounting, beer, fair, global, BEIA, changes, balance, expenses, volume, world, policy, use, growth, lease, and markets. Further, 167 words were found to be part of the lexical family of “sustainab*”, such as sustainability, sustainable and sustainably, while the most frequent sustainab*-related clusters with over 1 occurrence are sustainability review, sustainability data, sustainable development, sustainable agriculture, sustainable sources, sustainability section, sustainability growth, sustainable packaging, sustainable business, sustainable food, sustainable future, sustainable use, sustainable volumes, sustainably advocating, and sustainably cultivated. In addition, the food and foods terms appeared only 11 times, in the following clusters: sustainable food, local food, multinational food, nutritional food, potential food, food safety, food products, food security, food chain, food companies, food contaminants, food production, and food source. However, the drink*-related terms were mentioned 49 times, in clusters such as soft drinks, underage drinking, energy drinks, alcohol drinks, drink driving, drinking water, drink plant/s, drink responsibly, drinking occasions, anti-drink, excessive drinking, new drinking, online drinks, safe drinking. Also, the beverage*-related terms were mentioned 30 times, in clusters such as beverage production, beverage industry, beverage companies, beverage shops, beverage fridges, beverage volume, alcohol beverages, online beverage, premium beverage, and western beverages. The report has 85581-word tokens and 5314-word types.

In the 2019 URSUS Breweries declaration (2020), the most frequent words with over and 5 occurrences are: employees, environment, employers, management, zero. Also, the terms, courses, work, actions, businesses, alcohol, consumption, ethics, care, integrity, internal, bribery, policy, reduction, social, activity/-ies, detector, companies, communication, good behaviour (conduct), corruption, discrimination, energy, factories, financial, impact, norms, regulations, health, system, and tolerance, have over occurrences. Further, only 1 word was found to be part of the lexical family of "sustainab*", namely sustainable development. In addition, no food*-related terms appeared in the text. However, the drink*-related family field were beer and water. The report has 1156-word tokens and 579-word types.

The reports of Auchan Holding and Heineken, being at international level, have a more in-depth presentation, so this is why the word occurrences were significantly higher. In addition, Coca-Cola Romania had an in-depth report. Also, some companies, have several reports on sustainable investments or CSR, but in the analysis was chosen the annual or sustainability reports, such as Kaufland and Lidl, and a declaration from URSUS breweries.

Among the best practices of sustainable business strategies implemented and aimed by the analysed companies for achieving sustainable development are:

- Achieving the targeted economic growth of the business (all analysed businesses), by cost reductions, operational improvements, better management of acquisitions, etc.;
- Developing strategic partnerships and improving the collaboration with various stakeholders (all analysed companies);
- Supporting local communities through CSR (all analysed companies);
- Improvements of waste management (Auchan Holding, Coca-Cola Romania, Heineken, Lidl Discount, Nestlé, Ursus Breweries);
- Increasing energy efficiency (Auchan Holding, Coca-Cola Romania, Heineken, Lidl Discount, Ursus Breweries), by improving the heating, lightning, and technological systems;
- Promoting a healthy lifestyle (Auchan Holding, Coca-Cola Romania, Heineken, Kaufland Romania, Nestlé, Ursus Breweries);
- Reducing the water use (Coca-Cola Romania, Heineken, Lidl Discount, Nestlé, Ursus Breweries);
- Reducing the greenhouse gas emissions (Auchan Holding, Coca-Cola Romania, Heineken, Lidl Discount, Nestlé);
- Adopting new technologies (Auchan Holding, Heineken, Lidl Discount, Nestlé, Ursus Breweries);
- Improving employees' wellbeing (Auchan Holding, Coca-Cola Romania, Heineken, Lidl Discount, Ursus Breweries), by ensuring their training and safety, respecting the working hours and their rights, fair pay, as well as other benefits;
- Increasing the employment opportunities, especially for youth and vulnerable people (Auchan Holding, Heineken, Kaufland Romania, Lidl Discount, Nestlé);
- Adopting ethical and transparency practices (Auchan Holding, Coca-Cola Romania, Heineken, Nestlé, Ursus Breweries);

- Increasing the use of renewable energy instead of fossil fuels (Auchan Holding, Coca-Cola Romania, Heineken, Nestlé);
- Promoting sustainable production (Coca-Cola Romania, Heineken, Lidl Discount, Nestlé);
- Increasing food/beverages quality in terms of health and nutrition (Auchan Holding, Coca-Cola Romania, Heineken, Nestlé);
- Promoting women empowerment at work and gender balance (Auchan Holding, Coca-Cola Romania, Heineken, Nestlé);
- Improving digitalization (Auchan Holding, Coca-Cola Romania, Heineken, Nestlé);
- Aiming and adopting the zero-waste principle (Auchan Holding, Coca-Cola Romania, Heineken, Nestlé);
- Improving the transport infrastructure by adopting alternative solutions (Auchan Holding, Kaufland Romania, Lidl Discount);
- Promoting responsible consumption (Auchan Holding, Heineken, URSUS Breweries);
- Improving the support for suppliers (Coca-Cola Romania, Heineken, Lidl Discount);
- Fighting against fraud and corruption (Auchan Holding, Coca-Cola Romania, Lidl Discount);
- Reducing energy losses (Lidl Discount, Ursus Breweries);
- Reducing the food losses (Auchan Holding, Lidl Discount);
- Developing and maintaining urban gardens (Auchan Holding, Kaufland Romania)
- Developing plant-based products (Auchan Holding, Nestlé);
- Promoting sustainable consumption (Auchan Holding, Nestlé);
- Improving the emergency services (Auchan Holding, Lidl Discount);
- Promoting the low-sugar products (Coca-Cola Romania);
- Promoting zero-alcohol beverages (Heineken);
- Combating natural disasters (Kaufland Romania);
- Accelerate meaningful innovation (Nestlé);
- Improving food traceability (Nestlé).

Additionally, Auchan Holding (2020), Coca-Cola Romania (2020), Heineken (2020), Nestlé (2020) specify in their reports how their businesses contribute to each of the 17th sustainable development goals through their development strategies. Finally, these four companies registered also the most comprehensive and complete reporting from the ones analysed.

6. Conclusion

Turning towards a long-term sustainable business strategy is starting to raise awareness from food and beverage companies working in production (agriculture or processing), retail or other connected services.

Ensuring the presence on the market has divided into more than economic strategy, and it now includes social involvement and reducing the environmental impact from the economic activity. In that way, the consumers would prefer to purchase products or services from them instead of regular products, so to contribute as well to the social and environmental commitment of the business.

At international level, and also at national level, new indexes have been designed so to evaluate this social and environmental involvement of businesses in every industry or their CSR. The evaluations being performed by external entities on already financial and non-financial published data of the companies, so the objectivity is ensured. Such an evaluation may be used by a company for adjusting its sustainability objectives and for creating awareness among the consumers.

At Romanian level, the recent history of the Romania CSR Index shows a growing interest from the food sector for sustainability. Yet, most of the companies present in this index are multinational, meaning that they apply a multinational policy which might be more considerate to sustainability reasoning, but there are also national companies involved especially in social projects.

The corpus-based analysis developed with AntConc showed that the food-related company with the highest mentions of both "sustainab*"-related words and "beverage*/drink*"-related terms is Heineken, while for "food*"-related terms is Auchan Holding. Usually, internationally, at group level, the companies ensure a more transparent and in-depth information about their contribution to sustainable development, as the corpus-based analysis showed. Also, the actions developed by the seven analysed companies for achieving sustainable development took into consideration all three aspects of sustainability: economic, social and environmental dimensions. However, different importance was attributed for each dimension depending on the priorities of each company.

There is no shortcut towards sustainability. It is an effort for all actors and the sooner these efforts are understood and best practices from pioneers in this area are adjusted to the own business, significant improvements would be registered worldwide.

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Appendix A6 – Definitions of key terms

Business Strategy – the set of objectives and actions in a certain period of time that are chosen by a company as the best option its development. It is what differentiates a company from other similar entities and generates a unique set of values for that company.

Corporate Social Responsibility – A business strategy that includes environmental and social objectives and aims at having a conscious positive impact on both the environment and the community.

Sustainable development – ensuring that the pursue for satisfying the current would not compromise the possibility of future generations to pursue their own needs. A sustainable development includes the economic, the social and the environmental aspects of growth.

Food loss – represents the quantities of food, no matter the processing stage, that are unfit for further processing or consumption due to malfunctions of the food production and supply system or its institutional and policy framework. This may be caused by managerial or/and technical limitations (e.g., lack of appropriate storage facilities and food handling practices, infrastructure, packaging or transportation). Food loss mostly happens in early stages of the food supply-chain.

Food waste – represents the quantities or food that are removed from the food supply-chain intentionally or by neglect (leaving a product unconsumed until it expires). Food waste is more common at the retail and consumer levels.

Ch.6

SUSTAINABLE DEVELOPMENT STRATEGIES IN THE FOOD BUSINESS

Sustainability resporting and good practices of food businesses

OBJECTIVES: The readers will be able to:

- ✓ Understand the concept of sustainable development through its three main aspects
- ✓ Perform a qualitative analysis in any field by using the corpus analysis technique
- ✓ Give practical examples of sustainability indexes
- ✓ Give best practices examples of sustainable business strategies

SKILLS: The test requires the use of both hard and soft skills, i.e. data management, research skills, critical thinking, and communication.

QUESTION 1 (PLEASE CHECK THE CORRECT ANSWER)

Which of the follwing represents the first definition of sustainable development?

- ☐ Pursuing the current generation needs, without compromising the possibility of future generations to pursue their own needs
- ☐ Considering the needs of the community before your own ones
- ☐ Having a responsible conduct in society
- ☐ Following the international regulations on environment

QUESTION 2 (PLEASE CHECK THE CORRECT ANSWER)

Which index does not refer to evaluationg the sustainability of a business?

- ☐ The Green Business Index
- ☐ The Dow Jones Sustainability Indices
- ☐ The Romania CSR Index
- ☐ The GDP/capita

QUESTION 3 (PLEASE CHECK THE CORRECT ANSWER)

A sustinable business strategy should include?

- ☐ Economic and Social Objectives
- ☐ Economic, Social and Environmental Objectives
- ☐ Social and Environmental Objectives
- ☐ Environmental and Economic Objectives

QUESTION 4 (PLEASE CHECK THE CORRECT ANSWER)

Which of the following company reported the most comprehensive information on sustainability for romania in 2019?

- ☐ URSUS Breweries
- ☐ Kaufland Romania
- ☐ Coca-Cola Romania
- ☐ Auchan Holding

QUESTION 5 (PLEASE CHECK THE CORRECT ANSWER)

Which measure from below does not respect the sustainable development principles?

- ☐ Using technologies based on fossil fuels
- ☐ Adopting a zero-waste policy
- ☐ Reducing the meat consumption by increasing the plant-based products
- ☐ Promoting diversity and equal opportunities in the workplace

QUESTION 6 (PLEASE WRITE THE CORRECT ANSWER WITHIN THE BOX)

Please provide three examples of indicators that contribute to the evaluation of social involvement of a business.

PRACTICAL APPLICATION: COMPARE AND DISCUSS WITH YOUR PEERS THE SUSTAINABILITY-RELATED STRATEGIES OF TWO FOOD COMPANIES WHICH ACTIVATE IN YOUR AREA

7. Promoting Production and Export of Organic Agriculture Products through Government Policies

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Abstract: Environmental policies take into account the importance of organic farming in sustainable development and increasing concerns for protecting the environment through the use of agricultural practices, practices that have created the right framework for the advancement of organic farming practices and the resulting products. Globally, there are a number of interventions in the form of state measures conceived to support the development of organic agriculture. With roughly every country on the globe focusing on organic food production and growing demand, shaping government approaches to back up the changeover to organic farming, production and export of these products has become a priority.

Keywords: organic farming; global organic food market; organic farming policy; trade agreements; international trade; support policies.

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1. Introduction

In order to understand how the export and production of organic products can be promoted, it is necessary to analyze the dynamics of the world organic food market, identifying the main factors that influence it. To date, the global market for organic products has developed differently, due to either the adoption of legal regulations, the existence of diversified assortments of organic food, or the development of different infrastructure, different product promotion or ecological food demand. In addition, differences in the advancement of organic product markets are based on the different levels of economic and social development of states, natural and production resources or access to finance for producers. Thus, on the one hand, there are markets that have reached a certain degree of maturity such as the USA, Germany, France, Italy and Denmark, and, on the other hand, rapidly developing markets such as Spain, India, China, Australia. But new markets are also emerging. One of the most recent reports of FiBL and IFOAM shows a substantial increase in organically cultivated agricultural areas and the trend is rising (Willer & Lernoud 2019). Data available in 2017, collected from 181 countries, show that the organic farming market reached the highest value, respectively of 97 billion USD. “In the ongoing plot, the USA is the leader of the organic market with a net value of 40 billion euros” (Lernoud & Willer 2017). “Next to the USA, there is Germany with a market worth 10 billion euros” (Schaack 2016), followed by “France and China, with a net market share of 7.9 and 7.6 billion euros, specifically” (Willer & Lernoud 2017). The French organic market has reached the fastest growth rate of 18% (Bio Eco Actual 2019). At the same time, India ranks first with the largest number of organic producers (Assocham 2018). These statistics are of particular importance

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to policy-makers in understanding the overall economic impact of the consumption of organic products and also help them to develop more complex, consumer-oriented policies.

A special threat for "policy-making is that organic agriculture, as a concept, does not belong to the government, who cannot change and accommodate it at will. The idea has been developed by growers and stakeholders since the early twentieth century and supported by clients through specialized markets, especially since the 1970s" (Lockeretz 2007). Even though it can now be to a greater extent owned or controlled by other entities (food industry, regulators, policy-makers, research institute), the need to draw in entities with vested interest and to adhere to the contribution / ownership to maintain the uprightness of the idea it is also essential in line with contemporary viewpoints of good practice in policy advancement and application.

Thus, a critical part in the development of farming and export of organic goods is increasingly played by institutions that regulate and set strategic objectives. The table 7.1 shows the status of regulations implemented in countries in Europe, South America, North America and the Caribbean, Asia and the Pacific, respectively Africa.

Table 7.1. Organic regulation by continent or region

Continent/Region	Regulations fully implemented in the country	Regulations not fully implemented in the country	Countries in the process of regulation	Countries with a national standard but without regulations
Europe	37	2	3	-
Asia and Pacific Region	21	4	6	22
Americas and Caribbean	18	3	2	-
Africa	1	1	7	11

Source: Data from FiBL; IFOAM (2018).

The ability of the organic subdivision and its fundamental organization, its union and the liaison between organic interest groups and state alter the governmental rhetoric and, consequently, the way in which the policy of organic agriculture is developed (Stolze & Lampkin 2009).

The development of current and future policies for organic farming will always have multiple objectives: generation of income, conservation of natural assets, food self-sufficiency and rural advancement - but with different levels of emphasis. There are still many issues that need to be addressed in establishing conditions that provide equal opportunities for producers and the equivalence between different national standards. The focus on certified organic products (and the associated costs and risks) has drawn attention to the potential of this system to provide to local food security, especially in areas with low potential. Market-oriented organic agricultural policies must be complemented by agricultural policies aimed at local food security.

For both authorized organic farming and non-market organic farming, the main advantage that can be gained from governmental and worldwide organizational help is satisfactory research and education. The major challenge is to "shift capital investment from difficult technologies to light technologies - that is, from agricultural inputs (private goods) to creating a knowledge base (a public good)" (Scialabba 2000).

The present study analyzes the state of policies aimed at farming and export of organic products, highlighting the context of their appearance in relation to the specifics of the policy implementation area, presenting the impact that the measures included in these strategic documents have on the advancement of organic farming.

2. Production and export of organic products worldwide

Depending on the specifics of the development of the organic products market, there are two groups of countries: the first ranked and the least developed in the African continent. The table 7.2 shows the specifics of their development.

Table 7.2. Specifics of development of organic food markets

Countries	Specifics
The USA	Tough competition in the market; developed institutional structure; generator of new tendencies in the global organic food market, which are promptly adopted by organic food consumers from other countries; 75% of organic food is exported to USMCA countries (Canada and Mexico); setting direct connections between large chain resellers and small and medium organic producers, creating collaborations that lead to exclusion of all resellers by creating own supply systems.
Germany	Favorable economic environment; imports of a large quantity of organic food from EU countries since demand considerably exceeds supply; developed European regional and national chain of supermarkets and organic shops, which have relatively big assortments of organic food.
France	Demand satisfaction of 70% due to own production, with the other 30% covered by imports from European countries; considerable price difference between organic and traditional goods, at 79%.
Italy	Fragmented and competitive market; about 5% of food exports of Italy are organic food; major trade partners of Italy are Germany, France, the Benelux countries, Scandinavian countries and the USA; active organic food consumers of Italy are educational establishments; Italian organic sector mainly produces plant-source products.
Spain	Organic sector of Spain is export-oriented, mainly towards Central European countries; 80% of Spanish products are imported by Germany, France and Great Britain; so-called "sustainable restaurants" are widespread in Spain; they prefer local organic food suppliers.
China	Export-oriented development direction of Chinese organic sector; countries that import organic food from China are the USA, European countries, Japan and others; over 80% of domestic market is controlled by hypermarkets and specialized shops; the growth of solvent population forms demand for ecologically safe food; the world e-commerce development driver.
India	Concentration of the largest number of organic producers; major countries importing organic food from India are the USA, Canada, Switzerland and Israel; annual growth of Indian organic food market is at 20%–30%; considerable development potential if domestic issues are solved: creating transparent certification process, strengthening national brands' role in the international market and state support of national producers; has the first 100% organic city.
Latin American countries	Important regional organic food supplier; the biggest quantities of organic land are located in Argentina, Brazil and Uruguay; 80% to 90% of produce is exported to the EU, the USA (about 70% of organic food imported to the USA is from Latin America) and Japan; exports cover a wide range of food, including bananas and coffee beans from Central America, Paraguayan and Brazilian sugar as well as Argentinean meat.
African countries	The largest quantity of organic areas, favorable climate and a lot of water bodies; organic food is mainly exported.

Source: Bazaluk et al. 2020.

The concerns of organic producers point in two directions:

- *production domain (inputs with effects on total yield and production);*
- *marketing ("product prices, marketing cost and market availability").*

In a first stage, farmers had production problems, and their concerns were related to soil, pests and diseases. At a later stage, when worldwide trade in organic produce increased, the significance of market issues took precedence.

Direct aid for organic farming to help growth or to use more environment-friendly practices and other designs of aid have been granted in some countries, but not all of them. These subsidy policies create benefits for a few (like producers and consumers) and difficulties for others (like exporters whose competitive advantage decreases). A decrease in customer prices is crucial for the advancement of the market for organic products, which can be achieved by increasing production and market maturity. It is also necessary to harmonize legislation and standards in agriculture. Serious problems with non-tariff obstruction (such as time delays due to necessity) may arise. Policies to increase domestic consumption would protect organic producers in some developed countries from imports of products from exporting countries. One solution in establishing more effective government strategies would be to choose between promoting policies that favor domestic producers or regulate the import of organic products, a policy of taxing the use of pesticides and fertilizers in agriculture. Although several European countries have adopted this solution, much more needs to be done. Such policies "may confirm being beneficial to producers, consumers and environmentalists in all countries". (Vossenaar & Wynen 2004).

Experience has shown that help measures, including institutional ones, to sustain and promote exports are needed to enhance the capacity of less developed states, in order for them to benefit from trade favorable circumstances for organic products.

Raising awareness of the environmental, economic and social benefits of organic production is also the subject of an environmental policy. NGOs can play a substantial role in this.

Aiding research policies in both the production and marketing of organic products can contribute to the identification or development of suitable plant varieties, as well as those resistant to disease, to rapid growth in the early stages but also to the identification of "those that produce at high yields without synthetic fertilizers (without resorting to genetic engineering)". Different fields of study that should be reassured would involve rotation, to reduce pest problems, and the identification of natural methods of pest control, including the advancement of agricultural management appropriate to local circumstances.

It is also imperious to have policies that find the restrictions of increasing the stock of organic production and the measures to overcome these restrictions. Market research should be "conducted to determine: demand trends in both external and internal markets; the certification and quality requirements to be met by products imported from other countries; potential partners, including exporters, foreign buyers, distributors and consumers". All this would determine the most appropriate marketing strategies.

The advancement of local guidelines is valuable for organic production and certification. The problem of authorization is present especially in less developed countries that depend on worldwide certification to be able to export organic products. In these cases, there are internal certification entities that have been officially recognized by foreign entities and are commissioned to certify according to the guidelines of the importing states. In the case of countries with high consumption of organic products, policies should aim at systems to advocate imports of organic products from evolving nations. Governments of advanced states and import promotion organization could give intelligence on organic standards and regulations, market opportunities and other factors relevant to exporters in evolving nations.

It is specifically relevant to establish that measures that build up organic production do not distort competition and that standards for organic production, processing and marketing do not construct barriers to trade.

It is also necessary to balance "organic production policies with other concerns such as food security. Empirical analysis is needed to support developing countries in developing clear policies in support of organic farming." (Vossenaar & Wynen 2004)

Dhiman presents the cases of the main continental (Europe, Asia, North America) or national (Germany, Australia, Denmark) ecological markets and the measures provided for in the policies and legislation governing them. (Dhiman 2020)

Table 7.3. Current status and global policy initiatives in the organic farming sector

World's Regions	Current Status of Organic Market	Policies & Legislations
Europe	In 2017, Organic farmland reaches up to 12.6 million ha. 250000 organic product producers reported in 2016 in EU. 2nd largest consumer of organic food (retail sales of 34.3 Billion euros). Import of 3.3 Million tons of organic food products, reported in 2018.	National action plan. EU rural development program. Main target is to double the organic land proportion. Scheme of compensation for management of organic farms.
Asia	Total cultivated organic land is 6.1 million ha (0.4% of total agricultural land). 25 % hike is observed in organic farmland area in between 2016-2017. China is on the top with largest organic cultivated area followed by India. Estimation of 9.6 billion euros market of organic farming in Asia.	Establishment of OFDC by China in 1994 for organic products certification. Establishment of CAAC (China) in 2002. China instituted CNOPS in 2005. Cluster program by Indian government "Parampragat krishi vikas yojana" brings about 500,000 acres under organic farming. India initiates value chain based organic farming scheme in northeast regions. Scheme for integrated development of horticulture (India) was implemented from 2014-15. Introduction of national mission for sustainable agriculture.
North America	Presence of 7% agricultural land. 2.2 million ha land under organic farming. In 2017, FiBL and IFOAM estimated 48.7 billion dollars net worth of organic market.	USA in 1990 passes organic food production act to regulate production and processing of organic food. Initiation of National Organic Program. USDA labelling of products.
Germany	8% increase has been observed in organic cultivated land. 10.91 billion Market with average growth rate of 5.5% since 2018.	Framing of Organic farming act by the German government. Establishment of BOLW for improvement of organic farming. Uniform Ecolabel on organic products is used since 2001.
Australia	Australian organic market is with net worth of 2.4 billion dollars. 88% growth rate has been observed since the year 2012. 12% of Australians are now committed purchasers of organic products.	Development of private certification organizations in the period of 1980s. These organizations come under AQIS in 1990. Establishment of BFA and NASAA for the promotion of organic practices. Adoption of national standard in 1992 which later amended in 1998.
Denmark	World's leading nation in organic farming. Having share of 8.4% in global market.	Government in 1987 adopted the organic farming act. In 1992, Government starts providing Grant in aid for organic research. Introduction of permanent subsidies to farmers of organic agriculture sector in 1994. Initiation of Education program of farmers working in organic fields in 1995. Permanent organic payments and flat conversions replace the permanent subsidies in 2004.

Source: Dhiman, 2020.

3. Support for the production and export of organic products in Asia, Latin America and the Caribbean, Africa and Oceania

In the East (Asia), the support of the people for organic agriculture is quite new in comparison to the West (Europe). Nonetheless, remarkable steps nationwide to establish a set of actions for the advancement of organic agriculture have been initiated in Asian nations, including a number of states from India (Karnataka, Sikkim, Kerla), Taiwan, Bhutan, Philippines. During the year of 2010, the Philippines adopted the "Organic Agriculture Act (Republic Act 10068)" has been ratified, designed for creating a structural groundwork for backing the development of this area. This includes relegation but the most important is that the policy established the basis of a national key system for practicing organic agriculture during 2012-2016. A similar situation is found in Sikkim (India). Here, the engagement from the political factor for backing organic agriculture goes back to 2003 and was strengthened in the year 2010 when the Sikkim Organic Mission was created, a road map detailing the requirements needed to accomplish, by 2015, the objective of developing agriculture that is organic. In India, the national government as well as the states implemented important actions to develop organic agriculture. An example is the launching, in 2015, of the Paramparagat Krishi Vikas Yojana by the national government, a program with numerous actions designed for the advancement of organic agriculture, targeting smallholders and the adoption of the Participatory Program with Guarantee Systems. (Varini & Katto-Andrighetto 2019).

In the southern countries of the American Continent, political backing for this type of agriculture has not been very high. Political actions focused primarily on the development of organic legislation at a national level. Legislation for backing small farming is as recent as the early 2000s. Many of these actions do not form policies, but are rather programs posed to create risks in terms of becoming legislation and becoming permanent. Visible exceptions exist, such as the "Brazilian national policy for agro-ecology and organic production - PNAPO, Federal Decree no. 7,794" - in force since the year 2012 and the "Organic Program for Public Procurement in Public Schools (Programa Nacional de Alimentação Escolar (PNAE)" adopted in 2009 ("Law 11,947 / 2009"). A similar success can be found in Cuba where, in 1997, the Agricultural Program began and continues to operate. The program represents a crucial step the country took to combat the food shortage following the disappearance of the former USSR. This allowed for the advancement of organic agriculture as well as for agroecology in Cuba. Some Mexican states (e.g., Chiapas, Oaxaca, Zacatecas as well as Mexico City – the federal district) adopted legislation that encourages locals to farm organically.

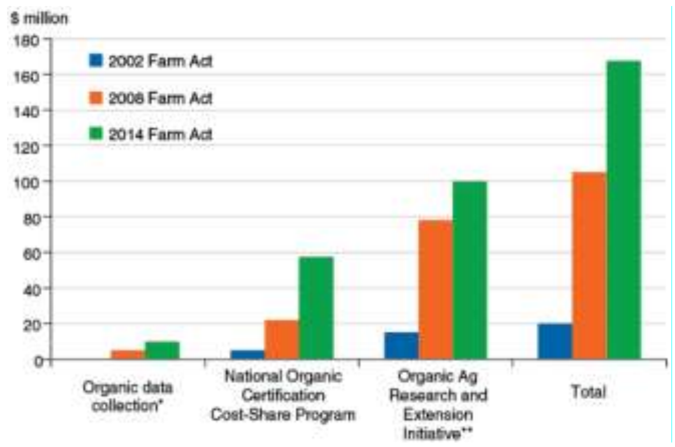
In Africa, as a rule, governments lacked the necessary resources to develop organic agriculture, therefore this was done mainly through external assistance. The exception is Tunisia, which has seen an overwhelming success in this area - especially in the value of exports after the application of the 1999 Law, that allowed for considerable public investment in research and the expansion of the sector (Varini & Katto-Andrighetto 2019).

Ocenian countries (Australia, New Zealand), in general, adopted a non-interventional stance regarding agriculture and, as a result, very few pro-organic legislation exists. In the Pacific islands there is a political interest in organic farming in communities and some intriguing programs can be found here. Before 2008, organic agriculture in the Pacific had no legislation, no support policy and no improvement plan that could allow the main players in organic farming to work together. Using funding from the "International Fund for Agricultural Development" (IFAD) and specialized guidance from IFOAM – "Organics International, the Pacific Regional Organic Task Force" (ROTF) has put together the "Pacific Organic Standards" (POS). ROTF has been described as a specialized entity speaking for those living in the islands from the Pacific where it is grown organically. Another ad hoc group was made up of leaders, known as the Pacific High Level Organics Group (PHLOG), which was created to contribute with political support at the higher levels and assistance. The norm approved in 2008 by PHLOG was later adopted by high government representatives of the region. Consequently, the "Secretariat of the Pacific Community" (SPC) backed the advancement of the Organic Pacific as well as the Ethical Trade Community (POETCom), a network of vested entities that has grown from ROTF. POETCom established an organic insurance and labeling framework and in 2013 implemented a regional brand called "Organic Pasifika". Even though a procedure of supporting organic farming is beginning to evolve in several places and states of the Pacific Community, the SOP has been recognized and adopted in accordance with the law only at national level in the legislation of French Polynesia (2011) and New Caledonia (2017). A recent tendency is that municipalities and cities are playing a bigger duty in helping the advancement of the organic sector while creating legislation on wider aims connected to the development and sustainable advancement of urban regions. In the Philippines, for example, the League of Municipalities and Cities Involved in Organic Agriculture (LOAMC), which was conceived in 2012 and has about 120 members, demonstrates an example of integrated urban management and aims to integrate organic farming at the municipal and urban level. LOAMC has become a "technical consultant for the National Council for Organic Agriculture, which formulates and oversees the implementation of organic farming policies at the national level" (Varini & Katto-Andrighetto 2019).

4. The situation of supporting the production and export of organic products in North America

The US is generally characterized by a inferior level of market interventionism. In the US, the agricultural sector and the government prefer to leave the agricultural market to self-regulation. The help measures for the most part target research, insurance plans and limited coverage of certification costs. Congress stimulated financing for some of organic programs in the agricultural laws of 2008 and 2014. The provisions on organic programs in the "Farm Act 2014" cover a wide range of objectives – "assistance with the costs of organic certification, expanding organic research and data collection, improving technical assistance and crop insurance, strengthening the application of organic regulations and expanding market opportunities for producers". The 2014 US Farm Bill1 was a valuable accomplishment for the American organic sector. The act also expanded financing for the "National Organic Program" (NOP) and enhanced the security plan for organic firms. Nevertheless, there are still critical lack of balance between organic and common producers. "In 2016, the U.S. Department of Agriculture (USDA) removed most of these discrepancies and made the law enforcement process accessible for small farms". (Greene 2014).

Figure 7.1. Mandatory spending on organic agriculture, 2002-2014 Farm Acts.



*Includes 5 million USD IN 2014 FOR National Organic Program database and technology update.
** Does not include intramural organic research funds in USDA, Agricultural Research Service.
Source: Office of Budget and policy Analysis budget summary data (2002), Congressional Budget Office (2008), and 2014 Farm Act (Green, 2014)

In Canada, the region of Quebec was the first place where the government provided help for the organic subdivision. It started in 1989 with a scheme for giving finance for studies, expansion and help for the formation of sectoral organizations. "At the federal level, the Center for Organic Agriculture in Canada (OACC) at Dalhousie University, in collaboration with the Organic Federation of Canada, has received federal government funding since 2009 to implement several Research Programs within the Organic Sciences Cluster" (Greene 2014).

The EU and US governments have always had different policy perspectives on environmental protection, agriculture and, by extension, organic farming.

From the outlook of many countries from EU countries, organic farming offers social and environmental advantages to everybody and is considered an industry that needs help to compete with other markets.

This perspective over organic farming as a facilitator of public goods offers an economic reason for government interference in the market.

The US government's approach, while recognizing the beneficial effect of organic farming on the quality of the habitat, holds the organic subdivision chiefly as a market favorable circumstances for producers and considers organic food as a differentiated produce available to consumers. "In such cases, government-developed standards and labeling rules facilitate market transactions and address consumer concerns about product identity." (Dimitri & Oberholtzer 2006)

5. The situation of supporting the production and export of organic products in Europe

Even though organic agriculture, as a notion, has been around for more than 80 years, it was during the 1980s that it became the center of attraction for governments, users, ecologists and producers all over the countries of Europe. This critical juncture coexisted with growing concerns about the negative impact on the environment and other effects of - farming advancement, after the Second World War, as well as the promotion of government programs to back agri-environmental actions, together with organic agriculture.

As attested, in the absenteeism of additional governmental, institutionalized backing, organic farmers relied on the clients for substantiating their principium and methods. Initially, the market evolved based on the "means to an end" principle, contributing with a sort of repayment to producers so that the market can now be regarded as a goal in its own right. As of this day, customers consider organic produce to be good for one's health, harmless and of superior condition and for this they are eager to spend more for organic produce, not necessarily motivated by aspects such as climate protection or wildlife well-being.

State help regarding organic agriculture, as acknowledgment of its extensive advantages, started during the end of the 1980s, with interstate programs in European nations such as, but not limit to the Danish nation, Austria, the Swiss nation, and programs in several States from EU, part of the Union's Enlargement Program ("Commission Regulation) (EEC) No 4115/88") ("Lampkin et al. 1999, Lockeretz 2007"). Following this, the advancement of organic agriculture transformed into a tool of state farming regulation. As a result of the lawful description of organic agriculture ("Council Regulation (EEC) No 2092/91") during the first years of the 1990s, it was eventually achievable to particularly encompass organic agriculture as a choice in environmental farming and different rural improvement plans. Central help for organic agriculture is to this day expanding in different fields such as R&D, market evolution and end-user advocacy.

At European level, research has identified two contrasting ranges of policy advancement:

1. Development of tools to back organic agriculture in the Union, junction as well as impact at homestead level,

2. Involvement of stakeholders and institutions in the development of policies and factors influencing Europe's agricultural policy networks. (Stolze & Lampkin 2009).

In the Czech nation, organic agriculture legislation is primarily talked by the state through the central power and the main organic agriculture entities for whom organic lobby groups have been empowered to speak for the whole sector with the political factors. Therefore, this domain performs coherently and adopts a clear and coordinated position vis-à-vis state entities. It is thus able to counterbalance the standardized power of the government. The close connection between the main ecological agricultural organization and the Ministry of Agriculture is materialized by the fact that it helps to implement policies and provides information to state agencies.

In contrast, in the case of Poland, there are several actors who do not act in a coordinated way, as there is no clear architecture. Organic farming policy is governed by the state, while the organic subdivision does not have sufficient assets to participate adequately in the policy-making mechanism. It lacks coherence and is not well systematized. As a result, organic farming organizations are finding it difficult to be heard and to establish a clear position on the government's policy. This also makes clear why organic agriculture legislation is not as coherent in the Polish nation as it is in the Czech Republic.

At the same time, it should be emphasized that newer policy areas, including organic agriculture performed by new States that joined EU, are generally quite active and susceptible to change. (Moschitz & Stolze 2010).

In Europe, when analyzing the alternatives feasible for politically backing organic agriculture, Michelsen distinguishes three important tools ("Michelsen 2002"):

1. Legislative tools (regulation) consisting of the rule and capacity of the central government.

2. Economic tools have a base on the market price system and operate through economic stimulus, either beneficial and encouraging or unfavorable (tariffs, taxes as well as fees).

3. Communication tools - are based on reciprocity and social norms of civil society and involves a kind of cooperation between the one that makes regulation and those who have to comply with the regulations.

Beginning with the early1990s, and the addition of "Council Regulation (EEC) No 2092/91", organic manufacturing, labeling as well as authorization acquire legal status from the central authorities. Such legislation can be interpreted as a least amount of rules, while much authoritarian ones can be set by private farmers' associations. These norms represent a backbone for state level policy in countries not part of the Union, such as the Kingdom of Norway or the Swiss Confederation. Very much alike legal interpretation and legislative strategies were put into action in numerous non-European states, including the US and Canada, and instructions for organic agriculture are included in the FAO Codex Alimentarius and the WHO ("Codex Alimentarius 2008") for governing international trade.

Green sector action plans are commonly used in Europe to back the evolution of the green sector, by harmonizing public legislation and particular or free-willed actions in a strategic structure, at various levels of power - regional, state-wide or continental. They most often rely on a alliance method by the representatives of the green sector, government officials as well as different relevant organizations, on prevailing development goals and actions, established over a set period of time.

The dominant continent regarding public help for organic farming has always been Europe, and, more precisely, the EU. Countries from Europe have brought in modification aid plans and other types of economical assistance for organic food growers at state-wide or local level since the year 1987 and the year 1993. With the establishment of the legal definition of organic farming (Regulation (EEC) 1991), it has become likely to incorporate it as an option in agri-environment programs (Regulation (EEC) 1992) and in provincial progress plans. Such proposal represented a consolidated method in aiding organic farming, in particular by introducing help for the transformation and support of organic agriculture.

Regulation (EC) no. 834/2007 of the Council lays down the "general objectives and principles of organic production, defining the basic rules for the organic production of crops, animals, aquaculture and seaweed and the processing of food and feed. The Regulation also includes criteria for the use of certain products and substances, control and inspection of the supply chain and rules of trade with third countries". (Regulation (EC) 2007).

"Commission Regulations (EC) 889/2008" and "(EC) 1235/2008" accompany "Council Regulation (EC) 834/2007" and "lay down detailed implementing rules governing the production, processing, packaging, transport, storage, labeling and control, and imports". (Regulation (EC) 2008).

A fresh EU regulation, adopted in 2017, "which took over many of the recommendations of the green sector, will repeal the current regulations. It is expected to enter into force in 2021, complemented by a number of implementing rules currently being developed". (IFOAM 2017).

Today, in the European Union, the ordinary agricultural policy goes on as being an essential legislation tool for supporting the advancement of organic agriculture. However, in time, support for the organic subdivision expanded into other legislation fields: "research, market development, public procurement, etc." In the middle of the 1990s, a diverse set of help actions began to unite in extensive legislative directions such as state-wide or local organic strategies. Moreover, the capacity of the organic subdivision to collaborate favorably with government entities has expanded. (Varini & Katto-Andrighetto 2019).

5.1. European action plans - the instrument to support the development of the green sector

Green sector action plans are commonly used in Europe to back the progress of the green subdivision, by harmonizing public and private agendas or free willing initiatives in a strategic structure, at dissimilar ranks of governance - local, national, and not least European. These relays on an association strategy of representatives of the green subdivision, – government officials and relevant organizations, on accepted development goals and actions, agreed over a exact period of time. (Meredith et al. 2018).

Through time, the organic campaign has evolved the basis and guidelines of organic farming further than the extent of EU policy through "IFOAM ("Basic Standards and Accreditation Criteria") rules" and at national level through independent, constantly updated, organic sets of rules, that provides additional details and engagements in particular areas. As organic products transcend specific markets, the green movement acts enthusiastic to make the transition of global food and agriculture systems to a sustainable approach based on ecological principles.

Figure 7.2. The IFOAM 2030 Vision and Map to Organic 3.0.

Source: IFOAM EU (2016).

The ecological movement strives to enable better adoption of absolutely tenable food and agricultural systems, as well as markets that are based on ecological and agro-ecological standards, and this engagement is outlined in "Transforming Food and Agriculture: An Ecological Vision for Europe in 2030", approved in the year 2015 by "IFOAM EU", within the worldwide Organic 3.0 method launched by "IFOAM Organics International". 2030 Vision was integrated by the document "Transforming the Agricultural Sector and the Food Industry - A Reality: A Map of the Ecological Sector for Sustainable Food and Agriculture Systems in Europe", that was published in 2017. In this document you can find out crucial advice for achieving the Vision, based on three topics:

- Organic products in every household: The addition of organic farming to sustainable food structures is recognized by decision-makers and taxpayers, accompanied by an increase in organic land and the supply of organic products.
- Improve - Inspire - Deliver: Ecological systems are flexible, repeatedly bettering their performance and attracting only positive changes regarding the knowledge and nutrition.
- Fair work - Fair payment: Value and potential are delivered equitably among all entities in the distribution chain, including production costs and benefits.

In its efforts to transform the agricultural sector and the agri-food industry, the green movement views the green sector approach as a proven way to achieve an earnest performance of the "UN Sustainable Development Goals" on the European continent and even abroad.

The EU policy framework to help the growth of the green sector consists of four main areas, as can be seen in the figure 7.3.

Figure 7.3. EU policy framework to support the development of the ecological sector

Source: Meredith et al, 2018.

European Green Action Plans produce a structure for assimilating legislation and actions to stimulate the growth of the green sector. Action plans are used as crucial tools for states and the green sector, as a whole, to accomplish policy objectives. This is especially essential when numerous policy objectives need to be considered, such as the growth and development of the green sector, economic development, market and provincial progress, the climate, sanitation and social gains.

Action plans can aid to create alliances and avert conflicting policies, while ensuring that different measures are complementary. In addition, action plans allow for a better approach to specific bottlenecks and allow for different entities with vested interest to be involved in legislation preparation. They count on productive and comprehensive gatherings to cultivate a key vision. Green measures can be put into action at contrasting stages of governance - from the European level to state-wide and local action plans and this needs to be comprehensible with a worldwide vision too - the maxim "think globally, act locally" is important in this situation. Strategies are usually coordinated by states, line ministries, but can also be initiated by business and central facility; they can be directed form the top (for example determined by government policy), or bottom-up (led by relevant entities with vested interest) or mixed (a combination of both top-down and bottom-up).

The key phases of the development of the action plan, including setting up the agenda, creating policy, application of policy and assessment, accompanied by the summary of the subject steps contained in the *Green Sector Resource Manual*. (Meredith et al. 2018).

A number of countries that are set in Europe, including the Kingdom of Belgium, the German Confederation, the Spanish Kingdom, the Swiss Confederation as well as the United Kingdom, have created regional strategies. Such strategies are present only at a local level in the Kingdom of Belgium, the Swiss Confederation and the United Kingdom, while in the German Confederationas well as in the Spanish Kingdom, you can find both local and state-wide green measures. In he German Confederation, for example, a national plan of action for organic agriculture was adopted in 2017 under the name "Organic farming - Looking ahead: Towards greater sustainability in Germany" ("Zukunftsstrategie ökologischer Landbau - Impulse für mehr Nachhaltigkeit in Deutschland") in order to reach 20% of the lands under ecological administration.

Similar to state-wide plans, local green strategies contain a number of actions, such as actions focused on manufacturing, retailing, research, science and know-how exchange. The advancement of strategies at a local level most generally mirrors the fact that accountability and capability for food, agriculture and rural advancement belong to regional or provincial governments in definite countries of Europe. Simultaneously, regional exploits grant the goals, action points, and first concern fields to echo the advancement requirements of a particular area or land and it can also favor the general objectives of a state-wide environmental strategy to be implemented regionally or locally. A 2015 report (IFOAM 2015) that monitored 31 countries found 12 countries that have a national plan and five countries that have local plans. Such strategies were created in states where accountability for farming and provincial advancement policy rests with local governments, and as a result the push to draw up a scheme arose at this degree. In the other nineteen countries, there was no national plan drawn up at time of the inquiry. Nevertheless, current actions have been taken in several countries and / or there have been continuing dialogs about possible new ideas. In the report that was released in 2015, the EU IFOAM and partners (Andalusia (the Spanish Kingdom), the Czechnation, the Kingdom of Denmark, the German Confederation, the French Republic and Scotland) carried out an painstaking review of six state-wide and regional environmental strategies. The analysis has been based on a previous investigation performed as part of the ORGAP undertaking. It disclosed a number of contrasting preferences in terms of areas of interest and approaches for the advancement, application and assessment of action plans. Plans also differ in increasing present backing for organic produces and agriculture, and for this entire area state-wide or locally. A few environmental action plans have been adopted based on top controlled measures (Czech Republic, the German Confederation). Others advanced having a different approach, incorporating sector-oriented, bottom controlled measures (the Kingdom of Denmark, the French Republic, Andalusia, and Scotland). For example, in Scotland, the advancement of this idea was carried out by a government-funded subdivision group. In principle, the case studies revealed a high level of entities with vested interest contribution in the advancement of strategies, usually from the start, by setting up a group of experts / consultants representing the green sector. The plans in the Czech Republic, France, Denmark and Scotland embodied an integrated observing or evaluation procedure in the agenda, and in the Czech Republic this contained observing by an advisory board of the Ministry of Agriculture.

Environmental action plans meet the objectives of government policy and the status quo, the development of the green sector in every region or country, which could be altogether dissimilar. Consequently, the revised action plans vary in terms of the development process, objectives and focus of the benchmark on assertive fields. This is expected to the contrasting political and socio-economic circumstances for the green subdivision in every one of these areas. Action plans cannot always be completed, due to policy adjustments at state level or other elements. "The ownership context of the plan and the role of the green sector in peak delivery may need to be considered from the outset to ensure against such contingencies". (Meredith et al. 2018)

6. Conclusion

The significance and urgency of organic farming in the contemporary era of the agricultural sector is also proven by the vast legislation and numerous policies that have been developed around the world for the development of its agriculture. The challenge now is to implement policies correctly. Implementation, significance analysis and public alertness are the answer to the success of any policy. An effective policy is one that contributes to the long-term development of the sector, while meeting the goal of a sustainable environment. (Dhiman 2020).

The institutional imperatives of the development of organic production are:

1) Informal rules actually accepted by society or "rules of the game", produced in society and established by law, aimed at ensuring the production of organic agricultural products;
2) The interaction between organic farming and the market for organic agricultural products;
3) Market strategies for organic agricultural products, regulatory and coordination mechanisms, taking into account spatial and temporal variables and complex forecasting tools (Bezus et al. 2019).

Although there are many government initiatives in the field of organic farming, it has been noted that more coherence and farmer-oriented policies are needed. Simple political commitment is not enough, and the correct implementation of policies must be guaranteed by the responsible entities. In addition to a long inventory of policies and regulations, several arguments have been analyzed that affect their effectiveness, such as:

A series of suggestions can help improve current policies for organic farming. These include a number of tasks for the authorities: to carry out an in-depth investigation of the current state of the sector and its impact on society; set clear development goals; to guarantee the assistance of all stakeholders in society for the development of policies and various programs; to assign responsibilities to the institutions for the correct implementation of the policies; to guarantee the compilation of scientific information and appropriate information on the organic farming sector; to carry out consumer education and awareness campaigns on organic food.

The analysis presented shows that most countries are aware of the important role that the government has in expanding organic farming either for the advancement of an independent market, which requires standards and authorization both domestically and internationally, or in granting subsidies to organic farmers, or of setting taxes for conventional farmers.

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Appendix A7. Definitions of the key terms

Organic agriculture – processes, activities and connections for farming according to the principles of sustainable development.

Organic product – a certified product which has to accomplish a series of rules and criteria regarding the ingredients and processes of production.

Government policy – a position, action, rules, etc. established by the Government for a certain field.

Export – a product or service sold abroad.

Production – processes and activities of creating something for use or sale.

Ch.7

PROMOTING PRODUCTION AND EXPORT OF ORGANIC AGRICULTURE PRODUCTS THROUGH GOVERNEMENT POLICIES

International policies comparison

OBJECTIVES:

- Students will be informed about the development of public policies for the development of organic farming.
- Students will learn about the stage of developing public policies to support the production and export of organic products.
- Students will understand the importance of public policies in supporting organic farming.

SKILLS: Analysis regarding different issues; Question the arguments; Management of information.

QUESTION 1 (PLEASE CHECK THE CORRECT ANSWER)

Most regulations in the field of organic farming have been implemented at the level of:.

- ☐ Europe
- ☐ Asia
- ☐ Latin America and the Caribbean
- ☐ Africa

QUESTION 2 (PLEASE CHECK THE CORRECT ANSWER)

Ecological action plans are commonly used in:

- ☐ Africa
- ☐ Oceania
- ☐ Asia
- ☐ Europe

QUESTION 3 (PLEASE CHECK THE CORRECT ANSWER)

What are the themes on which 2030 Vision is based:

- ☐ Organic products on every table, Improve – Inspire – Deliver, Fair work – Fair payment
- ☐ Organic products on every table, Improve - Inspire – Deliver
- ☐ Improve - Inspire – Deliver, Fair work – Fair payment

- [ ] Organic on every table, Fair work – Fair payment

QUESTION 4 (PLEASE CHECK THE CORRECT ANSWER)

The EU policy framework to support the development of the green sector consists of the following areas:

- [ ] Production and development of the supply chain; financial support for farmers; regulated rules on production and labeling; recognition of the contribution to the general objectives of public policy
- [ ] Production and development of the supply chain; financial support for farmers; regulated rules on production and labeling
- [ ] Regulated production and labeling rules; recognition of the contribution to the general objectives of public policy
- [ ] Financial support for farmers; regulated rules on production and labeling; recognition of the contribution to the general objectives of public policy

QUESTION 5 (PLEASE CHECK THE CORRECT ANSWER)

The ecological movement strives to:

- [ ] Enable markets that are based on ecological standards
- [ ] Enable the adoption of food, regardless the environmental challenges
- [ ] Promote the use of conventional agricultural practices
- [ ] Promote the genetically modified products

QUESTION 6 (PLEASE WRITE THE CORRECT ANSWER WITHIN THE BOX)

What is the specificity of the development of organic markets in European countries and the USA, starting from the information presented in Table 7.2?

PRACTICAL APPLICATION. PLEASE, DISCUSS WITH YOUR PEERS AND DESCRIBE, IN YOUR OWN WORDS, THE TABLE 7.3.

THIRD SECTION:

ECONOMIC ESTIMATIONS IN THE AGRI-FOOD SECTOR

8. Economic Efficiency of Investments in the Agri-Food Sector

9. Financial Reporting of Biological Products: A Review of Reporting Rules and European Practice

10. Estimation of Economic Effects of Processing of Organic Products in the case of Family Farms

8. Economic Efficiency of Investments in the Agri-Food Sector

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Abstract: Investments in the agri-food sector are considered very risky as climate-related and macroeconomic factors have a significant impact on them. Efficiency in the agri-food sector is a topic of interest for entrepreneurs, academics, and policy-makers.

The chapter aims to clarify the concepts and tools used in the assessment of efficiency in the agri-food sector. Furthermore, we intend to highlight the advantages and disadvantages of some methods used to assess the efficiency of investments in the agri-food sector.

Keywords: investment; investment decision; the payback period; discounted cash flow methods; net present value; internal rate of return; cost-benefit analysis.

1. What is an investment?

The term **"investment"** is used in a variety of settings. For example, in the entrepreneurial context, some authors use the term "start-up investment" to denote "the one-time expense of opening a business" (Mariotti & Glackin 2016, 250).

In general, an investment can be defined as "any decision that implies expenditure today with the expectation that it will generate cash inflows tomorrow" (Davies et al. 2008, 135). The firm can invest in tangible assets (for example, property, plants, and equipment) or intangible assets (for example, research and development, copyrights, brand names, franchise agreements).

For example, a firm active in the agri-food sector will decide to extend a warehouse.

The investment decision (or "capital budgeting") is one of the key decisions at the firm level (Ross et al. 2007), having a significant impact on firm long-term profitability, risk, and value (Booth et al. 2014). The firm has to choose among a large number of possible investments, but only some of them will create value for their owners.

The main question is: will the proposed investment (or project) will be worth more than its costs after its implementation?

Correli (2018, 123) highlights the assumptions governing long-term investment decisions:

- "decisions are based on cash flows, not income;
- timing of cash flows is important;
- cash flows are based on opportunity cost: cash flows that occur with an investment compared to what they would have been without the investment;
- cash flows are analyzed on an after-tax basis;
- financing costs are ignored because they are incorporated in the cost of capital".

The **efficiency** of the investments made is important for entrepreneurs, other investors in the firm, lenders, and policy-makers. Entrepreneurs want to see how the efforts they made in terms of money, energy, and time will be compensated overtime. Furthermore, as investments in real assets are (frequently) irrevocable and unique (Booth et al. 2014), the decisions to undertake these investments should have sound financial and economic grounds.

For example, an investment in an irrigation system involves a large amount of money, is irrevocable, and has very little alternative use.

Other equity investors and lenders are interested to see how they will recoup their investment and that they will be compensated for the risk taken. Public authorities (policy-makers) want to allocate scarce resources to the most efficient sectors or projects.

2. Tools for measuring efficiency

There are several tools used to assess the efficiency of an investment, commonly used in the agri-food sector (Coppola et al. 2020). We can divide them into (Lumby & Jones 2011):

- traditional methods of investment appraisal - the payback period (Pp) and Return on Capital Employed (ROCE);
- discounted cash flow (DCF) methods - the net present value (NPV), the internal rate of return (IRR), and the profitability index (PI).

a. Payback period

The **payback period** (Pp) measures the time span required to earn back the initial investment (Mariotti & Glackin 2016, 252). According to this investment decision rule, a project should be taken if its Pp is lower than a specified cutoff (period) (Brealey et al. 2009, 230). Otherwise, the firm should reject the project. Some authors suggest that an acceptable average payback period is 3 years (Corelli 2018, 126).

Example:

A firm has to choose only one investment project from two alternatives. The initial investment (or the investment outlay) and the cash flows generated by each investment project are presented in table 8.1.

Table 8.1. Payback rule for two mutually exclusive investment projects

Time (Year)	Cash flows (EUR)	
	Project X	Project Y
0 (Initial investment)	-100,000	- 100,000
1	20,000	60,000
2	80,000	30,000
3	15,000	10,000
Payback period	2.0	3.0
NPV	-4,956.05	60,658.94

The specified cutoff period (or the maximum acceptable payback period length) is 2.5 years. The expected rate of return is 8% for both projects. How many years does the firm have to wait until the cash flows generated by this investment equal or exceed the cost of investment?

If we use only the payback rule (see table 8.1), at the end of 1st year, the firm has recovered EUR 20,000, leaving EUR 80,000 from the initial investment. The cash flow for the 2nd year is exactly the difference - EUR 80,000. Thus, the investment is recovered in exactly two years. For the second project, the Pp is longer than two years.

The total cash flows over the first two years are EUR 90,000, so the project will recover the initial investment in the third year (at the end of the year if the cash-flows are period-end cash-flows). Based on the payback rule, project X is efficient and should be taken as its value is lower than the specified cutoff period (2.5 years) and the value for project Y.

However, as we have seen in this example, the PP rule ignores the time value of money for the cash inflows occurring in the first two years. The NPV for project X is negative, meaning that if X is accepted, shareholder value will decrease.

Although this criterion is simple (both conceptually and mathematically) and easy to understand, it has several significant shortcomings (disadvantages).

Firstly, it doesn't consider the time value of money (Corelli 2018; Berk & DeMarzo 2014) and the cost of capital (Berk & DeMarzo 2014). One can address this shortcoming by computing the discounted payback rule.

Secondly, it doesn't take into consideration any cash flows that occur after the payback period (Brealey et al. 2006; Berk & DeMarzo 2014; Corelli 2018).

Thirdly, it requires an arbitrary cutoff point (Ross et al. 2007, 246; Berk & DeMarzo 2014).

Fourthly, it rejects profitable long-term investments such as R&D or new projects (Ross et al. 2007). However, this method is used by managers when the (initial) investment is small (Berk & DeMarzo 2014) or when the advantages of the project are so clear that "more formal analysis is unnecessary" (Brealy et al. 2009, 231). Vega and Lam (2016) reported that Pp is usually employed in conjunction with the NPV and the IRR rules.

Interestingly, this method can be employed to appraise the efficiency of investment opportunities in everyday life. For example, we can assess the opportunity for earning an MBA (Booth et al. 2014).

b. Net present value (NPV)

Net present value (NPV) (or "discounted cash flow method") is one of the most used tools to assess the current value of proposed investments. Graham and Harvey (2001) reported that large firms are employing mainly NPV for making investment decisions, while the small ones are employing the payback criterion.

Some authors considered it the "gold standard" of investment criteria (Brealy et al. 2009, 246).

NPV of an investment is computed as the "difference between the present value (PV) of benefits and the present value of its costs" (Berk & DeMarzo 2014, 66). It is an indicator of "how much value is created or added <u>today</u> by undertaking an investment" (Ross et al. 2007, 246). The general formula is (Berk & DeMarzo 2014, 66):

$$NPV = PV\ (benefits) - PV\ (costs) \quad (1)$$

The benefits represent the cash inflows, while the costs are the cash outflows. Any receipt of money is a cash inflow. For example, selling a product will bring some money to the firm. Any expense of money is a cash outflow.

For example, when we acquire a fixed asset, we spend some money.

The NPV of an investment opportunity can be also seen as the *PV* of a stream of future cash flows generated by this investment minus the current (first) undiscounted flow (the initial investment). In this particular situation, when all the costs are recorded at time zero (t = 0) and benefits are recorded in the following years (t = 1, ..., n), we apply the following equation:

$$NPV = \sum_{t=1}^{n} \frac{CF_t}{(1+r)^t} - I_0 \quad (2)$$, where

CF_t – represent cash flow from the period (e.g., year) *t*;

I_0 – initial investment;

r – discount rate.

The NPV is expressed in money terms (e.g., EUR) and should be related to the scale of the project (European Commission 2014, 48). According to this decision rule, we will consider an investment efficient if the NPV is positive and thus the owners (and investors) will recoup their investment and earn a profit according to their required rate of return. Bad (negative NPV) investment projects should be rejected.

When the entrepreneur has to choose among mutually exclusive projects, he/she will choose the investment/project with the highest and at the same time positive NPV.

We can compute NPV using a formula, tables, a spreadsheet program (e.g., Excel), or a financial calculator (Mariotti & Glackin 2016, 253).

Example:

A firm has to decide whether to undertake an investment on a fixed asset of EUR 100,000. The investment will generate net cash inflows of EUR 65,000, EUR 70,000, and EUR 75,000 at the end of years 1, 2, and 3. The fixed asset will have a residual value of zero at the end of the third year. Using a 10% discount rate, what is this project's NPV? One way to approach this is by using equation 2. The solution to this problem is presented in table 8.2.

Table 8.2. NPV for one investment

Year	0	1	2	3
Net cash inflows (EUR)		65,000	70,000	75,000
Discount factor	1	$1/(1+10\%)^1=0.909091$	$1/(1+10\%)^2=0.826446$	$1/(1+10\%)^3=0.751315$
PV of cash flows (EUR)		59,090.91	57,851.24	56,348.61
Total PV of cash inflows (EUR)	173,291			
I_0 (Initial investment) (EUR)	100,000			
NPV (EUR)	73,291			

The NPV rule suggests that the investment should be accepted as the PV of future cash flows after subtracting the initial investment is higher than zero (in our case EUR 73,291).

Another easier way to compute NPV is to use a spreadsheet.

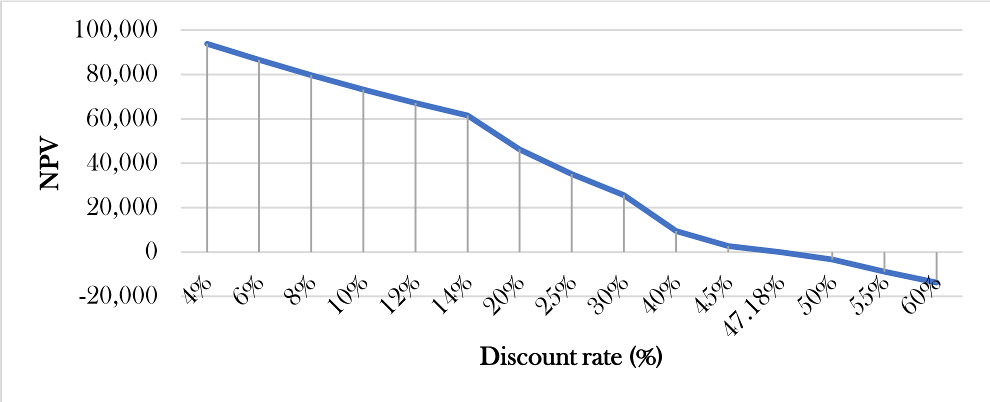
Figure 8.1 illustrates how to compute NPV for the previous example using a spreadsheet program. For this example, we have used Excel's NPV function. This NPV function uses the convention that the first flow (the initial investment) is discounted (Leach & Melicher 2012, 324).

Figure 8.1. Calculating NPV with a Spreadsheet (EUR)

	A	B	C	D	E	F	G	H
1								
2		Year	Cash flows		Discount rate	10%		
3		0	-100,000					
4		1	65,000					
5		2	70,000					
6		3	75,000					
7		NPV	73,291	The formula written in C7 is NPV(F2, C4:C6)+C3				
8								

The discount rate has a significant impact on NPV. In the next figure, we plotted the project's NPV for different discount rates. On the vertical or y-axis, you may see the different NPVs. On the horizontal or x-axis, discount rates are represented. This graphical representation is often called the "Net present value profile" of the project (Ross et al. 2007, 251-252; Booth et al. 2014, 232; Berk & DeMarzo 2014, 207) and support the understanding of the inverse relationship between net present value and discounting rate (Vernimmen et al. 2014).

Figure 8.2. The NPV profile



Notice two important things about Figure 8.2:

- Firstly, when the discount rate is equal to 47.18%, the NPV is zero. It is the point on the graph where the curve cuts through the x-axis. This corresponds to the internal rate of return (IRR).
- Secondly, if the discount rate (opportunity cost of capital) decreases, the NPV increases. Notice that the NPV is positive only for discount rates that are lower than 47.18%. When the discount rate increases, the NPV declines smoothly.

When a firm has to choose between two investment projects, the NPV method is straightforward: take the project that will bring the highest NPV.

Example:

Let's consider the following example. An eco-food chain is looking for expansion in our city. The manager has identified two locations with slightly different initial investment and estimated net cash inflows (see table 8.3). Which investments should he choose?

Table 8.3. NPV of Mutually Exclusive Projects (EUR)

Year	Project A		Project B	
	Cash flows	PV of cash flows	Cash flows	PV of cash flows
0	-125,000.00	-125,000.00	-138,000.00	-138,000.00
1	35,000.00	32,407.41	36,000.00	33,333.33
2	40,000.00	34,293.55	41,000.00	35,150.89
3	45,000.00	35,722.45	47,000.00	37,310.12
4	52,000.00	38,221.55	56,000.00	41,161.67
5	43,000.00	29,265.08	45,000.00	30,626.24
Discount rate	8%		8%	
NPV		44,910.04		39,582.26

The results presented in table 8.3 show that both investment projects have a positive NPV. However, as the firm can choose only one, the first project is the best alternative as it has the highest NPV.

c. The internal rate of return

An alternative method of appraisal to NPV is the internal rate of return (IRR).

IRR is "the discount rate (or the interest rate) for which the NPV of the cash flows equals zero" (Berk & DeMarzo 2014, 126). In other words, it represents "the compound rate of return that you get from a series of cash flows" (Corelli 2018, 125) or the average return on the investment opportunity. Contrary to NPV, this measure is scale-invariant (European Commission 2014, 48).

If the IRR is higher than the opportunity cost, then the investment project should be considered efficient. Thus, the cost of capital (CC) becomes "the minimum acceptable return on the project" (Booth et al. 2014, 380). If the IRR is lower than the CC, the firm should reject the project.

Similar to the NPV, the IRR is employed for single, standalone projects within the firm. It works fine and provides corrects decisions if "all of the project's negative cash flows precede its positive cash flows" (Berk & DeMarzo 2014, 210). Otherwise, this investment decision rule can lead to incorrect decisions. Ross et al. (2007), Brealey et al. (2009), and Berk & DeMarzo (2014) provide an extensive discussion on IRR's pitfalls.

There are several approaches to compute IRR (Davies et al. 2008):

- using a formula, through interpolation (a graphical approach);
- using a trial and error process;
- using a financial calculator, or
- using an appropriate spreadsheet function in Excel.

IRR can be computed by employing the following formula (Bucataru & Anton 2007):

$$IRR = a.min + \frac{NPV_1}{NPV_1 + |NPV_2|}(a.max - a.min) \quad (3)$$

Where:

IRR – the internal rate of return;

NPV1 – the positive net present value of the investment that corresponds to a minimum discount rate (a. min)

NPV2 – the negative net present value of the investment that corresponds to a maximum discount rate (a.max).

As employing an appropriate spreadsheet function in Excel is the most used and the easiest to understand, we will employ it for the next case.

Example:

A firm has to decide whether to undertake an investment on a fixed asset of EUR 100,000. The investment will generate net cash inflows of EUR 35,000, EUR 40,000, and EUR 55,000 at the end of years 1, 2, and 3. The fixed asset will have a residual value of zero at the end of the period. The estimated cost of capital is 10%. The solution to this exercise computed in Excel is presented in figure 8.3.

Figure 8.3. Calculating IRR with a Spreadsheet (EUR)

	A	B	C	D	E	F	G
1							
2		Year	Cash flows				
3		0	-100,000				
4		1	35,000				
5		2	40,000				
6		3	55,000				
7		IRR	13.23%	The formula written in C7 is IRR(C3:C6)			
8							

If the CC is below the IRR (in our case, 13.23%), the project will have a positive NPV and the firm should accept it. Otherwise, if the CC is higher than the IRR (13.23%), NPV becomes negative. We observe that the two rules are equivalent in this case.

d. The profitability index

The profitability index (PI) is another tool used to assess the efficiency of investment projects. It is also called profitability ratio (Corelli 2018, 127) or benefit/cost ratio (Ross et al. 2007, 258).

The index is computed as the ratio between the PV of the future stream of cash flows and the initial investment (Ross et al. 2007, 258). If the value of this index is higher than 1.0, that means the PV of future cash flows is higher than the initial investment, so the NPV is positive and the project is accepted. Otherwise, the PV of future cash flows is lower than the initial investment, the NPV is negative, thus the investment should be rejected.

We notice a close relationship between NPV and PI (Booth et al. 2014). If NPV is higher than 0 then PI is higher than 1. Otherwise, if NPV is lower than 0 then PI is lower than 1.

Furthermore, the PI gives us an overview of how much we gain for each monetary unit (e.g., euro or dollar) invested (so-called "bang for the buck"). For example, a value of 1.20 can be interpreted that, per euro invested, EUR 1.20 in value or EUR 0.20 in NPV results.

Given this, the PI is used as a tool in the evaluation of government or other not-for-profit investments (e.g., a tree-planting program). Also, this measure may be used to rank investments (the highest values for PIs being preferred) and to find the optimal mix of projects when the resources are scarce (Berk & DeMarzo 2014). Atrill (2017, 195) consider that this method is suitable only where investment projects are divisible.

Example:

Recall the previous example (Table 8.4).

Table 8.4. The profitability index for one investment

Year	0	1	2	3
Net cash inflows (EUR)		65,000	70,000	75,000
Discount factor	1	$1/(1+10\%)^1=0.909091$	$1/(1+10\%)^2=0.826446$	$1/(1+10\%)^3=0.751315$
PV of cash flows (EUR)		59,090.91	57,851.24	56,348.61
Total PV of cash inflows (EUR)	173,291			
Initial investment (EUR)	100,000			
Profitability index	1.73291			

A firm has to decide whether to undertake an initial investment on a fixed asset of EUR 100,000. The investment will generate cash inflows of EUR 65,000, EUR 70,000, and EUR 75,000 at the end of years 1, 2, and 3. The fixed asset will have a residual value of zero at the end of the period. The discount rate is 10%. The solution to this problem is presented in table 8.4.

In this case, the value 1.7329 can be interpreted as that, per euro invested, the project will generate EUR 1.7329 in value or EUR 0.7329 in NPV results.

A synopsis of the presented methods and their basic rules may be observed in Table 8.5.

Table 8.5. A synopsis of investment decision rules

No	Criterion	Investment rule
1	Net present value (NPV)	Accept an investment only if the NPV is higher than 0.
2	Internal rate of return (IRR)	Accept an investment only if the IRR is higher than the CC.
3	Payback period (Pp)	Accept an investment only if the Pp is lower than a specified cutoff period.
4	Profitability index (PI)	Accept an investment only if the PI is higher than 1.0

3. Cost-Benefit Analysis

As the previous rules apply to investment projects, we need to have another tool that can be used also for policies or at the society level. For example, in the agri-food sector, we want to know whether it is worth establishing a program for replanting orchards.

The cost-benefit analysis (CBA) can be applied to "policies, programs, projects, regulations, demonstrations, and other government interventions" (Boardman et al. 2011, 2) in almost any sector.

J. Dupuit (a French ingenieur) and A. Marshall (a British economist) have defined some of the concepts that have become the basics of cost-benefit analysis.

Projects in the agricultural sector financed by the government or from European funds may target agricultural production (less often) and infrastructure and services for rural development (most often). At the European Union level, agriculture and food sectors still receive a significant proportion of the public funds. Projects or programs can target actions such as (Alpopi 2014, 265-266):

- organization of land ownership;
- development of the irrigation system;
- development of technological innovation;
- provision of promotion and storage services;
- granting loans for the purchase of raw materials;
- construction or improvement of road infrastructure for the population living in rural areas.

The **objective** of the CBA is to identify and quantify (respectively to give a monetary value) all possible impacts of the action or project under discussion, to determine the corresponding costs and benefits. In other words, the purpose of the CBA is to compare the costs and benefits (revenues) related to any economic activity to estimate its economic efficiency and make the best decision (Mariotti & Glackin 2016).

According to the extant literature, one can distinguish among are two types of CBA (Boardman et al. 2011, 3):

- *ex-ante* CBA (the standard CBA) is conducted before starting the project or policy. Thus, it is used as a decision tool by governments/management authorities;
- *ex-post* CBA is elaborate after the implementation of the project/policy. Thus, it provides lessons to decision-makers and academics regarding the efficiency/opportunity for a class of projects.

In practice, how CBA is carried out differs between countries and between sectors of activity (transport, health) within the same country.

The main differences refer to the types of impacts that are considered costs and benefits, the degree to which the impacts are expressed in monetary units, and differences regarding the discount rate between countries.

At the European Union level, the CBA is required for **major projects** co-financed within the operational programs of the European Regional Development Fund (ERDF) and the Cohesion Fund (European Commission 2014, 15).

Major projects are defined as operations performing precise and indivisible tasks and whose total costs exceed the EUR 50 million value (European Commission 2014, 15). However, for small projects, the relevant managing authority may decide that the results of the economic analysis be evaluated in the project selection process.

The CBA implies several **steps.** In order to save space, we didn't include an extensive example here for each step, but we present some example of benefits/cost specific to the projects in the agri-food sector. Boardman et al. (2011) provide an extensive example of how to apply CBA for a highway.

Our examples will be related to a project on the modernization and expansion of an irrigation system in a certain geographical area. According to Boardman et al. (2011, 5-15), the following steps must be followed in analyzing the efficiency of an investment project using CBA:

3.1 Identify and specify a set of alternative projects to the extant status quo

The ACB will compare "the net social benefits of investing resources in one or more particular potential projects with the net social benefits of a project that would be displaced if the project(s) under evaluation were to proceed" (Boardman et al. 2011, 7).

In some countries (for example, Romania) the legislation provides for the consideration of at least three options (Authority for the Coordination of Structural Instruments 2008, 8):

- The zero variant (variant without investment) is the alternative to continue the operations without any intervention. It is also called "do nothing";
- The average variant (minimum investment variant or "do minimum") includes all realistic costs necessary for maintenance and a minimum investment or improvement costs necessary to avoid or delay damage or achieve a minimum level of compliance with safety standards.
- The maximum variant (variant with maximum investment or "do maximum"), implies the full implementation of the proposed investment in order to achieve the expected objectives.

For our case, these scenarios are as following:

- *The zero variant* – no investment will be made in the irrigation system. The activity will continue as before and the farmers will bear the crop losses caused by the prolonged drought of certain years.
- *The average variant* – includes all cost regarding the maintenance of the existing irrigation system plus a minim investment;
- *The maxim variant* - implies the full implementation of the proposed investment, meaning modernization and expansion of an irrigation system.

3.2 Identify the subjects who will receive the benefits and those who bear the costs

In this step, the CBA should provide details about the perspective from which it will be elaborated. It can be a local (e.g., a city or a village), regional (e.g., a country or a region), national (e.g., a country), or a global perspective.

The appropriate level of analysis is determined by the size and goal of the project.

For our example, the analysis will be carried out from a local perspective. The beneficiaries will be the farmers and also the customers from the local area.

3.3 Identify the impact categories (consequences), catalog them, and select the measurement indicators

In this step, all the impact categories for all the investment alternatives have to be identified. Secondly, they should be divided into benefits and costs. For each of them, a measurement variable needs to be defined.

The term "impacts" includes „both inputs (required resources) and outputs" (Boardman et al. 2011, 8).

In our example, the main **benefits** can be:

- Financial benefits:
    - revenues in the form of tariffs collected from the beneficiaries of the irrigation system (e.g., local farmers);
    - the value of the irrigation system at the end of the discounting period (also called „the residual value");

  - increasing agricultural production as a result of project implementation;
- Economics benefits
  - Development of small local farmers;
- Social benefits
  - Increasing the number of jobs both during the implementation period and subsequently for objective maintenance;
- Environmental benefits
  - reducing soil degradation due to long periods of drought;
  - better rainwater management;
  - reducing the risk of floods;

The **costs** implied by the irrigation system can be:
- costs related to the initial investment;
- maintenance costs (improvements, repairs, etc);
- operating costs:
  - electricity costs;
  - staff costs.

3.4 Forecasting the impacts quantitatively on the whole life of the project

This step involves quantifying all the effects for each alternative in each time period. The prediction is essential, but at the same time very difficult for unique projects, long-term horizon, and complex relationships among variables.

For example, the analyst should estimate:
- the area of land to be irrigated (e.g., 20.000 ha);
- the electricity consumption for the irrigation system (e.g., 3.650 kWh per year);
- the number of new jobs created for the management of the irrigation system (e.g., 3 new full-time jobs).

3.5 Calculating the monetary value of effects (attaching a value expressed in a currency unit)

The analyst must quantify each consequence in a monetary unit. Often, the most important intuitive impacts are very challenging to assess in monetary units (e.g, the impact on the environment). All the cash flows should be expressed in constant (real) prices (European Commission 2014, 41).

For example, when analyzing the impacts for an irrigation system, one must quantify:
- the increase in the crops per year in monetary terms (e.g., Euro);
- the cost of electricity consumption;
- the staff cost – 3 new employees * EUR 1,500/month * 12 months = EUR 54,000

3.6 Computing the present values for all the benefits and costs

In this step, the future benefits and costs of each project are discounted to the present, obtaining their PV.

A cash flow (benefit or cost) from year t is converted to its PV by dividing it by $(1+r)^t$, where r is the discount rate.

The discount rate represents the opportunity cost of capital, which can be considered as the income that would have been obtained from the best alternative for the project. The level of the discount rate is established by the decision of the public authorities and can be adjusted in time, depending on the macroeconomic indicators (e.g., inflation).

For example, for the programming period 2014-2020, the European Commission recommends a discount rate of 4% in real terms as a benchmark for the real opportunity cost of long-term capital (European Commission 2014, 42).

For a project with a life of n years, B_t and C_t are the benefits and costs in year t.

The present values of the benefits - PV(B) and costs – PV(C) for one project are computed using the following formulas (Boardman et al. 2011, 12-13):

$$PV(B) = \sum_{t=0}^{n} \frac{Bt}{(1+r)t} \quad (4)$$

$$PV(C) = \sum_{t=0}^{n} \frac{Ct}{(1+r)t} \quad (5)$$

3.7 Determining the net present value of each alternative project

The net present value of an investment alternative is computed as „the difference between the PV of benefits and the PV of costs" (Boardman et al. 2011, 13):

NPV(project) = PV(Benefits) – PV(Costs) (6)

Recall the NPV rule from the previous subchapter. The analyst should recommend taking the investment if the NPV is higher than 0 (or the benefits are higher than the costs):

When a decision has to be made between alternative mutually exclusive projects, the rule is straightforward: consider the project with the highest NPV (from the positive ones).

In practice, other indicators are used to estimate the efficiency of an investment in the cost-benefit analysis. For example, the ratio between PV of benefits and PV of costs (B/C). If this ratio is higher than 1.0, then the project should be accepted.

3.8 Perform sensitivity analysis

There is considerable uncertainty both in terms of the expected consequences and the monetary assessment of each type of effect. Sensitivity analysis provides information on the degree of sensitivity of the expected net benefits in case of changes in working assumptions (critical variables). For example, the NPV and B/C ratio are influenced by the net discount rate. As the discount rate increases, the NPV and B/C ratios decrease.

In the case of CBA performed for the investment project requesting European funds, a critical variable is "any project variable for which the variation with 1% will produce a change of more than 5% in the base value of NPV or IRR" (Authority for the Coordination of Structural Instruments 2008, 17).

An additional analysis requested by some finance providers is risk analysis. It aims to estimate the probability of occurrence of a change for each critical variable.

The results of this analysis will be estimated in terms of average and standard deviation (Authority for the Coordination of Structural Instruments 2008, 16-17).

The other risks that may arise during the implementation of the investment (technical, environmental, financial, institutional, and legal) and measures to reduce them will also be analyzed.

The particularities of the agri-food sector increase the project risks. Alpopi (2014, 268) identify two important sources of additional risks for the projects in the agri-food sector:

1) physical factors – that increase the uncertainty regarding the quantity, quality and implicitly the price of the produced goods, such as:

- floods;
- severe droughts;
- landslides;
- various climatic phenomena.

2) the final beneficiary of the projects - small and medium-sized enterprises (SMEs). Several factors increased the risks associated with these firms, namely:

a. reduced entrepreneurial capacities that affect their ability to deal with unforeseen events;

b. a large division of the agricultural enterprise creates obstacles to the diffusion of technological innovation;

c. a large number of producers and different cultures determine the need for very different interventions and difficult to coordinate.

3.9 Make a decision/recommendation

Based on the results obtained in the previous two steps, the analyst will recommend taking the project with the highest NPV. If more alternative investments have a positive NPV, the variant with the highest NPV should be considered.

4. Conclusions

The aim of this chapter is to provide a brief overview of the key methods/tools used in the assessment of investment projects.

The main goal is to emphasize the advantages and disadvantages of the various approaches. Particular attention has been given to tools allowing the comparison of cash flows that occur at different points in time, so-called discounted cash flow methods.

The NPV and IRR are the two most used capital budgeting methods (rules) (Graham & Harvey 2001; Ross et al. 2007; Vega & Lam 2016).

The net present value allows us to asset and to express the “net benefit of the project in terms of cash today” (Berk and DeMarzo 2014, 96). From this perspective, the capital budgeting process can be seen as “a search for investments with positive net present values” (Ross et al. 2007, 241).

IRR represents “the compound rate of return that you get from a series of cash flows” (Corelli 2018, 125). Contrary to NPV, this measure is scale-invariant. An investment should be accepted only if the expected IRR is higher than the CC.

The other two rules used by firms/policymakers are the payback period (Pp) and the profitability index (PI). The first one measures the time it takes to recover the initial investment. Also, it is an indicator of project risk, especially for short-term projects (Booth et al., 2014). A project is accepted if the Pp is lower than a specified cutoff period. The profitability index (PI) is a relative measure of wealth created. A project should be accepted only if the PI is higher than 1.

As investments in agri-food have been the subject of several public policies in the European Union, we need a tool able to assess the efficiency and opportunity at the program and the society level.

The Cost-Benefit Analysis (CBA) can be employed to select the best program/project/policy from a set of alternatives to the extant status quo. Furthermore, it takes into consideration the impact of various factors (e.g., economic, social, and environmental factors) on the efficiency of each alternative.

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Appendix A8 – Definitions of key terms

Investment decision – the firm is deciding on what tangible or intangible asset to put money to generate futures cash inflows. It is one of the most important firm-level decisions, together with financing and dividend policy.

Payback period – the period required to earn back the initial investment (Mariotti & Glackin 2016, 252).

Net present value (NPV) – “the difference between the present value (PV) of benefits and the present value of its costs” (Berk & DeMarzo 2014, 66).

Internal rate of return (IRR) - represents “the compound rate of return that you get from a series of cash flows” (Corelli 2018, 125).

Profitability index (PI) – the ratio between the PV of the future stream of cash flows and the initial investment (Ross et al. 2007, 258).

Cost-benefit analysis (CBA) - is an analytical tool used to estimate (in terms of benefits and costs) socio-economic impact due to the implementation of certain actions and/or projects.

Ch.8

ECONOMIC EFFICIENCY OF INVESTMENTS IN THE AGRI-FOOD SECTOR

Economic decision making instruments

OBJECTIVES:

- The students will be able to understand the main characteristics of investments;
- The students will be able to use methods by which firms from the agri-food sector and public authorities make investment decisions;
- The students will be able to discuss the advantages and disadvantages of each decision method.

SKILLS:

- Critical thinking on the issues regarding the investment decision and decision methods/rule;
- Use of appropriate methods of investment appraisal in the agri-food sector;
- Managing information about private and public investments.

QUESTION 1 (PLEASE CHECK THE CORRECT ANSWER)

Based on the payback (Pp) rule, an investment project will be accepted if:

- [ ] its Pp is lower than a specified cutoff (period)
- [ ] its Pp is higher than a specified cutoff (period)
- [ ] the IRR is higher than the cost of capital
- [ ] the NPV is higher than 0

QUESTION 2 (PLEASE CHECK THE CORRECT ANSWER)

Based on the net present value (NPV) rule, an investment project will be accepted if:

- [ ] its Pp is lower than a specified cutoff (period)
- [ ] its Pp is higher than a specified cutoff (period)
- [ ] the IRR is higher than the cost of capital
- [ ] the NPV is higher than 0

QUESTION 3 (PLEASE CHECK THE CORRECT ANSWER)

<u>**Based on the internal rate of return rate (IRR) rule, an investment project will be accepted if:**</u>

- [ ] its Pp is lower than a specified cutoff (period)
- [ ] its IRR is higher than a specified cutoff (period)
- [ ] the IRR is higher than the cost of capital
- [ ] the NPV is higher than 0

QUESTION 4 (PLEASE CHECK THE CORRECT ANSWER)

<u>**Based on the profitability index (PI) rule, an investment project will be accepted if:**</u>

- [ ] its PI is lower than a specified cutoff (period)
- [ ] the PI is higher than 1.0
- [ ] the IRR is higher than the cost of capital
- [ ] the NPV is higher than 0

QUESTION 5 (PLEASE CHECK THE CORRECT ANSWER)

<u>**Based on the cost-benefit analysis, an investment project will be accepted if:**</u>

- [ ] its PI is lower than a specified cutoff (period)
- [ ] the PI is lower than 1.0
- [ ] the IRR is higher than the cost of capital
- [ ] the NPV is higher than 0

PRACTICAL APPLICATION OF THE PREVIOUS CHAPTER: USING A 10% DISCOUNT RATE, WHAT IS THE NPV OF THE FOLLOWING PROJECT? CF0 = -2,000; CF1 = +700; CF2 = +1,100; CF3 = +600.

9. Financial Reporting of Biological Products: A Review of Reporting Rules and European Practice

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Abstract: This chapter presents the financial reporting rules of biological assets and agricultural activities by companies that prepare financial information using International Financial Reporting Standards (IFRS). IFRS refer to high-quality global standards of accounting used by listed firms in more than 150 countries. The chapter introduces the concepts of biological assets, agricultural produce, and bearer plants, and discusses the implications of using the model of fair value to measure and report biological assets. This chapter provides examples of reporting practices by European companies.

Keywords: biological assets; agriculture produce; government grants; accounting; IFRS; financial statements; income; business performance

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1. Introduction

According to the World Bank, in 2018, agriculture contributed to 4% of the global gross domestic product (GDP). But for some of the developing countries this percentage is as high as 25% of their GDP (World Bank 2020). In developing countries, the agricultural sector remains a central piece in economic and social welfare and it keeps being the prime source of income for the poorest population. This chapter explains how companies following International Financial Reporting Standards (IFRS) in the construction of financial documents and information should report their agricultural activities. Understanding how companies operating in the agricultural sector value and report assets is important for stakeholders that use that information to assess the company's performance and value.

Companies around the world have to prepare financial statements to report to outside stakeholders (investors, creditors, tax authorities, employees, etc.) the performance of the business and provide a real image of the financial situation. To ensure that financial information is trustworthy, companies must follow reporting rules. IFRS are the high-quality global reporting rules used in more than 150 countries.

The focus on financial reporting under IFRS is motived by the global importance of these standards of accounting. IFRS are issued by the International Accounting Standards Board (IASB), an international independent organization. IFRS provides indications regarding the construction of financial documentation of listed companies that represent about half of the Global GDP.

In Europe, firms which trade securities on a regulated European market are obligated to prepare their financial statements in a consolidated form, following international financial reporting standards, as adopted by the EU (European Commission 2002).

The international rule of accounting, that is governing agricultural activity is International Accounting Standard (IAS) 41, issued by the IASB in December 2000. This regulation was first applied beginning with 1 January 2003. This document defines how should biological assets be treated in accounting during the period of biological transformation, as well as the measurement rules of agricultural produce at the harvesting moment.

Biological assets are considered to be the living animals or plants that encounter biological modification through growth, degeneration, production, and managed procreation. What distinguishes biological assets from other assets used in a business (for example, buildings, equipment, or cash) is biological transformation. For example, pigs raised for pork meat or trees cultivated from timber are biological assets.

In general terms, IAS 41 establishes that biological assets must be recognized at fair value less costs to sell. A company can only recognize these assets at historical or acquisition cost less depreciation and impairment costs when market prices are unavailable, a company can recognize the biological assets at historical or acquisition cost less depreciation and impairment costs.

Despite the economic importance of agriculture for the world economy, academic research on financial reporting of agricultural activities is relatively scarce. Most of the studies are centered on the debate about the benefits and problems of the fair value method used to quantify biological assets. Some authors defend the use of the fair value because it better reflects the real economic value of biological assets (Miller & Bahnson 2009). But other authors point out the difficulties in determining fair values when active markets do not exist and claim that fair values can distort the financial performance of the business (Elad & Herbohn 2011; George 2007). The objectives of this chapter are threefold: (i) to present the international financial reporting rules for agricultural activities; (ii) to debate the fundamental advantages and disadvantages regarding the fair value approach to report biological assets; and (iii) to illustrate reporting practices by European firms which function in the agricultural sector.

2. The concept of biological asset and agricultural activity

How should the agricultural activity be treated in accountancy is defined by International Standard (IAS) 41 – Agriculture (IASB 2000). This standard defines the concepts of biological asset, agricultural produce, and agricultural activity. IAS 41 also identifies the methods to measure assets of biological type in the financial documents and indicates the data companies need to provide about their agricultural activities.

According to IAS 41, a "*biological asset* is a living animal or plant that has biological transformation". The biological transformation is the considered as the natural change any biological asset. For example, the natural growth of cattle, trees and plants, the decreasing of output due to old age or disease of the animal or plant, the production and procreation of new assets considering a guided reproductive scheme.

Agricultural produce is seen in the IAS 41 as "the harvested produce of the biological assets". For example, milk produced by cows and grapes picked from the vines. It is important to note that agricultural produce are the products of biological assets until the moment of harvest (e.g., when grapes are picked, and milk is collected). Once the produce is detached from the assets, i.e., when it is harvested, it becomes regular inventory and it is treated under the rules of IAS 2 – Inventories. Table 9.1 and Figure 9.1 summarize the difference between biological asset and agricultural produce. For example, hens are biological assets and eggs are the agricultural produce.

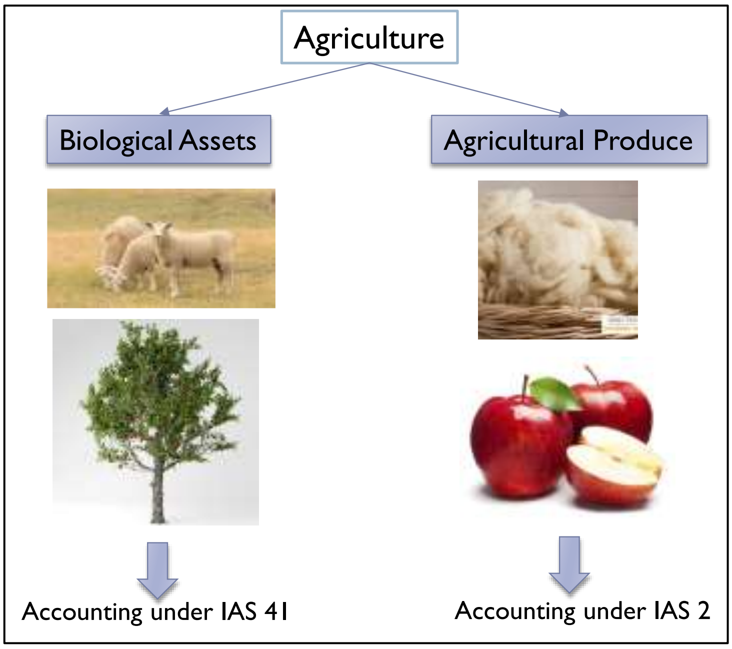
Table 9.1. Examples of biological assets and their derived agricultural produce

Biological assets	Agricultural produce	Products resulting from processing agriculture produce
Cows	Milk	Cheese, butter
Fruit trees	Fruit	Jams, juices

Biological assets	Agricultural produce	Products resulting from processing agriculture produce
Chicken	Eggs, Carcass	Chicken meat and ham
Cocoa plants	Harvested cocoa beans	Chocolate and cocoa drinks
Grape vines	Harvested grapes	Wine
Trees	Logs and timber	Wood products

Source: author examples based on IASB 2020, IAS 41

Figure 9.1. Accounting treatment of biological assets and the agricultural produce resulted after harvesting

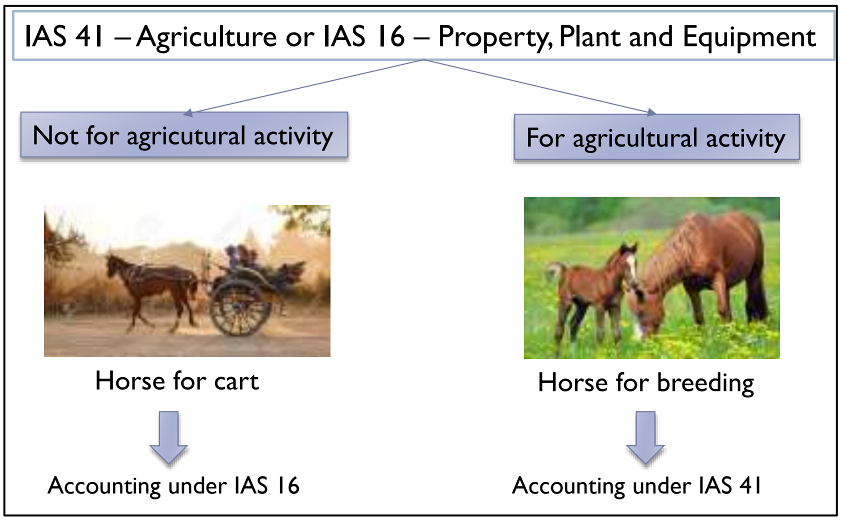


Source: author examples based on IASB 2020, IAS 41 and IAS 2

The agricultural activity is "the management by an entity of the biological transformation and harvest of biological assets for sale or for conversion into agricultural produce or into additional biological assets." Such activity includes: raising farm animals or aquaculture, forestry, cultivating crops, orchards and plantations, floriculture.

An important consideration is that companies can only classify a farm animal or plant as a biological asset if it is involved in agricultural activity. For example, a horse is a living animal. But if the horse is used to drive a cart or transport people then it does not qualify as a biological asset because it is not used for agricultural activity. It must be recognized in the company's financial declarations as "Property, Plant, and Equipment", and measured at cost minus accumulated depreciation. Yet, if the horse is used for breeding then the horse is a biological asset, and IAS 41 applies. Figure 9.2 shows this example.

Figure 9.2. Assets accounted for under IAS 16 and IAS 41



Source: author examples based on IASB 2020, IAS 41 and IAS 16

Another example where there is no agricultural activity is managing zoos or recreational animal parks. Natural breeding of animals that takes place in a zoo or park are incidental to the main activity, which is providing recreational services. Hence, the zoo cannot measure and report the animals in the financial reports as biological assets. But if the zoo also has a breeding program carried out to produce animals for sale, that breeding activity would be considered agricultural activity and the breeding animal would be reported as biological assets.

2. Appreciation and measurement of biological assets in financial statements

Companies measure biological assets "at its fair value less costs to sell, except when the fair value cannot be measured reliably" (IAS 41). Contrary to other tangible assets, such equipment or inventory, where the measurement rule is the historical or acquisition cost, biological assets are not evaluated at cost.

From the first moment of acquisition or production, "biological assets are measured at fair value less costs to sell" (IAS 41). Only when "the fair value of a biological asset cannot be measured reliably" (for example, there are no market prices available), can the "biological asset be measured at its cost less any accumulated depreciation and any accumulated impairment losses" (IAS 41). But if this value becomes available and can be measured reliably, then the company needs to re-measure the asset using the fair value method.

a. The debate about the model of fair value

The reasoning for using the fair value model for assets of biological type is that agricultural activity typically involves natural change in the economic value of these assets without any market transactions. Hence, the traditional historical cost model is not correctly representing the economic value of the agricultural resources of a business. For example, livestock and trees have physical growth and their value increases as they growth. The initial cost of acquisition or production of the livestock and trees would not reflect their economic value at each reporting period. Similarly, a new calf is born without any market transaction. Hence, the fair value of the biological assets at the end of each period of reporting is assumed to be a good representation of their real economic value. Therefore, this is seen as the main advantage of the fair value model. Using market value as the basis of the fair value of biological assets results in financial information that is closest to the economic value of the assets (Miller & Bahnson 2009). Further, the business community is more familiar with market values of certain agricultural products than with their acquisition costs. For example, investors in agricultural businesses are familiar with market prices of new-born livestock and plantation crops such as rubber, corn, coffee, cocoa or tea (Elad 2004).

But one important downsides of this model is the inexistence of active markets for many biological assets.

If the market price of a biological asset does not exist or cannot be measured reliably, the company can either estimate the fair value based on reasonable assumptions or report the asset at its acquisition cost. Elad and Herbohn (2011) point out that the lack of reliable market prices for many biological assets will lead to the use of discretionary proxies for fair value. In these cases, fair value recognition may result in lower information quality and the possibility of management manipulating accounting numbers. Two studies by consulting firm PriceWaterhouseCoopers (PwC) show that companies in the timber industry use an array of approaches to estimate fair value and they are not always transparent about the assumptions used in the estimations (PwC 2009 2011). Some companies calculate the fair value of forests based on discounted future cash from sales of timber. Sometimes companies use current prices of logs to calculate the future cash of timber sales but other times they use estimated log prices. PwC also observed other fair value methods, such as the market price of trees approaching harvest age, and the current market price of trees. And some companies use a mix of methods. This variety of proxies to estimate "fair value of biological assets" (IAS 41) impairs comparability of financial information across companies. For example, it would be difficult for an investor to compare the profitability of biological assets between two companies in the timber sector if they use different approaches to value the assets.

Elad and Herbohn (2011) compare the valuation of biological assets in three countries, the United Kingdom, France and Australia. Their conclusions are similar to the PwC conclusions. Companies applying the fair value model use a diversity of proxies to fairly estimate the value, such as the net present value, valuation through an external consultant, net realizable value, or by market price. This diversity reduces the international comparability of financial information in the agricultural sector. They argue that the International Accounting Standards Board (IASB) should revisit the use of fair value accounting in the agriculture sector.

Elad and Herbohn (2011) also present significant variation in the quantity and quality of information about agricultural resources that companies disclose. The level of compliance with the disclosures requirements is quite low, at about 36%. In other words, most companies do not disclosure the information required by the reporting standards (IAS 41). Firms in France generally disclose less information than their Australian and British counterparts. Elad and Herbohn (2011) suggest that this pattern reflects important cultural differences across countries. French managers tend to be more secretive and less transparent than their U.K. and Australian colleagues, and these cultural features are reflected in the construction of financial declarations.

Another concern with the fair value method is that all unrealized incomes and losses that may result from changes in the market prices of the biological assets, are immediately recognized in net income of the company. Considering the fair value method, a company must re-measure the value of its assets of biological type each period. As an example, a company has breeding cattle with a fair value of 1.000 in year 1. In year 2, the fair value of the cattle went up to 1.200. The company must now recognize a biological asset of 1.200 in the financial statements. The difference of 200 (unrealized gain) is reported as part of profit, changing profit of the company upwards even if there was no sale of the cattle.

As the market price for some biological products are quite volatile, under the fair value method this volatility will be immediately included in the profit of the business. As a result, investors and other stakeholders may perceive companies' financial performance to have high volatility and risk. Further, if there are large unrealized gains due to the fair value re-measurement, profit will be overstated, which could encourage distribution of dividends that are not supported by cash flows (George 2007). Consistent with this view, Daly and Skaife (2016) point out a higher cost of debt for agricultural firms using the fair value method (IAS 41) to account for their assets of biological type than the companies using historical cost. They conclude that creditors who finance the business (e.g., banks, investment funds) charge more for loans when the firms use fair values to measure biological assets. One explanation is that the fair value method results in more volatility in profit, which is viewed by creditors as an indication of risk and uncertainty about the company's ability to repay the loans. In their study, Elad and Herbohn (2011) also identified that accountants and auditors strongly believe that this accounting method (the fair value) leads to high volatility of earnings.

The controversy about the fair value method for biological assets motivated several studies to investigate the implications of the method for economic decisions. Argilés, Garcia-Blandon and Monllau (2011) and He, Wright and Evans (2018) study whether fair values can predict future cash flows of the company, for Spanish and Australian companies, respectively. Both studies conclude that fair valuations are not superior to historical cost valuations in forecasting future cash flows.

Stakeholders, such as investors, lenders, tax authorities and others, use quantitative and qualitative information reported by companies in their financial reports to make investment and financing decisions. When the information reported by companies is strongly associated with future profitability and future cash, stakeholders can better predict the implications of their decisions. But the findings of Argilés, Garcia-Blandon and Monllau (2011) and He, Wright and Evans (2018) indicate that stakeholders do not perceive the assets of biological type measured at fair value as more informative considering the future performance of the company than biological assets valued at historical cost. This result is consistent with the argument that fair value methods are only suited for assets that are commercialized in active and liquid markets. In the absence of such active liquid markets, it is too difficult for companies to estimate a value reliably and fairly for the biological assets.

3. Disclosure of information related to biological assets

Besides reporting the value of biological assets in the financial declarations, companies should disclosure detailed information about the types of biological assets and the criteria used to calculate its value. For example:

- The company needs to disclose the unrealized incomes or losses arising by the re-measuring assets using the fair value less selling costs method.
- The company should also quantify the groups of biological assets, separating consumable assets (e.g., rubber) and bearer biological assets (e.g. rubber trees), mature (e.g., fruit ready to harvest) and immature biological assets (e.g., fruit not ready to harvest).

Companies are also required to describe in the financial declarations the nature of the agricultural activities and its biological assets involved in the activities. Further, companies are encouraged to report non-financial information about the biological assets such as the quantities of particular groups of assets of biological type and their derived agricultural produce. Examples are the number of trees in an orchard, the square meters of land used, and the estimated tons of fruit.

The following table summarizes the information disclosed by two European companies. Agro Generation, a Ukrainian farming company that produces grains and oils; and Vallourec, a French company operating in the energy and forestry sectors (the detailed notes are presented in appendix B9, examples 1 and 2). These two examples illustrate the variation in format and content of information about biological assets that companies disclose (Table 9.2).

Table 9.2. Information about biological assets included in the financial statements of two European companies

Type of information disclosed by the company	Agro Generation	Valourec
Notes to the financial statements	Note 4.2	Note 2.2
Use fair value method	Yes	Yes
Explain reasons for changes in fair value	Yes – climate conditions and crop prices	No
Explain the market prices used in fair value calculations	Yes – market price at point of harvest and contract prices for presold crops	No
Sensitivity analysis	Yes – company explains that a 10% change in management assumptions about climate and prices would result in € 2 009 change in fair value of assets	No
Type of explanation	Written explanations, with some quantitative information	Table quantifying the value of biological assets at year end

Source: Vallourec, financial statements 2018 and Agro Generation, financial statements 2018.

To document how companies report information about their biological assets, PwC studied the disclosure and measurement practice of agricultural companies operating in the timber sector (PwC 2009; 2011). The purpose of this study was to observe the implementation of IAS 41 and recommend best practices. PwC concluded that timber companies differ considerably in the level of transparency. Often companies do not explain their fair value assumptions, such as volume and growth rate used to calculate expected income at harvest, and discount rates used to discount future cash inflows. PwC recommends the following improvements in disclosure practices. Companies should provide explanations about key valuation assumptions (e.g., harvest plans and forests); they should discuss the expected future sale prices of timber and any associated selling costs; and they should report a sensitivity analysis related to each assumption used in the valuation of biological assets. An example of a sensitivity analysis is presented in Appendix B9, example 3.

4. Bearer plants

Companies and investors have raised several concerns about the application of the fair value method to value mature biological assets. Specifically, biological assets that have matured and do not suffer significant biological modification and are used only for growing produce, such as mature trees used only to produce rubber, fruit, seeds, etc. Mature plants are viewed by the company like “property, plant and equipment” and their conceptual usage is similar to the one of a manufacturing equipment. Following these concerns, the IASB issued an amendment to the accountancy rules considering the bearer plants (IAS 16 and IAS 41 2014). Biological assets that fall under the definition of bearer plants are now reported under the scope of IAS 16, i.e. as “property, plant and equipment”.

According to the new rule, a bearer plant must be a living plant and meet three criteria: (a) it is used to obtain agricultural produce; (b) it grows agricultural products during more than one period, and; (c) it is rarely sold as agricultural produce (sold only at the end of its life as scrap sale).

Differently from agricultural produce, the biological assets of bearer type are self-regenerating. Such as, dairy cattle used to produce milk, grape vines, and fruit trees (IAS 41). In this case, annual crops, such as soya and wheat, and trees farmed for lumber do not fall under the definition of a bearer plant because they are grown to be harvested every year. Plants used for both bearing produce and to sale also do not fall under the definition of bearer plants. For example, a company cultivates rubber trees for the rubber milk as agricultural produce, but also for the trees as lumber. In the case of bearer animals (e.g., pigs to breed), they are also excluded from the new accounting treatment, because they are not plants. Bearer animals will continue to be reported as agricultural assets according to IAS 41.

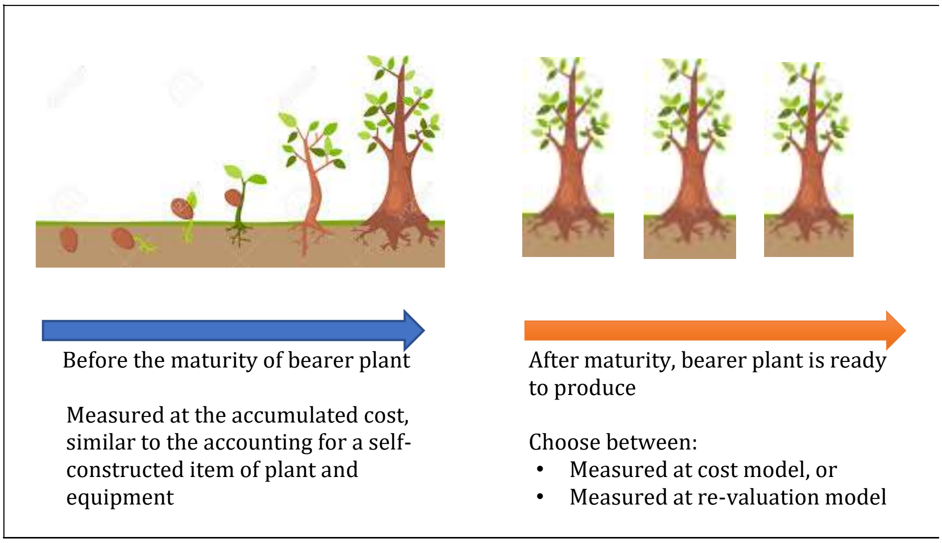
The new reporting method for bearer plants assume that the plant and the produce of the plant are two assets valued using different methods. Bearer plants are presented in the financial statements as non-current assets (IAS 16 – “Property, Plant and Equipment”). Agricultural produce is declared as a current asset (IAS 2 – “Inventories”) unless it needs more than a year to be considered as mature.

4.1. Recognition and measurement of bearer plants

Grape vines, rubber trees, tea bushes, or oil palms are all examples of bearer plants. They are similar to equipment or property and thus are considered non-current assets of the business. Before reaching their maturity stage, the bearer plants are evaluated at their accumulated cost, in a similar way to the accounting measurements of a property or equipment that is self-constructed. After the bearer plants mature and are ready to go into production, the firm can choose the accounting treatment for the bearer plants: it can either use the model of cost or the model of revaluation.

Under the model of cost the bearer plant is valued at cost minus the accumulated depreciation and impairment, with changes included in net income. Under the model of revaluation, the bearer plant is measured at the fair value of each period, minus the accumulated depreciation and impairment. Revaluation adjustments are recognized in other comprehensive income and other changes are recognized in net income. Figure 9.3 summarizes the accounting treatment of bearer plants.

Figure 9.3. Accounting treatment of bearer plants



Source: author notes based on IASB 2020, IAS 41

The produce that grows on bearer plants until the point of harvest, for example, grapes, latex, tea leaves, fruit, or oil palm, are considered biological products.

5. Government grants for agriculture

Companies operating in the agriculture often receive government grants. In Europe, the development of agricultural businesses has been strongly supported by subsidies and grants provided by the Common Agricultural Policy (CAP) of the European Union (EU)'s. About one third of the total EU budget goes to CAP activities, and about 54 billion Euros are for agricultural subsidies (European Commission 2020). The EU subsidies and grants take various forms such as direct payments to farmers, and subsidies based on the income generated by the farm.

From the financial reporting perspective, the question is how to include the grant in the net income of the business. One option is to include the entire amount of the grant in the company's revenues when received, increasing profit in one single period. But that would distort the financial performance of the business and increase earnings volatility. While the grant would increase profit in one single period, the agricultural production that the grant finances is spread over several periods. For example, a grant received in first period to finance costs of producing sustainable grape vines that take five years to grow. Thus, to ensure matching between the grant revenue and the costs of producing agricultural products, accounting rules requires the recognition of the grant over time, on a systematic basis.

IAS 41 defines how government grants should be reported in the financial declarations of a company. Government grants were already considered in IAS 20 "Accounting for Government Grants and Disclosure of Government Assistance". According to IAS 20, these grants should be included in "net income over the periods necessary to match them with the costs" of the agricultural assets that they finance, on a systematic basis. IAS 20 allows companies to choose between two methods of recognition: record the grant as a separate item or deducting the grant from the value of the biological asset. If the latter method is selected, the decrease in the cost of the asset would create an excess (i.e., the difference registered considering the fair value and the net cost of the biological asset). Under IAS 41, that excess would be recorded directly in profit or loss, which implies that the grant itself would be reported in profit or loss, a practice that is not allowed.

To resolve this mismatching problem, IAS 41 requires the delay of recognition of government grants. Therefore, the accounting considerations for government grants that relates to biological assets measured at fair value is as follows:

a) If the grant is unconditional it is reported directly in profits or losses when, and only when, the government grant is receivable;

b) If the grant is conditional (e.g., a company is required not to develop agricultural activity for a number of years or the company must produce certain types of crops), it is included in profits or losses when the conditions settled to receive the government grant are satisfied. For example, if a company receives a grant to acquire a herd of cows under the condition that the cows must be kept for four years (conditional grant), then the grant can only be considered revenue after the four years.

6. Reporting of biological assets by European firms

This section exemplifies financial reporting practices by European companies included in the Financial Times (2019) list of the 500 largest European companies. Financial Times companies represent the largest portion of Europe's capital markets and contribute to a significant percentage of Europe's GDP. The analysis excludes companies operating in the financial sector (e.g., banks, investment companies) because they follow specific financial reporting rules issued by Central Banks and other regulatory bodies. Out of 324 non-financial companies included in the Financial Times list, 12 companies report biological assets (see Table 9.3).

Table 9.3. Biological assets in large European firms

Company	Country	Sector	Biological assets (mean 2008-2018)	
			Thousand Euros	% of net income
ACCIONA	Spain	Renewable energy	6.798	2,5%
ASSOCIATED BRITISH FOODS	U.K.	Production of food ingredients	192.140	29,3%
CHRISTIAN DIOR	France	Luxury fashion	2.354.833	119,9%
DIAGEO	U.K.	Beverage and alcohol	40.991	1,7%
DS SMITH	U.K.	Packaging	7.799	2,7%
JERONIMO MARTINS	Portugal	Food producer and retailer	3.569	0,9%
KINNEVIK	Sweden	Digital consumer business	13.400	5,2%
LVMH MOET HENNESSY	France	Luxury goods	2.419.833	54,4%
ANADOLU EFES BIRACIL	Turkey	Production of beverages	1.683	1,1%
UNILEVER	U.K.	Food and beverages	33.456	0,7%
VALLOUREC	France	Energy and technology	143.321	15,8%
MONDI	U.K.	Packaging and paper	278.204	20,7%
SMURFIT KAPPA	Ireland	Packaging and paper	114.117	21,4%
SVENSKA CELLULOSA	Sweden	Timber, pulp and paper	3.006.196	940,4%
PERNOD RICARD	France	Alcoholic beverages	122.444	11,9%
STORA ENSO	Finland	Pulp, paper and forest products	334.690	21,5%
SWEDISH MATCH	Sweden	Tobacco and other products	130.961	4,2%
UPM-KYMMENE	Finland	Forestry and paper	1.526.273	182,2%
XSTRATA	Switzerland	Mining	14.973	1,2%

Source: author calculations based on data from Refinitiv Worldscope 2021

They operate in several countries and across different sectors. The average amount of biological assets reported by these companies, between 2008 and 2018, is quite large, 1.438.646 thousand Euros, which highlights the importance of agricultural activities for the European economy. On average, biological assets represent about 5% of total net assets and 77% of net profit of the companies. But for some companies these figures can be much higher. The following sections show detailed examples of financial reporting of agricultural activities by three European companies, for period 2018: SVENSKA CELLULOSA, LVMH MOET HENNESSY and ASSOCIATED BRITISH FOODS.

6.1. SVENSKA CELLULOSA

SVENSKA CELLULOSA (SCA) is a Swedish company operating in the forestry and paper sectors. SCA is the evaluated as largest private owner of forest in Europe with about 2.6 million hectares of environmentally certified forest land in Sweden. The company manages forest land and manufactures products such as wood, pulp, and paper. It also uses forest resources for renewable energy.

Biological assets are a significant part of the SCA resources. Biological assets represent 26% of total assets and contribute to 24% of total profit, on average in periods between 2008 and 2018. The biological assets of SVENSKA comprise mostly forests, and the company uses a mix of valuation methods to measure its forest assets. Land is valued at acquisition cost and growing forests are valued at fair value. However, the company does not use market prices to measure the fair value of growing forests. The fair values are estimated by management using the discounted present value of the expected revenues generated by forests. SCA explains in the notes to the financial declarations that this is a common practice among other forest companies in Sweden, given that “a market price or other comparable value does not exist for forests”. Therefore, the company’s valuation methods are aligned with those of the industry peers.

This case illustrates well some of the problems of the fair value method discussed in section 2. As the company relies on its own estimates of future revenues to calculate the fair value of forests, the values of forest assets reported in the financial reports can be subject to discretion and error. To have an idea about the potential impact of such fair value measurements in the company’s financial efficiency, the gains and losses from fair value adjustments of biological assets represent 19% of SVENSKA’s profit in 2018. Hence, variations in the calculations and estimations can have a large impact on SCA profitability either positive or negative.

To increase the reliability on the reported values for growing forests, SCA discloses detailed explanations about the assumptions used in the calculations and provides a sensitivity analysis to changes in these assumptions (SCA financial statements 2018).

In this case, in the notes to the financial declarations the company explains that it uses management assumptions to calculate fair values, because there are no observable market prices. The management of SCA make assumptions about felling plans and costs, tree growth, timber prices, and silviculture costs. SCA also provides detailed explanations about the calculations of the fair values. SCA management assumes a production cycle of 100 years, a 5.9% discount rate, an inflation rate of 2%, and an average price of wood of SEK 449, per solid cubic meter under bark.

Further, SCA quantifies the potential impact of changes in these assumptions to calculate fair value based on the present value of future estimated revenues from forests (sensitivity analysis is presented in appendix B9, example 3). For example, a change of 0.25% in the discount rate would result in a change of 2.041 SEK million (201.07 million Euros) in the value of forests. An increase of 0.50% in wood price in the first 10 years would lead to an increase of 2.496 SEK million (247.1 million Euros) in the value of forests. The disclosure of a sensitivity analysis is important for investors as it helps reduce uncertainty about the economic value of the biological type assets of the company.

6.2. LVMH MOET HENNESSY

The economic agent known as LVMH Moët Hennessy Louis Vuitton (LVMH) represents a French company with operations and sales around the world. LVMH specializes in luxury goods including fashion products (fashion house Louis Vuitton) and wines and spirits (Moët Hennessy).

An important part of LVMH business is the production of the champagne Moët & Chandon and cognac Hennessy. The vines cultivated for champagnes, cognacs and other wines produced by LVMH are considered as biological type assets. The company uses “the fair value method” (IAS 41) to measure these assets because a reliable market price is available. For example, harvested grapes are measured at purchase prices for equivalent grape harvests. The company explains that the wine produced, including champagne and cognac, is valued at the market value of the harvest, which is “determined by reference to the average purchase price of equivalent grapes, as if the grapes harvested had been purchased from third parties” (LVMH financial statements 2018, notes 1.9 and 1.17).

LVMH does not provide additional information about biological assets, despite its large amount and important contribution to the business revenues. For example, LVMH does not describe each group of biological assets, the criteria used in the calculation of fair values, and the impact of fair value adjustments on net income of the company. In comparison with SCA, LVMH provides less and lower-quality information about biological assets.

6.3. ASSOCIATED BRITISH FOODS (ABF)

ABF is a company with headquarters in the U.K. that operates internationally in more than 50 countries. They main business is the production of food ingredients such as sugar, baker's yeast, emulsifiers, enzymes and lactose.

One of the most important biological assets of the company is growing cane, which is used to produce sugar and sugar-based ingredients.

The company applies "the fair value method" (IAS 41) to measure the value of sugar cane in each period. To obtain the fair value of growing cane, management needs to estimate the sucrose content and sucrose price. ABF explains how these estimations are done in the notes to the financial declarations (ABF financial statements 2018, note – significant accounting policies). Specifically, ABF management estimates the expected cane and sucrose yields based on the expected climate conditions and harvesting plans. As the company exports a large portion of its food products, management also consider the export prices and foreign currency exchange rates in the fair value estimates of such products.

ABF provides additional information about quantities and assumptions made by management to obtain the fair value of growing cane. In note 15 of the 2018 financial declarations, ABF reports the land used, expected quantity of cane, and expected maturity of canes. This information is provided by region where the plantations are located (an extract of the ABF financial statements is presented in Appendix B9, example 4).

Finally, the company presents a sensitivity analysis for a 1% change in the inputs used to calculate fair values. ABF explains that 1% increase in the estimated sucrose content and a 1% rise in the estimated sucrose price would result in 1.1 million pounds increase in the fair value of growing cane.

7. Conclusion

This chapter explains the accounting evaluations of biological type assets and agricultural activity for companies preparing financial information based on International Financial Reporting Standards (IFRS). The international standard for agricultural activities (IAS 41) defines the assets of biological type as living plants or animals that experience biological evolution. Generally, these assets and their agricultural produce are reported in companies' financial reports at the fair value minus cost of sell, where fair value is usually the market price of the biological asset.

The use of the fair value model to measure biological assets is based on the idea that market values are the best representation of the economic value of these assets. However, the fair value method has some disadvantages for financial reporting. Some biological assets are not traded in active markets which may lead to management discretion in the determination of proxies for fair value. The consequence of that is the possibility to manage earnings and distort stakeholders' perception about the performance of the business.

Given the complexity in applying fair values to certain biological type assets, bearer plants are now treated as a fixed asset measured at historical cost. This chapter provides several examples of financial reporting of biological assets by European companies. The examples show that there is substantial variation across companies in the measurement and method of disclosure for the biological type assets, which reduces the international comparability of business information.

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Appendix A9 – Definitions of key terms

Agricultural activity is the management by an entity of the biological transformation and harvest of biological assets for sale or for conversion into agricultural produce or into additional biological assets.

Agricultural produce is the harvested produce of the entity's biological assets.

Bearer plant is a living plant that is used in the production or supply of agricultural produce, is expected to bear produce for more than one period, and has a remote likelihood of being sold as agricultural produce.

Biological asset is a living animal or plant that has biological transformation.

Fair value is the price that would be received to sell an asset or paid to transfer a liability in an orderly transaction between market participants at the measurement date (IFRS 13 – Fair Value Measurement).

Appendix B9 – Examples from companies' financial statements

Example 1 - Extract from Agro Generation 2018 financial statements, note 4.2.

"The Group's biological assets are measured at fair value less costs to sell at each balance sheet date. The fair value of biological assets varies according to climatic conditions during growth and harvest, yield potential and price development. A change in any of these estimates could lead to a material change in the income statement. If the management team's assumptions as of December 31, 2018, would have been by 10% better/lower, then the fair value of the biological assets and gross margin would increase/decrease by around € 2 009 thousand. The agricultural produce harvested by the Group is first fair valued at the harvest date when accounted for in inventory in the "Agricultural produce". They are later revalued at the lower of that fair value and the net realizable value at the balance sheet date. The value used for agricultural produce in the assessment of fair value at harvest time and subsequently for the net realizable value at the balance sheet date is determined based on the actual prices less costs to sell at the point of harvest and contract prices on the presold crops."

Example 2 – Extract from Vallourec financial statements 2018, note 2.2.

Note 2.2 Biological assets

Change in biological assets	2017	2018
As at 1 January	**88,411**	**71,494**
Investments	6,184	6,209
Valuation at fair value	3,136	3,293
Net depreciation expenses for the period	(8,603)	(8,870)
Impairment losses	-	(1,663)
Reclassification to inventory	(4,514)	(3,171)
Foreign exchange differences	(11,576)	(7,444)
Other changes	(1,544)	(237)
AS AT 31 DECEMBER	**71,494**	**59,611**

The Group's Brazilian subsidiary Vallourec Florestal cultivates eucalyptus plantations mainly to produce the charcoal used in the blast furnaces of Vallourec Soluções Tubulares do Brasil.

As at 31 December 2018, the company cultivated approximately 112,709 hectares of eucalyptus over a total area of 230,375 hectares.

In 2018, Vallourec Florestal posted revenue of €45.6 million, as compared to €53.5 million in 2017.

Example 3 – Extract from CSA financial statements 2018, note TD3.1

TD3:1 Sensitivity analysis

SEKm	Change in assumption		Change in value, before tax 2018	2017
Discount rate	0.25%	±	2,041	2,280
Wood price	0.50% the first 10 years	±	2,496	2,900
Felling cost	0.50% the first 10 years	±	630	745
Volume (final felling)	150,000 m^3sub the first 10 years	±	424	417

Example 4 – Extract from ABF financial statements 2018, note 15

15. Biological assets

	Growing cane £m
At 17 September 2016	78
Transferred to inventory	(104)
Purchases	–
Changes in fair value	101
Effect of movements in foreign exchange	2
At 16 September 2017	77
Transferred to inventory	(75)
Purchases	–
Changes in fair value	76
Effect of movements in foreign exchange	(2)
At 15 September 2018	**76**

	South Africa	Malawi	Zambia	Eswatini	Tanzania	Mozambique
Expected area to harvest (hectares)	6,517	18,363	15,848	8,609	9,426	5,875
Estimated yield (tonnes cane/hectare)	69.0	97.7	119.0	102.1	74.8	82.1
Average maturity of growing cane	46.4%	68.2%	65.7%	67.7%	46.2%	71.6%

Ch.9

FINANCIAL REPORTING OF AGRICULTURAL AND BIOLOGICAL PRODUCTS

Understanding the concepts and the accounting treatment of biological assets and agricultural-related activities

OBJECTIVES: The chapter objective is to understand the concepts and the accounting treatment of biological assets and agricultural-related activities.

SKILLS: The test verify if students are able to apply the recognition and measurement criteria defined by IFRS standards for biological assets and agriculture produce.

QUESTION 1 (PLEASE CHECK THE CORRECT ANSWER)

Which of the following assets are biological assets according to the concept defined in IAS 41 – Agriculture?

- ☐ Land for a farm.
- ☐ Cows used for breeding.
- ☐ Mature fruit trees.
- ☐ Machine to sew the soil in a farm.

QUESTION 2 (PLEASE CHECK THE CORRECT ANSWER)

Biological assets should be recognized in the company's financial statements at the:

- ☐ Fair value less costs to sell.
- ☐ Accumulated costs incurred to produce the asset.
- ☐ Costs to sell the asset.
- ☐ Market price.

QUESTION 3 (PLEASE CHECK THE CORRECT ANSWER)

A living pant is considered as a bearer plant if:

- ☐ It is used to produce fruits.
- ☐ It is expected to live more than 100 years.
- ☐ It is used in the production or supply of agricultural produce; it is expected to bear produce for more than one period.
- ☐ It is used in the production or supply of agricultural produce; it is expected to bear produce for more than one period; and it has a remote likelihood of being sold.

QUESTION 4 (PLEASE CHECK THE CORRECT ANSWER)

One disadvantage of the fair value model to measure biological assets is:

- ☐ Fair value of biological assets is estimated by the auditors of the company.
- ☐ Fair values are not available for animals, only for plants and crops.
- ☐ It is difficult to measure fair value reliably for certain assets that do not trade in active markets.
- ☐ Fair values of biological assets depend of climate conditions.

QUESTION 5 (PLEASE CHECK THE CORRECT ANSWER)

A company has several fruit orchards and acquires two horses to transport the employees between orchads. The horses are reported in the company's financial reports as:

- ☐ Bearer plants, because they work in a company that cultivates plants.
- ☐ Biological assets, because they are living animals.
- ☐ Property, plant and equipment, because they are not used for an agriculture activity.
- ☐ Inventory, because they can be sold to another company.

QUESTION 6 (PLEASE WRITE THE CORRECT ANSWER WITHIN THE BOX)

Atlantic Fish is a fish farm that creates salmon and cod using aquaculture. When the fish is mature it is killed and sold to supermarkets and fish retailers. Discuss how Atlantic Fish reports the fish in the financial reports.

COMPANY SCOTT SPECIALIZES IN RAISING AND BREEDING OF PIGS AS LIVESTOCK. IN JUNE, SCOTT ACQUIRES 10 PIGS FOR BREEDING FOR 3.000 EUROS EACH. IN OCTOBER, 4 NEW PIGLETS ARE BORN WITH A MARKET VALUE (NET OF COSTS TO SELL) OF 500 EUROS EACH. DURING THE YEAR THE COMPANY HAS COST OF 100 EUROS WITH VETERINARY SERVICES AND FOOD FOR THE PIGLETS. AT THE END OF THE YEAR, THE MARKET VALUE OF EACH PIGLET IS 1.000 EUROS AND THE ESTIMATED COSTS TO SELL ARE 150 EUROS. DISCUSS HOW THE PIGS SHOULD BE RECOGNIZED IN THE COMPANY FINANCIAL REPORTS IN EACH PERIOD.

10. Estimation of Economic Effects of Processing of Organic Products in the case of Family Farms

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Abstract: Global trends in the sector of agriculture have forced family farms to look for strengthening of their economic sustainability or even for survival in one of the available alternatives for creating added value. Among the adequate possibilities for creating added value at the farm level, both the implementation of organic production system and additional offering of organic food products gained solely from processing of organic agricultural products, could be found. In line with entrepreneurial spirit and creation of additional income at the farm level, the aim of the chapter is reflected in the assessment of economic effects (based on variable costs) obtained by the use of identical capacities in the processing of conventionally and organically produced apples. In other words, a comparative analysis of the effects of substitution of the production input, with the use of processing capacities for the production of apple chips on a family farm, would be performed. According to the topic of the paper, the evaluation of the results should show whether there is a significant advantage in production of apple chips, obtained from organic apples over conventional raw material base. Substitution of used inputs generates increase in the contribution margin for almost 7.8 times, ensuring thus the boost in the overall farm profit.

Keywords: value added; economic effects; family farms; processing of organic products; apple chips.

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1. Introduction

Terms as agriculture, farm(er), rural areas and rural communities assume certain level of dynamism and synergetic action. Throughout the last few centuries their meanings, characteristics, forms, position and importance in society were constantly improved, incorporating into them relevant knowledge, which are valid for the current level of civilizational progress.

Agriculture is among the first and the most important consciously organized activities of people. It is primarily linked to satisfaction of one of the primary human needs – food. So, agriculture could be understood as the overall set of activities that indicate how the crops and domestic animals support the survival of human population in numerous ways. Over the time, apart from providing the food security, it was assigned some other functions e.g., landscape shaping and sustainable exploitation of natural resources, boosting of local economy, maintaining the quality of life of rural communities. Although the meaning of this term is usually limited to crop cultivation and livestock breeding, agriculture involves wide range of activities and sub-activities e.g., cultivation, breeding, domestication, livestock management, agri-food logistic. It is a type of human occupation or a way of life. Today agriculture is considered an essential sector of global economy capable to create the added value required for its further growth and development (Byrne 1955; Harris & Fuller 2014).

Starting from the definition of farming as the organized and targeted land (plant) cultivation or stock raising, the farm could be described as the area of land used dominantly for agricultural activities in order to produce food of plant or animal origin, fibre, biomass, energy and other products or services used in human life i.e., the essential production facility in agriculture. In contemporary agriculture, special focus is given to family farms, which offer decent living conditions for certain family involved in agriculture and enable them to accumulate enough savings for old age. They are usually not dependant on external labour, as all activities are conducted by family members with occasional help from close neighbours during the production peaks. One characteristic is that the farm members are making independently the majority of managerial decisions. Its size is determined by available natural and production resources, number of family members and their ability to efficiently use their own equipment and labour potential over the life cycle of the family. One of the crucial questions related to family farms is their size, which depending on the specific analysis could be determined through various indicators i.e., cultivated land area, number of units of livestock, value of overall farm output or generated incomes, off-farm engagement, etc. (Carlin & Crecink 1979; Garner & de la O Campos 2014; Lewandowski et al. 2018).

Globally, small farms are numerous, regardless of their location either in developed or developing part of the world. Some estimations show that farms with up to 2 ha cover almost 31% of global crop production, along with almost 34% of global food supply, and cultivating up to 24% of worldwide available agricultural land complex (Ricciardi et al. 2018). Small farms are more oriented to food production, maintaining the larger level of crop diversity (large farms are mostly involved in monoculture production), and having the lower post-harvest losses (Dixon et al. 2001). Apart from their role in securing the food security, small farms are very important for reducing the rural poverty, and contributing to local rural communities with the additional income. Overall experience have shown that increase in GDP originating from agro-sector is two times more effective in poverty reduction than the one generated outside of the agriculture (Mahendra 2014).

For example, around 2/3 of the EU farms are smaller than 5 ha (Cook 2018). Some analyses (Huang et al. 2012; Chen & Gu 2020) show that almost 98% of farms in China possess up to 2 ha, mainly due to national regulative on regional migration and land use rights. It is estimated that these farms usually overuse the agro-chemicals in comparison to the larger farms, which is mainly a result of lack of knowledge and managerial skills. It is also observed that small farms with less than 0.6 ha are mostly present in cash crop sector (Huang et al. 2012; Chen & Gu 2020). USA agriculture rests on the family farms, as they have a share of 99% in total number of active farms, while covering 89% of overall agri-production. On the other hand, 90% of all farms are small family farms with annual incomes less than 350,000 USD. They are participating in total value of production at national level with around 24% (Hoppe & MacDonald 2016). In India, 78% of all farms are owning less than 2 ha, while cultivating just 33% of total arable land and producing around 41% of grains at national level (Singh et al. 2002).

Who is managing the farm? Usually, it is manged and run either by the farmer supported by family members or externally engaged labour, or employed agricultural manager. They are responsible for all steps and activities related to crop, livestock or biomass production, food processing, agri-tourism, etc. They are making decisions about any relevant issue in relation to the farm operations e.g., raising living organisms, getting supplies and required inputs, maintaining farm equipment and facilities, selling farm products and services, etc. (BLS 2015).

At the beginning of the century, agriculture was the sector of the economy with the biggest employment rate worldwide, until the services sector took the primacy. Besides the fact that growth of employment in agriculture is reducing, it currently employs over 2.3 billion persons (FAO 2012). Over the time, with the increase in the level of intensification, knowledge transfer and tech-tech progress in agriculture, number of population involved in agri-sector has decreased. Number of people active in agriculture becomes the indicator that divides the countries to rich and poor. For example, 75% of the labour force in Madagascar is engaged in agriculture (representative of the poorest countries), while in countries with developed economy such as Germany or UK just around 1% of citizens is working in agri-sector. Share of labour involved in agriculture in Poland is 13%, which is well above than in UK, although both being representatives of developed world with noted tradition and use of hi-tech in agriculture, as well as in both countries the food production is independent, self-sufficient, or even significantly in surplus (Roser 2013).

Today, the farmer is seen as entrepreneur capable and ready to devise and implement in that moment the best possible production alternative i.e., to choose the alternative that generates the highest added value in regard with the farm businesses. It is expected that he should be well educated and skilful, as well as fully oriented to the application of all sustainability factors and principles of good agricultural practice.

Terms rural areas and rural communities are somewhat hard to explain. Generally, both in developing and developed parts of the world, the term "rural" is defined as being opposed to urban, or as "anti" urban. It refers to sparsely populated territories located outside of the urban areas. Rural areas are providing crucial contribution to the well-being and progress of any country, as they are usually involved in food production, generation of raw materials and ecosystem services. Worldwide, they offer more or less different frameworks for settlements and local communities, available physical and social infrastructure, elements of livelihood, etc. Their linkage with the urban areas is generally complex and multi-layered.

Commonly used criteria in defining rural area are population density and number of inhabitants in certain settlement. Besides, other defining indicators could be the distance from the main roads or urban centres, share of agricultural population or agricultural income, population size, etc. OECD defines rural areas as territory with population density lower than 150 inhabitants/km2 (accepted also by EU but limited to the density of 100 inhabitants/km2), (Bogdanov 2007). At regional level, functional and administrative units are classified depending on how much of the region's population lives in rural communities, where regions with over the 50% of the total population settled in rural communities could be observed as predominantly rural regions (Brezzi et al. 2011). On the other hand, level of mentioned criteria is not so strict, as it slightly varies among countries. For example, in Canada rural area/settlement is determined as the one that has up to thousand inhabitants or population density lower than 400 inhabitants/km2 (du Plessis et al. 2002). In China by small villages are considered settlements with up to 300 inhabitants, while in Australia it ranges from 200 to 999 inhabitants, or in USA up to 2,500 inhabitants or 386 people/km2, etc. (Dasgupta et al. 2014). Around 24% of world's population lives in rural areas[4] (OECD 2020). Majority of global rural population lives in less developed or least developed countries, while almost 70% of the extremely poor inhabitants in the developing countries live in rural areas (Dasgupta et al. 2014). In EU over the 91% of territory could be labelled as rural, in which around 56% of overall population lives. Prefix rurality differs among member states, from Ireland with over 98% of its territory marked as predominantly rural areas, to the Netherlands with around 2% (Štrbac et al. 2011).

[4] Globally, during the previous four decades, urban population that lives in cities larger than 50 thousands inhabitants has been increased for more than twice. So, around 48% of global population settles the cities, while almost 28% of global population lives in towns and semi-dense territories (OECD 2020).

Rural communities are an important factor for farms as well as for overall agriculture development. Rural communities usually represent the first level of either administrative, economic, social or some other aspect of public support to farm sustainability. So, quality of mutual interaction could lead both to strengthening of their capacities and to creating successful business opportunities.

What is considered as rural community? As previously mentioned, the label rural is generally linked to certain community in regard to the number of the inhabitants, density of population, its dominant focus to agri-sector, or its distance from urban centres. Unfortunately, there is no one-size-fits-all solution, as precondition thresholds could differ from region to region. At the end, the majority of rural communities are clustered in hinterland of urban areas, acting as their resource base (for food, raw materials, labour, natural services, etc.), (Scazzosi & Branduini 2020; AARP 2020).

Farms are one of the key links in global strivings to achieve the entirely sustainable agriculture i.e., agriculture that will enable the use of accessible natural resources to current and upcoming generations under the same volume and quality. So, farm sustainability should be based on its capability to run the business in manner that will secure its durability and lead to its growth under to given socio-economic and natural circumstances. Farm sustainability fully adheres to the general principles of sustainability, by meeting economic, social and environmental objectives simultaneously. Regarding the economic aspect, farm should provide optimal and responsible use of the available technical, natural and human resources, along with securing economic efficiency and financial stability in longer period. In line with social aspect of sustainability it should preserve wellbeing of all farm members, along with being proactive in relations with both participants active in agriculture and members of rural community. Regarding the ecological aspect, farm members should show high level of awareness and responsibility towards the environmental issues in micro and macro surroundings (Sullivan 2003; Menalled et al. 2008; Bachev 2016).

Creation of added value at farm estate is among the factors that preserve the farm sustainability. Added value could be defined as any improvement in product or service characteristics, which have positive economic implications for certain producer (any change that makes products/services more welcome for the use, giving the customers additional impulse to make the purchase). In general, the overall sustainability is more economically than socially or environmentally inclined (primarily oriented toward increase of producer incomes and competitiveness), (Burchell et al. 1985). By implementing the added value, rural entrepreneurs, mostly small farms, greatly benefit from the strengthening of their earning potential, as it creates and later makes stronger economic linkage between the farm practices and the end consumer. Farmers can add the value to certain raw commodities throughout the increase of their utility e.g., by mechanically cleaning and packaging the fruits and vegetables making them ready for consumption). In agriculture, added value mainly refers to the processing activities i.e., the transformation of raw agricultural into the food products e.g., transfer of wheat into the flour or bakery products; transfer of milk or meat into the dairy or meat products; transfer of fruits into the juices, jams, or dried fruits; transfer of olives into the oil; transfer of tomatoes into the juice or sauce; etc. Furthermore, added value could appear as result of redirection of production process along with emphasizing the food origin i.e., switching to production systems in which the changed product characteristics cannot physically be seen e.g., agri-food products gained by organic or integral production, products with known origin or geographical indication, etc. (Crawford 1997; Lu & Dudensing, 2015).

Added value methods usually have notable economic dimension, while, on the other hand, practicing the organic farming emphasizes more the environmental dimension of the product. By switching entirely to organic farming, we will not be in position to feed the world, as switching from extensive type of production to organic production will lead to sharp decline in yields (compared to intensive farming) that by volume do not meet the needs of current population. But for small-scale farms (limited by size of property, or lack of mechanisation), transition to organic farming could boost the expected incomes due to higher prices of organic agricultural products. Furthermore, in order to avoid organic transition timeline (approaching to full organic status of production through the three-year conversion period) small farms could reach the sustainability and embed certain level of added value by the processing of organic food products. There are a lot of processing capacities that could be used both for processing of conventionally or organically produced raw materials at farm level (Kuepper 2006; Krall 2015).

The chapter is based on the main hypothesis that processing of organic agricultural products leads the farm to higher profits than the processing of conventionally produced raw material, having in same time the higher overall sustainability potential (there is notable environmental and social component). Similar research was previously done in production of sauerkraut (processing of cabbage), (Jeločnik et al. 2019b).

In line with that, the main goal of the chapter is the assessment of economic effects (based on contribution margin) gained by the use of unique farm facilities and equipment for the processing of conventionally and organically produced agricultural products. A comparative analysis of effects gained by substitution of raw material used for the production of apple chips, that will serve as the instrument for decision making towards the available processing alternatives at small family farms will be conducted.

2. Methodology and Used Data

Economic analysis is performed for the apple processing organized on a small family farm i.e., production of apple chips. Analysis was based on the data obtained through two in-depth interviews conducted with the farm manager. Observed farm is primarily profiled in fruit processing (mainly fruit drying and fruit brandy production) and in smaller part in apple production. It is located in peri-urban zone of the Belgrade city in Serbia. Analysis relates to the production year 2019.

Initial research was conducted within the project funded by the Ministry of Agriculture of Republic of Serbia (Improvement of knowledge transfer towards the gaining of safe and competitive agricultural products obtained by processing at the small farms within the sectors of milk, meat, fruit and vegetable) during the period 2018-2019. It incorporated the estimation of economic justification of investment in facility and equipment required for apple processing (apple chips production), while focusing on the processing of conventionally produced apples. Previous research shows that investment under assumed circumstances was justified, considering apple processing profitable for the small farm.

In order to earn additional incomes, farm would like to switch the used inputs, and to process organic apples. This idea comes from the facts that both processing activities require identical facility and equipment, and quite a similar production cycle. Additionally, there is constant growth in demand for organic products. Besides, although farm capacities are adequate just for small scale production, and inadequate for export, farmer is aware that there is small but uncovered local market niche of organically produced food products.

It is assumed that undertaken input substitution will initiate slower growth of costs than incomes, initiating the increase in gained gross profit. Organic[5] apples will be purchased locally (delivered to farm gate), while apples conventionally produced at farm will be processed into the apple brandy. Besides economic implications, farmer believes that input substitution will also boost environmental and social components of farm sustainability.

[5] It has to be noted that campaign of apple processing last for up to three months, while rest of the year facility and installed equipment are in function of service of drying other fruit species, vegetables, medicinal and aromatic herbs, etc.

Further, for the verification of the used technological (standard in apple chips production) and methodological framework (use of contribution margin and sensitive analysis), certain scientific and professional literature was used. All data and results are presented by tables, while all values are in EUR currency.

As mentioned above, economic analysis was conducted under the following methodological framework: analytical calculations based on variable costs (calculating the contribution margin), development of sensitivity analysis and calculating the critical values of production (evaluation of economic success of organizing the processing at the farm in conditions of uncertainty). Besides, in order to see which costs burden the apple processing the most, the structure of variable costs was also presented.

Costs of production – Costs of production are the monetary expression of spending of material goods (inputs and fixed assets), labour, services, public expenditures, etc., required for realization of entrepreneur/company (including farm) business mission (Anđelić et al. 2017). In value they represent variables of physical volume of spending multiplied by price for the unit measure. Overall production costs have two sides fixed and variable. Fixed costs do not change towards the volume of production. Their initiator is the readiness of legal entity to perform a certain production (service), while they remain constant even if there is no any production activity. Variable costs occur with the beginning of production activity. Variable costs differ in proportion to output. Usually they include raw materials, labour and energy costs. They can be proportional, progressive and degressive, while most often being proportional to the volume of production. If there is no production their value is zero. The purpose of the cost analysis (specifically of the variable costs) is to identify groups or individual costs that can be reduced or avoided, which would lead to improvement of business results. According to the above, for certain production process besides the overview of overall costs, their structure is expressed too (Baye 2010; Chen & Koebel 2017).

Variable costs could differ towards the observed production line organized at the farm. Characteristics of variable costs in plant production usually refer to costs of seeds and seedlings, agrochemicals (mineral and organic fertilizers, substrates, pesticides and growth bio-stimulators), fuels and lubricants, external services of mechanization, labor[6], binder, packaging material, water, dripping tapes, mulch foil, variable part of general costs, etc. In livestock production variable costs usually include costs of feed, water, medical treatments and medicaments, fattening cattle, fuels and energy, external services of mechanization and equipment, labour, packaging material, straw or sawdust as litter, variable part of general costs, etc. There are many inputs whose costs have variable character and are linked to certain line of food processing. Usually those are raw agricultural material (grains, oilseeds, fruits, vegetables, meat, milk, honey, etc.), various food additives (salt, pepper, spices, etc.), water, energy, external services of processing equipment, labour, packaging material, variable part of general costs, etc.

Contribution margin - The farm production and market environment are characterized by high variability, and in such conditions, in order to survive and maintain the business activity, farmer is forced to frequently change the production structure at the farm, as well as the volume and method of production within the certain production line. Timely and quick adjustments in production are largely limited by the application of the classical full cost price calculations, as they require the determination of costs from all sources of their occurrence. On the other hand, calculations based on variable costs allow almost immediate assessment of

[6] In economic analysis labor costs could carry two generally conflicting stands. At one side, depending on the organization of work at the farm, overall labor costs can be considered either fixed or variable. On the other hand, the character of variable costs could be only linked to externally engaged labor, or it may also include the engagement of all farm members (Meyer & Thibadoux 1996; Jeločnik et al. 2011). We support the stand that economic analysis provides a more realistic picture of the financial success of certain production line if the costs of labour also involve the valorisation of all farm members' engagement.

the obtained product ability to cover the costs incurred within the particular production line (Andrić 1998).

They enable the development of adequate analytical portfolio of the farm which will be in function of more efficient cost management and decision-making, as they allow for quick adjustments in production structure in response to the changes in the farms business environment, as well as the assessment of the farmer's business risk (Vasiljević & Subić 2010). If several production lines are simultaneously practiced on the farm, the sum of the contribution margins gained in all production lines represents the total contribution margin. By reducing the mentioned sum for the total fixed costs realized at farm, the financial result of overall farm business (profit or loss) in predefined time frame will be shown (Pejanović 2009).

As there are many interconnected or mutually conditioned production lines at the farm, generation of overall profit does not imply the profitability of individual production lines. But, gaining the negative or very low value of contribution margin over the several production cycles in certain production line could be the perfect signal for farmer to leave the given production and to focus to those production lines that yield the higher profitability (method enables direct comparing of financial success of two production lines or two levels of production intensity within the certain production line under the equal fixed costs). Therefore, calculations based on variable costs could serve as good instrument for assessing the quality of adopted technology at the farm, or economic effects of changing the intensity or technology of production of some agri-food product at the farm (Jeločnik et al. 2015).

The contribution margin in crop production is mainly calculated per unit of production area, while in livestock production per head of cattle, or in food processing per unit of produced food product.

The financial indicator of production activity based on variable costs is increasingly applied in the analysis of farm business activity. It represents the overall output (value of production) increased for allocated subsidies, and later decreased for all variable costs specific for certain line of agricultural production. Mathematically it could be expressed as (Subić et al. 2019):

$CM = VP - VC$ While,

$VP = (q \times p) + s$ Where,

CM – contribution margin

VP – overall value of production in certain production line (main and by-products)

VC – variable costs made in certain production line

q – volume of products per unit of production capacity (e.g. per m2, ha, head of cattle, hive, etc.)

p – price of product per unit of measure (e.g., per kg, t, l, piece, etc.)

s – subsidies per unit of production capacity (e.g., per m2, ha, head of cattle, hive, etc.)

Sensitivity analysis – represents the instrument for determining the sensitivity of contribution margin towards the market and production disturbance. Generally, it is not so rare for certain market disruptions to occur, at input or product market, or due to weather accident or technical failure, etc., that could endanger the level of achieved (planned) contribution margin in some production line, e.g. increase in input price could occur or due to shortage in certain input farmer would be forced to use the more expensive substitute, or due to a machine failure he has to pay external services of mechanisation, or after the spring torrential rains or floods he has to re-sow the production parcel by certain grain or vegetable, etc. In all cases the level of contribution margin is additionally pressed by increase in variable costs of production. On the other hand, drop in market price of agri-food product produced at the farm, caused by oversized offer at local market (towards the surplus in local production or uncontrolled import), or drop in yields caused by weather condition or pests could occur, that would reduce the farm incomes and endanger the level of planned contribution margin.

So, the use of sensitivity analysis defines the size of the drop in value of contribution margin due to the decrease in yields or product market price, or due to the increase in variable costs in certain production line. It supports determining which factor affects more the fall in contribution margin value, or what represents the higher risk in gaining the planned contribution margin at farm level (Subić et al. 2010).

Critical values of production – There is no doubt that farmers and their profitability are constantly exposed to various production and market risks that are usually out of their control e.g., natural disaster, extreme weather conditions, significance agri-food price fluctuation, etc. In order to secure their production and incomes they usually practice the risk management at the farm e.g., crop or income insurance, appliance of full agro-technical measures, pest control, agri-food products storing, etc., which is institutionally supported in many cases (Lipinska 2016). Considering large uncertainty in agricultural production and its potentially highly adverse impact on farm business sustainability, the method of critical values of production could serve as practical and easy to use risk management tool. Basically, this method determines the critical values of indicators at income and cost side of a certain line of production at which the contribution margin equals to zero. Method assumes calculation of critical price, critical yield and critical variable costs. Their calculation is based on following formulas (Subić & Jeločnik 2019):

Critical price: CP = (VC - s) / EY
Critical yield: CY = (VC - s) / EP
Critical variable costs: CVC = (EY x EP) + s   Where,
EY - Expected yield;
EP - Expected price;
s - Subsidy;
VC - Variable costs.

3. Results with Discussion

Small family farm is equipped with orchard of 0.5 ha and processing facility of limited capacity. Among the fruit species apples and plums are dominating. According to reduced area under the orchard, gained volume of fruits limits the market orientation and business sustainability of the farm if it will be sold as fresh, so all produced fruits are primarily directed to processing, mainly to brandy production. Processing involves drying of fruits and production of fruit brandies and brandies with medicinal herbs and honey, as well as the service of drying fruits, vegetables, aromatic and spicy herbs, mushrooms, etc. for external users.

The existing working area used for processing represents panel type montage facility with useful area of over 80 m2, which includes both working and storing space. The facility is electrified, adequately lit, with ventilation system and access to fresh water and sewage system, etc. Regarding the capital equipment there exists an installed mini cold storage, with the overall capacity of 5 t that operates on temperature of 2-4°C, and container dryer with dislocated thermo-generator and two 1,5 kW power fans. Installed drying system does not allow mixing of combustion products and hot drying air. Apples are drying under the operating temperature of 50-60° C. The facility is equipped with the required equipment such are stainless steel trolleys with trays for reception of fresh and dried material, mechanic and electronic weighing scales, stainless steel containers for apple washing and chopped apple soaking into the citric acid, seed remover, chopper, working tables, chairs and carts, various knifes, heat sealing machine, etc.

The campaign of apple drying i.e., apple chips production, usually overlaps with the period of apple arrival, and lasts for 3 months (from August to October). Within that period, three cycles of apples drying are carried out at the farm (cold storage is loaded/emptied three times), during the processing of around 15 t of fresh apples. Bottleneck in apple processing could be represented by daily capacity of the used dryer. During the one working day (12 h) entire cycle of processing (preparation of input, drying and packaging of apple chips) includes 2 production loads (80 kg of fresh apples/load), that is processing of 160 kg of fresh apples/day.

Organisation of apple chips production at the farm estate generally considers following operations: monthly purchase and storing of fresh apples, daily withdrawal of two production loads according to dryer capacity, mechanical cleaning of apples and seeds' removal, chopping of input into the apple rings (4 mm thick) and their soaking in citric acid, setting the apple rings on trays and carts, and bringing the carts into the dryer, drying of fresh material and later cooling of dried apples, packaging of apple chips into the plastic bags and cardboard transport boxes, storing (for up to 6 months) and finally sale of final product. One gross load of fresh apples (80 kg) gives 75 kg of fresh input ready for processing (after removing of seeds and undesirable parts). Process of drying per one load brings out about 10 kg of apple chips. In this sum, around 5% represents the breakage made under the chips' manipulation and packaging, while 9.5 kg represents the final food-product attractive for consumers. So, processing campaign considers 188 loads of fresh apple, or 1,786 kg of well-shaped apple chips and 94 kg of broken apple chips.

For apple chips production, apples of Idared cultivar (apple with medium sweet-sour taste) have been purchased from local fruit growers. Farmer is processing just II class apples, according to the fruit size, which are suitable for chopping. Entire cycle of processing, including administration, input purchase and manipulation, and selling of final products requires engagement of 5 persons (farmer and 4 external employees). Packed products are sold to local buyers at the farm gate. As previously mentioned, before and after campaign of apple processing, facility and equipment are in function of drying of other fruits and plant species suitable for drying (Jeločnik et al. 2019a; Subić & Tomić 2019).

The farmer's intentions are to substitute the used input, or to switch the use of conventionally produced with organically produced apples. The business reason lies in unchanged requirements towards the facility and equipment needed for the apple chips production. The farmer would come to have an additional income (growth in coverage margin) derived from the use of organically produced input, as the overall costs of processing do not follow the increased rate of market price of organic food products. Such a step will certainly contribute to the growth of the overall farm sustainability. In line with the above, decision-making process at the farm required a comparison of the coverage margin values obtained by processing of inputs with different origin. In Table 10.1 and Table 10.2 all incomes and costs are presented, as well as contribution margins gained in conventional and organic apple chips production.

Table 10.1. Contribution margin gained in processing of conventionally grown apples (in EUR, for one campaign of apple processing – 3 months)

Description	Quantity	UM	Price per UM	Total
A – Incomes				
Apple chips	1,880	Kg	-	-
Final product (95%)	1,786	Kg	8.20	14,645.20
Breakage (5%)	94	Kg	5.70	535.80
Subsidies	-	-	-	-
Total A				**15,181.00**
B – Variable costs				
Fresh apples (conventionally grown)	15,000	Kg	0.13	1,950.00
Citric acid	15	Kg	3.05	45.75

Description	Quantity	UM	Price per UM	Total
Plastic bags (50 gr)	35,800	Pcs	0.02	716.00
Plastic bags (5 kg)	25	Pcs	0.17	4.25
Cardboard transport box (5 kg)	360	Pcs	0.40	144.00
Redesign and printing of bags	-	-	-	125.00
Phytosanitary check and content verification	3	Set	115,00	345.00
Labour	2,880	Hour	2.35	6,768.00
Electricity	3	Month	130.00	390.00
Pellet	9,400	Kg	0.16	1,504.00
Utility costs	-	-	-	95.00
Certification and labelling	-	-	-	60.00
Bookkeeping	-	-	-	90.00
Taxes and fees	-	-	-	45.00
Other costs	-	-	-	65.00
Total B				**12,347.00**
C – Contribution margin				**2,834.00**

Source: Authors' calculation based on IAE 2019.

Table 10.2. Contribution margin gained in processing of organically grown apples (in EUR, for one campaign of apple processing – 3 months)

Description	Quantity	UM	Price per UM	Total
A – Incomes				
Apple chips	1,880	Kg	-	-
Final product (95%)	1,786	Kg	35.10	62,688.60
Breakage (5%)	94	Kg	21.50	2,021.00
Subsidies	-	-	-	-
Total A				**64,709.60**
B – Variable costs				
Fresh apples (organically grown)	15,000	Kg	2.12	31,800.00
Lemon juice (concentrated, organic)	75	L	5.51	413.25
Plastic bags (50 gr)	35,800	Pcs	0.02	716.00
Plastic bags (5 kg)	25	Pcs	0.17	4.25
Cardboard transport box (5 kg)	360	Pcs	0.40	144.00
Redesign and printing of bags	-	-	-	125.00
Phytosanitary check and content verification	3	Set	115,00	345.00
Labour	2,880	Hour	2.35	6,768.00
Electricity	3	Month	130.00	390.00
Pellet	9,400	Kg	0.16	1,504.00
Utility costs	-	-	-	95.00
Certification and labelling	-	-	-	105.00
Bookkeeping	-	-	-	90.00
Taxes and fees	-	-	-	45.00
Other costs	-	-	-	115.00
Total B				**42,659.50**
C – Contribution margin				**22,050.10**

Source: Authors' calculation based on IAE 2019.

In order to improve the analysis, the presented data will be explained in detail. As mentioned above, apple chips are sold at farm gate to the known buyers. Final product is sold packed in 50 gr plastic bags, later fold into the cardboard boxes, while chips scrap is sold in bulk, packed in 5 kg plastic bags. Wholesale price of both conventional and organic product (VAT included) is more than 30-50% lower than the store price in local retails or specialized shops (health food stores). Food product based on organically grown apples has almost 4.3 times higher selling price, or almost 3.8 times higher price, if being sold as apple chips scrap (largely used in small specialized pastry shops), than the price of products gained from conventionally grown apples. Unfortunately, the farmer does not receive any direct support (subsidy) related to apple processing, so during one campaign, the overall farm incomes reached in processing of organically grown apples are for more than 426% higher than the incomes gained from the products based on conventionally produced input.

Towards the size of fruits, farmer usually purchases the apples of II quality class. It is not so hard to find local producers that conventionally grown the Idared cultivar. Situation slightly complicates with organically produced fruits, as farmer will buy the fruits just from certified apple growers. Firstly, there are no strong difference between the I and II class, so generally both classes are selling as fresh. Secondly, locally produced volumes are quite limited, so farmer will be potentially forced to buy different cultivars suitable for processing e.g., Idared, Gold Rush, Granny Smith, etc. Resulting from this, as a production cost, organically produced input is around 16.3 times more expensive for farmer than conventional one.

Processing requires the use of citric acid as natural antioxidant against apple chips darkening. For that purpose, usually 1 kg of antioxidant for 1 ton of processed apples is used. Citric acid is purchased from specialized stores for restaurants. In order to fully retain organic formulation of final product, in processing of organically grown apples the organic fresh lemon juice is used as a substitution for citric acid. The used norm is 5 litters of juice for 1 ton of processed apples. Juice is purchased from specialized health food stores.

Final product is packed in plastic bags with printed farm logo, barcode, organic product label and declaration. Apple chips is packed in small 50 grams plastic bags, while chips scrap is packed in large 5 kilograms plastic bags. A hundred small bags with final product are delivered in cardboard transport box. By double packing, the product is secured from breaking, mechanical contamination or pathogens.

Redesign of all printed details (if necessary) and printing of bags usually is done at the beginning and at the middle of campaign. For these purposes, the farmer is using the services of local printing studio.

Product sample is phytosanitary checked, while its content is re-verified at monthly basis. Food quality analysis and food safety control represent the part of farmer's risk management agenda. Mentioned activities are done in laboratory of the nearest Public Health Institute.

In order to ensure the relevance of economic analysis, the paid labour (labour costs) assumes engagement of farmer and four external employees (representatives of rural local community). Working day is split in two shifts. As in processing campaign there are no free days, external labour is involved in all processing activities with 6 hours/day, while farmer is engaged with 8 hours/day as administrative, marketing and processing support. Overall fund of working hours amounts to 2,880 hours, while gross wage is 2.35 EUR/hour (gross wage represents usually paid sum at the local level for this and similar activities).

Electricity is used for running of cold storage, lightening, ventilation, fens, etc. It is paid on monthly basis. Other part of used energy in apple processing (for drying) represents the combustion of pellet in thermo-generator. Drying of one load of apples requires around 50 kg of pellet. Farmer is usually purchasing the eco beech pellet without bark and any combustion additives. Wholesale purchase is conducted in late spring when the prices are generally low (buying for the whole season of processing at the farm).

Utility costs involve costs of fresh water use, sewage and garbage removal. For overall campaign of apple processing around 23 m2 of fresh water is spent. Garbage mostly consists of waste from apple cuttings. These costs are paid on monthly basis.

Besides daily cleaning, detail disinfection of processing facility and equipment is conducting each month. Pest control (setting of bait stations) is done at the beginning and in the mid of the processing campaign.

There is an issue of process certification and food labelling. General stance is that processed food products could be labelled as organic only if all or the majority of ingredients (raw agricultural products as inputs) are organic. Globally, one of the best tools (efficient and relatively cheap for small farms) for ensuring the safety in food chain is implementation of HACCP system (Hazard Analysis and Critical Control Point). This is even a good solution for organic food sector, as farmers are mostly aware that conventionally used food preservatives, non-organic ingredients, etc. are undesirable or forbidden in production of food product that will be labelled as organic (Stanley et al. 2011; Thulasimani 2019). So, HACCP is introduced at the farm by local branch of global certification company. Costs of certification are paid during the HACCP implementation, while annual checks are not charged. Conservative approach in analysis considers that processing facility is just in service of apple chips production, so overall costs of certification are broken into the several years, where contribution margin is burdened with 20% of overall costs. In line with more complex procedure for HACCP certification of organic food-products, the costs in this case are slightly higher.

In relation to the costs of bookkeeping, it is assumed that processing facility is just in function of apple processing, and these costs are paid on monthly basis to bookkeeping agency. Besides, analysis assumes that the farm is paying some local and national taxes and fees, as well as that apple processing is generating small amount of some other unidentified costs.

Analysis shows that in one processing campaign overall variable costs of production of apple chips based on organically grown apples are more than 345% higher than the variable costs gained in apple chips production based on conventionally grown apples.

After direct comparison of gained incomes and variable costs linked to apple processing, it could be regarded that both models of processing would be economic (after covering of fixed costs) as incomes are almost 23% higher than the variable costs in apple chips production from conventionally grown apples, or even 52% higher in apple chips production from organically grown apples.

Expressed in absolute values, in both models of processing the positive contribution margin is achieved, while it is 778% higher in processing of organically produced apples. It could be assumed that gained contribution margins ensure the farmer with considerable amount of financial assets for covering of remaining fixed costs and obtaining of certain level of profit. Besides, available facility and equipment could be later used for processing of some other plant crops, what will certainly decrease incurred fixed costs and boost the overall farm profit.

The presented food-production lines could be additionally analysed by determining the structure of overall variable costs, as it could be seen in Table 10.3.

Table 10.3. Structure of variable costs in apple processing

Variable costs	Apple chips - conventional		Apple chips – organic	
	Value (in EUR)	Share (in %)	Value (in EUR)	Share (in %)
Fresh apples	1,950.00	15.80	31,800.00	74.54
Citric acid / Lemon juice	45.75	0.37	413.25	0.97
Plastic bags (50 gr)	716.00	5.80	716.00	1.68
Plastic bags (5 kg)	4.25	0.03	4.25	0.01
Cardboard transport box (5 kg)	144.00	1.17	144.00	0.34
Redesign and printing of bags	125.00	1.01	125.00	0.29
Phytosanitary check and content verification	345.00	2.79	345.00	0.81
Labour	6,768.00	54.81	6,768.00	15.86
Electricity	390.00	3.16	390.00	0.91
Pellet	1,504.00	12.18	1,504.00	3.53
Utility costs	95.00	0.77	95.00	0.22
Certification and labelling	60.00	0.49	105.00	0.25
Bookkeeping	90.00	0.73	90.00	0.21
Taxes and fees	45.00	0.36	45.00	0.11

Variable costs	Apple chips - conventional		Apple chips – organic	
	Value (in EUR)	Share (in %)	Value (in EUR)	Share (in %)
Other costs	65.00	0.53	115.00	0.27
Total	**12,347.00**	**100.00**	**42,659.50**	**100.00**

Source: Authors' calculation based on IAE 2019.

Observing the structure of variable costs certain differences are visible between the two models of apple processing. In apple chips production based on conventionally grown apples the costs of labour are dominating with more than half of the sum of overall variable costs, followed by the costs of fresh apples and pellets. Other costs have negligible share. In apple chips production based on organically grown apples the costs of fresh apples have the share of almost ¾ of overall variable costs. By their sum, as significant could be also considered the costs of labour, while other costs occur with much lower value.

By direct comparing of the used models of apple processing, it could be noticed that although both models are labour intensive, the production of organic food products is notably burdened by the costs of organically produced ingredients, while in case of food products that come from conventional agriculture the labour costs dominate. So, farmer's decision to significantly increase the costs of primary input (substitution of the origin of fresh apples) in order to approach to the market niche oriented to organic food products proved to be economically justified as it would lead to higher incomes and subsequently profits.

Besides, considering that the analysis was based on the engagement of primarily external labour, by the substitution of each external employee with one farm member, family that owns the farm could additionally earn the 1,269 EUR per campaign of apple processing.

In current challenging times, related to global and local socio-economic trends, there is a constant need for analytical approach to the economic effects of product processing at small farms under the conditions of risk and uncertainty. There is high probability that mentioned uncertainty could lead to change in achieved financial result at the farm due to the increase in costs of processing, or due to the decrease in food-product prices throughout its realisation on the market. Considered reason requires determination of the risk level for certain processing lines, in which sensitivity analysis provides an opportunity to identify the factors that affect the most the economic effects of processing, as well as to recognize which processing line is riskier.

Reconsidering the sensitivity of contribution margin toward the market and processing disorders, from Tables 10.4 and 10.5 it can be noticed that the contribution margin in conventional production of apple chips is more sensitive to a decrease in produced volume of final product or drop in products' price than to increase in variable costs of processing.

Table 10.4. Change in contribution margin in conventional apple chips production due to decrease in produced volume or market price of food-product

Fall in produced volume or market price of food-product (in %)	Contribution margin in processing of conventionally produced apples (in EUR)
5.00	2,074.95
10.00	1,315.90
15.00	556.85
20.00	**-202.20**

Source: Authors' calculation based on IAE 2019.

Table 10.5. Change in contribution margin in conventional apple chips production due to grow in variable costs of apples processing

Grow in in variable costs of apples processing (in %)	Contribution margin in processing of conventionally produced apples (in EUR)
5.00	2,216.65
10.00	1,599.30

Grow in in variable costs of apples processing (in %)	Contribution margin in processing of conventionally produced apples (in EUR)
15.00	981.95
20.00	364.60
25.00	**-252.75**

Source: Authors' calculation based on IAE 2019.

Similar situation occurs in processing of organically produced apples, as it could be observed in Table 10.6 and Table 10.7. In this case, the contribution margin is also more sensitive to decrease in produced volume or drop in food-products' prices than to increase in variable costs of apples processing.

Table 10.6. Change in contribution margin in organic apple chips production due to decrease in produced volume or market price of food-product

Fall in produced volume or market price of food-product (in %)	Contribution margin in processing of organically produced apples (in EUR)
5.00	18,814.62
10.00	15,579.14
15.00	12,343.66
20.00	9,108.18
25.00	5,872.70
30.00	2,637.22
35.00	**-598.26**

Source: Authors' calculation based on IAE 2019.

Table 10.7. Change in contribution margin in organically apple chips production due to grow in variable costs of apples processing

Grow in in variable costs of apples processing (in %)	Contribution margin in processing of conventionally produced apples (in EUR)
5.00	19,917.13
10.00	17,784.15
15.00	15,651.18
20.00	13,518.20
25.00	9,364.23
30.00	9,252.25
35.00	7,119.28
40.00	4,986.30
45.00	2,853.33
50.00	720.35
55.00	**-1,412.63**

Source: Authors' calculation based on IAE 2019.

As considered, contribution margin is generally more sensitive to decrease in volume of production or fall of price of food product than to growth of variable costs of processing. In same time, production of organic apple chips is less risky, as contribution margin in mentioned production changes slower with the change of factors affecting it (contribution margin equals to zero in line with the increase of variable costs for 51.69%, or 22.95%, or if the food product price falls for 34.08%, or 18.67%).

Considering the agri-food processing as the vital part of agricultural complex, it could be also affected by the expressed uncertainty linked to the agricultural production, so it is good for farmer to know what will be the threshold values of certain production parameters that will guarantee the zero or positive contribution margin. Table 10.8 presents this situation.

Table 10.8. Critical values in apple chips production

Description	Apple chips based on conventionally grown apples	Apple chips based on organically grown apples
Expected yield (EY) – in kg	1,880.00	1,880.00
Expected price (EP) – in EUR/kg	8.08	34.42
Subsidy (s) – in EUR	-	-
Variable costs (VC) – in EUR	12,347.00	42,659.50
Critical price: CP = (VC - s) / EY	6.57	22.69
Critical yield: CY = (VC - s) / EP	1,528.09	1,239.38
Critical variable costs: CVC = (EY x EP) + s	15,190.4	64.709.6

Source: Authors' calculation based on IAE 2019.

There are some assumptions related to the production of processed products at the farm under the uncertainty. Uncertainty is considered as fixed variable, where achieved values for all production parameters could be expected in same amounts in future processing cycles. So, according to the previous table, the expected yield represents all produced volumes of apple chips, both the final product packed in small bags and chips scrap. Generally, as the overall product of apple processing is divided into two quality parts (final product and chips scrap), the expected price could be represented with the average price per kilogram of completely produced product.

Critical values of apple processing could be understood as the measures of production and market risks. For the farmer, the threshold value of product price that will ensure positive contribution margin is 6.57 or 22.69 EUR/kg of final product. Related to achieved (expected) selling price (8.08 or 34.42 EUR/kg for final product), the calculated critical prices give the farmer certain manoeuvring space to survive the potential drop in market prices of the final product (apple chips). So, in the upcoming period the market price of apple chips could be decreased for almost 23% (for conventional food product), or for more than 51.5% (for organic food product) and the observed processing line will be still in safe zone related to its contribution to overall farm profit. In other words, it is obvious that processing of organically grown apples related to potential oscillation of market prices is less risky processing model for the farmer.

Similarly, the threshold for the volume of production of processed apples that will secure farm survival is 1,528.09, or 1,239.38 kg of final product. In line with gained (expected) production volume (1,880 kg of final product for both processing models), the calculated critical yields show the strength of observed processing line to handle the decrease in production for more than 23% (for conventional food product), or for more than 51.5% (for organic food product) and to still remain financially positive. According to that parameter, production of organic apple chips is less risky for the farm. It should be noted that in both processing models the critical variable costs represent the level of achieved incomes.

4. Conclusions

Creation of added value represents one of the key factors for the strengthening of overall economic sustainability of small farms. Surely, food processing could be among successful methods for achieving the added value at the farm level. So, apart from the economic aspect, could the creation of added value be in function of strengthening the overall sustainability of small farms? In the chapter one possibility that leads to such situation was presented. The farmer involved in fruit processing was mainly wondering if it would be economically effective to substitute the input used in existing line of processing at the farm (unique processing facility and equipment is used). In relation to that, an economic analysis that assumes the change of conventionally grown apples with the organically grown apples within the apple chips production was performed.

The analysis showed that according to the change in value of incomes (they were increased almost 4.3 times) and value of variable costs (they were increased almost 3.5 times), substitution of used inputs and production of organic apple chips is from economic aspect highly appreciated for the farmer, as it derives the positive change in the value of contribution margin (it was increased almost 7.8 times). Gained increase in contribution margin ensures to farmer much more financial assets for covering the remaining fixed costs, while boosting the overall farm profit.

In relation to the structure of variable costs, there are some essential differences between the observed models of processing. While in apple chips production based on conventionally grown apples the costs of labour are dominating (over 50% of overall variable costs), in apple chips production based on organically grown apples the costs of fresh apples reach the share of almost 75% of overall variable costs. Although the both processing models have unique labour intensity, the expressed difference is generally linked to the much higher market price of organically grown apples.

Considering the impact of uncertainty to agri-food production, by switching to processing of organically produced apples the farmer will be in a position to withstand the bigger drop in market price of final product than expected (23% compared to 51.5%) and still achieve a positive contribution margin. As similar situation occurs with the decrease in production volume of apple chips, considering the production of organic apple chips is less risky for the farm.

In both processing variants contribution margin is more sensitive to decrease in volume of processed apples or to drop in price of final product than to increase in overall variable costs. Meanwhile, production of apple chips from organically grown apples proved to be less risky, as its contribution margin changes slower with the change of mentioned factors.

Besides, by switching to organic production farm will improve its environmental sustainability, as it is assumed that handling organic inputs and organic final products is much more environmentally friendly than orientation to conventional production.

Farmer's entrepreneurial spirit and creation of additional incomes through the change in used inputs are not directly linked to the increase of the farm social sustainability. But, on the other side, considering that engagement of external labour is presented in both models of apples processing, there is surely significant farm impact to the development of local rural community e.g., decrease in local unemployment, promotion of local rural community's image, additional transfers to local rural community's budget, etc.

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Appendix A10. Key terms learned

Agriculture – It is the one of the most important consciously organized activities of human population, run to satisfy one of the primary man need, food availability. With the development of global society its initial function was supplemented with shaping of rural landscape, sustainable exploitation of natural resources, strengthening of local economy, maintaining the quality of life of rural population, etc. So, although the agriculture usually refers to crop production and livestock breeding, it also involves many activities as are land cultivation, domestication, livestock management, agri-food logistic, etc.

Farm – As basic production unit engaged in agricultural production, farm usually represents the area of land used dominantly for agricultural activities in order to produce food of plant or animal origin, fibre, biomass, energy and other products or services used for satisfaction of different human needs.

Farmer – It is a person who manages the farm, alone or supported by family members or external employees, being responsible for all crucial activities toward the crop, livestock or biomass production, food processing, agri-tourism, etc.

Rural areas – they are generally defined as sparsely populated territories located outside the urban areas (usually with less than 100-150 inhabitants per square kilometre), that provides majority of raw materials and agri-food products, and ecosystem services.

Farm sustainability – It represents the ability of farm to operate, survive and grow within the predefined socio-economic and natural conditions, while keeping up for a longer period farms' administrative, economic, ecological and social functions at satisfactory level.

Farms' value-added – Under the specific conditions it represents the optimal portfolio of farms' activities and agricultural practices run by farmer in order to meet consumers' preferences through the offered farm output (produced agri-food products and services).

Costs of production – They represent the monetary expression of spending of material goods (inputs and fixed assets), labour, services, public expenditures, etc., involved in realization of entrepreneur's business mission. They could be observed as fixed (do not change toward the volume of production), or variable (differ in certain proportion to gained output).

Contribution margin – From the context of agricultural production, it corresponds to the difference between the overall output (value of production) increased for allocated subsidies and variable costs derived from specific line of agricultural production or processing organized at the farm.

Sensitivity analysis – It could be defined as the instrument for determining the sensitivity of contribution margin toward the market and production disturbance. It defines the size in fall of contribution margin due to decrease in volume of production or products' market price, or due to growth of overall variable costs linked to certain production line.

Critical values of production – They represent the methods for determining the critical value of price, volume of production and overall variable costs within the certain line of production at which the contribution margin equals to zero.

Ch.10

ESTIMATION OF ECONOMIC EFFECTS OF PROCESSING OF ORGANIC PRODUCTS IN THE CASE OF FAMILY FARMS

Economic sustainability of entrepreneurial initiatives in processing of organic products

OBJECTIVES: The readers will be able to define and identify all incomes and variable costs that appear in certain production or processing line at the farm. By the use of presented analytical tools they will be also able to estimate expected economics effects gained in selected line of agricultural production or processing of agricultural products.

SKILLS: Students have overmastered the use of advanced tool for analytical analysis in decision making process towards the choosing the proper production/processing line at farm level (the production/processing line that will derive the highest possible profit).

QUESTION 1 (PLEASE CHECK THE CORRECT ANSWER)

What aspects of sustainability farm should follow in order to be completely viable?

- ☐ Aspects of economic and social sustainability
- ☐ Aspects of ecological and economic sustainability
- ☐ Aspects of economic, ecological and social sustainability
- ☐ Aspects of ecological and social sustainability

QUESTION 2 (PLEASE CHECK THE CORRECT ANSWER)

What are the most often variable costs linked to food processing?

- ☐ Costs of raw agricultural material, packaging material, energy, property tax, interest
- ☐ Costs of raw agricultural material, food additives, energy, water, packaging material
- ☐ Costs of raw agricultural material, water, packaging material, insurance, rent
- ☐ Costs of equipment and labour

QUESTION 3 (PLEASE CHECK THE CORRECT ANSWER)

What is represented by the contribution margin?

- ☐ Difference between the incomes and overall variable costs derived from the certain line of agricultural production at the farm
- ☐ Difference between the incomes and overall costs derived from the certain line of agricultural production at the farm
- ☐ Difference between the incomes and overall fixed costs derived from the certain line of agricultural production at the farm

QUESTION 4 (PLEASE CHECK THE CORRECT ANSWER)

What defines the sensitivity analysis of the contribution margin?

- ☐ Size of fall in contribution margin due to fall in yields/market price of product, or increase in overall variable costs of production
- ☐ Size of fall in contribution margin due to fall in yields/market price of product, or increase in overall fixed costs of production
- ☐ None of the above

QUESTION 5 (PLEASE CHECK THE CORRECT ANSWER)

What is the right formula for the critical price?

- ☐ CP = (VC - S) / EP
- ☐ CP = (VC - S) / EY
- ☐ CP = (EY x EP) + S
- ☐ None of the above

PRACTICAL APPLICATION OF THE PREVIOUSLY ACQUIRED KNOWLEDGE:

TASK: RELATED TO THE EXAMPLE EXPLAINED IN THE CHAPTER, TRY TO RECONSIDER THE POSSIBLE CHANGE IN PROCESSING OF DIFFERENT RAW MATERIAL (FOR EXAMPLE QUINCE, AS ITS' PROCESSING HAS ALMOST THE SIMILAR TECHNOLOGICAL PROCESS AND REQUESTS AS APPLES) WITH THE USE OF SAME PROCESSING FACILITY AND EQUIPMENT. IN LINE TO PREVIOUSLY PRESENTED ECONOMIC ANALYSIS TRY TO DEFINE ALL INCOMES AND VARIABLE COSTS THAT COULD APPEAR IN ON MONTHLY BASIS IN QUINCE PROCESSING (PRODUCTION OF QUINCE CHIPS, NO MATTER ORGANIC OR CONVENTIONAL). BASED ON THEM CALCULATE THE CONTRIBUTION MARGIN THAT DERIVES FROM THIS LINE OF PROCESSING AT THE FARM. ACCORDING TO PREVIOUSLY LEARNED FORMULAS FOR CRITICAL VALUES OF PRODUCTION, TRY TO CALCULATE THE THRESHOLD VALUES FOR ALL PRODUCTION ELEMENTS THAT ENABLE REACHING OF POSITIVE CONTRIBUTION MARGIN.

FORTH SECTION:

CONSUMPTION PERSPECTIVES IN AGRI-FOOD SECTOR

11. Theoretical Framework of Food Consumption Drivers in the European Society
12. Organic products and consumer behavior: a research on consumer motivation
13. Quality and Safety of Organic Food: Estimation and Perception
14. Consumers Perceptions on Rebranding Strategies for Romanian Food Products

11. Theoretical Framework of Food Consumption Drivers in the European Society

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Abstract: Consumer food behavior studies are a topic addressed in many studies and subject to continuous contributions. The social and economic changes in society push scholars to update their analysis, especially in Europe, a geographical area that is characterized by the production of many quality foods. Some authors also believe that food consumption choices represent an element of European identity. The present chapter aims to illustrate factors driving food consumption in European countries. Indeed, consumers choose their food according various factors, such as personal preference system, reasons of ethics, culture, security, health, prestige or choices for pulse and other factors that are very important in the final choice of foods. The paper presents several quantitative comparisons, and some qualitative interpretations, based on the previous research of several authors. The analysis will try to highlight the main trends in the field of nutrition. Moreover, it takes into account Mediterranean diet and various evidence for its benefit for the health. The results show the great importance of the comprehension of the motivation underlying the buying process and in general of the consumer food behavior.

Keywords: Food consumption; Identity; Culture; Mediterranean diet; Price; Income.

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1. Introduction

The European Union (EU) is an area with high economic development and multiple processes of internal integration, thanks to the policies implemented by the European Union (see for example Mora & Bazo, 2020; Börzel et al., 2017). Among the various processes, those relating to food consumption are very complex: integration in the long run will tend to converge across countries and regions of Europe, but the complexity of this phenomenon should be considered, especially in the short term, because it also produces changes in consumption and it is also characterized by the influences produced by the process of internationalization. These processes are linked to those of globalization, already underway in many other sectors. In the food sector, in addition to the economic effects, they can produce effects on people's health. It is important to clarify the extent of these differences and their reasons. Consumer welfare is increasing and has reached a level where the consumer chooses their food, not only for nutriment, but also according to their personal preference system, for reasons of ethics, culture, security, prestige or choices for pulse and other factors that are very important in the final choice of foods (Kjærnes, 2012; Lusk & McCluskey, 2018; Šapić et al., 2018; Stedefeldt et al., 2015).
The complexity of the phenomenon has necessitated that the European Commission (EU Commission, 2010) provides specific policies, such as those in their White Paper, to

combat excess weight and obesity, which involves a series of interventions in areas such as agriculture, transport, sport, education, health, and nutrition. But the simple transmission of information alone cannot suffice. It is necessary to establish policies that allow consumers to be aware of their choices, even down to following specific directions in order to inform a Knowledge Society.
To better understand the food style of European consumers, the analysis needs to examine their economic, social and demographic traits, as well as their behavior and their choices, even considering the major changes in European society. The paper presents several quantitative comparisons, and some qualitative interpretations, to better understand the consumption of food in different EU countries. The analysis is based on the previous research of several authors, in order to highlight the main trends in the field of nutrition. In particular, the study will analyze the main trends through the analysis of the general statistics (considering the aggregate market consumption) to understand the differences between countries and it will present some interpretations on the consumption patterns of food (in terms of individual consumption), in relation to the changes taking place in European society.
Finally, the paper takes into account health benefit of following the Mediterranean diet, a diet widely used in southern European countries (for example, Greece, Italy, and Spain), that includes high consumption of legumes, fruit, and vegetables and low consumption of meat.

2. Food and its identity: consumption and the construction of European culture

Before proceeding to the analysis of the role of food in the formation of European identity, it is necessary to review briefly how the paper developed the feeding study. Retracing the history of food is another way of reconstructing and understanding the history of humanity. This study is connected to different scientific approaches, such as human sciences (such as ethnology, ethnography, etc..), environmental analysis (geography, climatology, agronomics) and economy. Furthermore, if we consider gastronomy, we can add elements of philosophy and art (Toussaint-Samat 2009).
The study of food is important because this field has proved valuable for debating and advancing in theory and research methods. In theory building, the analysis of food systems have been used to understand societal processes such as the symbolic value creation and the social construction of memory (Brulotte & Di Giovine 2016). In addition, food research has offered theoretical frameworks for the comprehension of the relationship between cultural and biological evolution (Mintz & Du Bois 2002).
Interest in food consumption was established at the end of the eighteenth century, through the work of Davies and Eden on the study of family budgets (and also with their work on national income) (Stigler 1954).
Attention to the analysis of food consumption is linked to the influence of food styles on human health (Poulain 2005). In addition, there are novelty elements related to globalization processes: some theories have shown a reaction effect to the homogenization of eating habits. Scholars highlighted that diverse and distant groups of people eat and drink similar things, as well as to how people often consume similar items.
Despite the globalization of food, “Europe cannot yet be considered as a homogeneous block with respect to food culture” (Albisu & Gracia 2001: 475). National borders with linguistic borders are still the best indicators for differences in food behavior (Albisu & Gracia 2001).

Food is often seen as an element of social identity, both for its universality, and for the regularity with which individuals and groups feed (De Solier, 2013; Moreno & Malone, 2020). Wilson (2006) suggests several considerations when examining the role of food in identity: first of all, food and drink are first of all, food and drink are symbolic: they represent some characteristic aspects of a culture. As commodities, they are essential elements in the economic and social processes of production, distribution and consumption. Secondly, eating as a practice plays an important role in many social behavior, both private and public, both in the normal practice of social life, and in extraordinary social events. Finally, food ingested says something significant about people. Communicates to oneself and to others, in the processes of social identification, of an ethnic, national, class character, etc ....

The importance of food for identity has been clarified by various different contributions of humanistic theories: we can say that food is the lifeblood of social cohesion, integration and differentiation. In feeding, there are also some elements that humans feel are connected to the themes of the sacred and the supernatural.

In Europe, in this field, there are clear signs of a search for identity, and this area has become the space where it has played a very important match, so that McDonald's represents zero degree of culinary culture, and for Europe, local products emerge as a symbol of a bet on identity (Poulain 2005).

"Europeanization" seems to have been also helped by the processes related to food choices. Borneman and Fowler (1997: 489) describe Europeanization as a process that redefines the "forms of identification with territory and people", determining force to support the transformation of European society and culture. Therefore, a movement of ideas and people of ideas and people "which is radically changing various notions of traditional and modern culture and identity; thereby changing the groundwork of local, regional and national social, economic and political frames of reference" (Wilson 2006).

"Europeanization, however, should not be seen as a subversion of local or national identities and cultures" (Wilson, 2006: 17): instead, it is a reconfiguration of the various identities in Europe (Wilson, 2006).

The analysis of the principal trends in EU consumption helps to focus on the consumptive patterns that have shaped some of Europe's national histories. These trends have helped to constitute changing identities and cultures, and which have moved towards "a variety of forms of Europeanization, within the context of European integration" (Wilson, 2006: 14).

"The dietary changes that characterize the ''nutrition transition'', include both quantitative and qualitative changes in diet" (World Health Organization, 2003: p13), and the sedentary lifestyle influences dietary changes (Arce & Marsden 1993); but the transformations also have social implications.

Today, "the food industry sells an image, not food" (Petrini 2004, 11). This has led to an impoverished food culture in what we eat: just think of the hundreds of children who have never seen animals eat. Between dietary patterns, thinness, enriched by healthy implications, is now widespread in Europe, setting off cultural levels where a relationship is reversed by food.

Various food movement (slow food, organic farming, etc.) are the evidence of this transition of the food culture in Europe. These movements have success by organizing them at worldwide level using internet (Watson & Caldwell 2005).

3. Trends in food consumption

There is considerable literature on the trends in food consumption. It has been shown that the per capita requirements, in terms of nutrients, have reached saturation. In addition, there is a tendency to homogenization at a territorial level and in society.
There are different contributions that have focused attention on this aspect: Blandford (1984) said that the diets of Europeans are converging and that, despite their differences in income and price, their composition shows remarkable similarities. Albisu and Gracia (2001) and Reig (1992) have argued that differences in the consumption of food in different European countries has steadily declined; this convergence was verified by Gil et al. (1995) and Herrmann and Röder (1995).
Specifically, interesting, for a more precise understanding of the processes and trends, is the study of Askegaard and Madsen (1995), who analyzed the extent to which Europeans are homogeneous, or heterogeneous, with respect to their behavior and attitude towards food: this study shows that the most homogeneous countries are Belgium, Portugal, Greece and Italy. Countries such as Spain, Ireland, Norway and Austria are rather mixed. The study also shows that heterogeneity is caused by features or products, or the lifestyle that the food represents.
Vasileska & Rechkoska (2012: 363) state that "diets evolve over time being influenced by many factors and complex interactions. Income, price, individual preferences and beliefs, cultural traditions, as well as geographical, environmental, social and economic factors, all interact in a complex manner, to shape dietary consumption patterns".
Casini et al. (2015) through an exploratory survey on generation X consumers affirm that there are different dietary lifestyles even within the same generation. They also argue that other aspects to take into consideration are the attention to the organoleptic and nutritional qualities of products, the value for money and the consumption outside the home, which are becoming increasingly important for various categories of consumers.
Albisu and Gracia (2001) consider that the characteristics of food consumption in EU countries can be summarized by some main tendencies: first, there is a further reduction in the percentage of spending on food consumption. This trend is not surprising, as a consequence of the growth that is occurring in all developed economies. Another tendency is linked to the fact that attention to quantity has shifted to the quality of the food. A third trend is related to the changing structure of food consumption: that depends on the evolution of culture and individual countries, and is not as homogeneous as the two previous tendencies (Albisu & Gracia 2001).
With an in-depth analysis, it is possible to confirm Albisu and Gracia's hypothesis. The importance of food consumption on total household expenditure has been reduced in Europe following a general similar trend in all industrialized countries; so, with an increasing per capita income, the importance of food expenditure is reduced (Engel's law).
Nevertheless, considerable differences in dietary patterns, and in consumer responses, to changes in demand determinants, remain between countries in Europe (Rickertsen & von Cramon-Taubadel 2003). Overall, the European Union has increased its consumption of Cereals, Sugar, Oilcrops, Milk and Fish and it has decreased its consumption of Vegetables, Fruits, Meat and Eggs, as represented in Table 11.1.

Table 11.1. Annual percentage changes in Per Capita Consumption (Kg/capita/year) of Food Products in EU: 1990-2017

Cereals - Excluding Beer	Sugar & Sweeteners	Oilcrops	Vegetables	Fruits - Excluding Wine	Alcoholic Beverages	Meat	Eggs	Milk - Excluding Butter	Fish, Seafood
9.05	21.36	19.16	-8.65	-12.46	-14.51	-2.88	-11.45	3.91	15.03
Source: FAOSTAT									

There are several reasons for these changes. For example, the decrease in meat consumption probably is linked to the crisis in the consumption of beef that has brought damage to the entire sector, as the substitution between the different types of meat, although important, is not total and complete. Moreover, even the choices of consumers for the Mediterranean diet may explain this reduction in consumption.
Percentage changes in per capita consumption for the 1990–2017 periods in selected European countries are presented in Table 11.2.

Table 11.2. Percentage Changes in Per Capita Consumption (Kg/capita/year) of Food Products in selected European Countries (1990-2017)

	Denmark	Finland	France	Germany	Italy	Netherlands	Portugal	Romania
Meat	-27.8	21.8	-15.9	-6.9	-5.4	-10.7	49.4	-12.7
Fish	0.0	10.1	8.7	-7.7	39.8	102.9	-4.4	8.6
Eggs	12.1	-17.6	-21.4	-21.3	1.5	20.8	22.7	16.4
Milk	34.1	31.6	-2.7	21.3	-10.6	8.1	42.1	65.0
Vegetables	43.8	47.8	-23.6	29.6	-24.0	-18.0	-15.5	59.0
Fruit	-22.0	-11.0	14.5	-41.3	-11.9	-32.1	35.0	52.2
Cereals	39.5	11.9	20.6	22.3	2.2	39.1	7.1	-4.0
Sugar & Sweeteners	23.9	-4.5	36.7	34.3	6.8	-21.6	30.5	16.2
Source: FAOSTAT								

Meat consumption has been going down in Denmark, France, Germany, the Netherlands and Romania, while it has increased in Portugal and Finland. The consumption of fish has increased, except in Germany and Portugal. Cereal consumption has been going up, except in Romania. There are no clear trends in the consumption of eggs and vegetables in these selected countries. Sugar consumption is falling in Finland and the Netherlands.
If we look at the evolution of the daily calorie supply per capita (kcal / capita / day) in the EU since 1990, in Table 11.3, the analysis shows that there are some countries where growth has been remarkable.

Table 11.3. Evolution of daily calorie supply per capita (kcal/capita/day) in EU (1990-92=100)

	1990-1992	1993-1995	1996-1998	1999-2001	2002-2004	2005-2007	2008-2010	2011-2013	2014-2016
Austria	100	99.7	100.4	104.9	102.4	104.6	105.2	105.9	106.5
Belgium	100	100.0	101.8	103.8	104.3	103.9	103.6	104.2	104.2
Bulgaria	100	94.9	89.6	92.6	90.3	89.4	90.6	91.1	93.0
Croatia	100	103.1	109.5	113.0	124.4	131.6	131.7	130.5	134.9
Cyprus	100	102.6	99.4	97.7	95.5	94.4	96.8	97.0	97.5
Czechia (*)		100.0	106.5	101.6	107.2	106.9	106.5	105.7	103.8
Denmark	100	103.3	103.4	102.6	103.8	105.6	103.5	103.3	101.2

	1990-1992	1993-1995	1996-1998	1999-2001	2002-2004	2005-2007	2008-2010	2011-2013	2014-2016
Estonia	100	108.5	119.7	122.0	121.8	127.1	132.1	129.5	128.9
Finland	100	95.9	99.0	100.6	100.6	102.9	103.3	105.9	107.1
France	100	99.9	100.6	102.4	101.9	99.3	100.2	98.7	98.3
Germany	100	96.9	97.8	100.0	102.5	104.7	105.6	105.6	107.0
Greece	100	99.6	98.8	101.5	103.1	99.1	98.0	95.8	95.3
Hungary	100	92.0	90.6	93.9	94.5	98.4	94.8	92.3	96.0
Ireland	100	98.1	101.3	103.1	99.3	97.2	99.3	99.8	100.0
Italy	100	97.1	100.4	102.4	101.2	100.3	100.0	99.5	100.1
Latvia	100	97.2	89.5	87.0	93.3	97.2	96.7	96.3	98.0
Lithuania	100	94.1	104.8	106.8	110.9	117.2	115.3	114.1	113.6
Luxembourg	-	-	-	100.0	100.2	100.6	101.0	101.6	99.6
Malta	100	102.7	106.8	107.9	108.3	108.6	108.9	108.9	111.4
Netherlands	100	99.8	100.7	98.6	96.5	97.4	97.1	97.2	98.5
Poland	100	100.5	100.4	102.3	102.3	100.9	101.8	103.4	103.6
Portugal	100	101.6	101.6	104.0	103.5	103.4	103.0	101.9	101.3
Romania	100	100.8	103.2	106.5	113.0	114.8	113.8	113.0	122.3
Slovakia (*)	-	100.0	101.7	98.2	97.7	98.4	101.3	102.1	102.7
Slovenia	100	109.7	113.5	118.0	120.3	120.1	122.4	122.1	121.3
Spain	100	97.6	99.2	99.5	98.3	96.0	95.2	94.7	95.3
Sweden	100	103.8	102.5	104.1	104.9	103.7	104.9	106.0	106.2
United Kingdom	100	99.2	102.3	104.5	105.6	105.9	105.3	105.4	103.7

Source: FAOSTAT
The indicator shows the total daily calorie supply per capita and the split into calories from animal products and vegetal products.
(*) Data available from 1993
(**) Data available from 1999

The countries with the greatest evolution of calorie supply (more of 20%) are Croatia, Estonia, Romania and Slovenia. Then there is another group of countries that have a little increase (up to the 10%) or maintained a stable consumption - among these are Italy, Germany, United Kingdom, Sweden, and Finland. Finally, a group of countries has indicated a reduction in consumption: Bulgaria, Cyprus, France, Greece, Hungary, Latvia, Luxembourg and the Netherlands. The reasons for these trends are different from country to country and require specific analysis: for example, in Bulgaria the reduction in food consumption would appear to be caused on the performance of inflation that mainly affected some categories of agricultural products and foodstuffs (The Oxford Analytica Daily Brief 2008). This further confirms the diversity of food habits in Europe. Although very similar in structure to agri-nutrition, there are different styles, even different quantitative evolutions.
At the same time, it is evident that national diets are converging in long time on the so-called 'Western diet' (Khoury et al. 2014), "characterized by a high intake of refined carbohydrates, sugars, fats, processed foods, animal-sourced foods and an inadequate intake of fruits and vegetables" (Le et al., 2020: 1).

4. Prices and income effect on the food choice

In the past, the systemic "studies of the political economy of food have tended, so far, to hide rather than disclose" the social differentiations in the value of the consumption of food (Arce & Marsden, 1993: 299). On the other hand, in recent years, examination of the purchasing habits of people, aimed at understanding the relationship between the levels of education, income and other socioeconomics and demographic factors, were also revealing (Popkin 2001).
These factors are many, and their importance in explaining food consumption patterns over time and space is changing rapidly. The analysis can certainly have a starting point

from the theory of Engel on the relationship between income and food consumption. But it is equally certain that the analysis for the need for food and its determinants is very complex, and cannot be separated from the analysis of the social context in which it occurs. Halbwachs (1913), already in 1912, with some innovative observations, explained consumer choices, not only with the type of profession, family size, and income involved, but also with the habits, beliefs and prejudices of consumers. This author has introduced, therefore, the existence of an interaction between biological and sociological effects in the food field.

In the cases of quantitative saturation and dietary patterns being stabilized, the food product assumes the generic nature of convenience goods, in that it is a product that has a low unit value and a repeat purchase. In this situation, the consumer is less sensitive to price changes, and its preference structure is influenced by factors that have a high influence on the perception of the price, for example, with respect to the availability of equipment for storage and food preparation (Tokoyama & Egaitsu 1994).

Price and income are, therefore, less likely to influence the food choice: other factors are more decisive (Connor 1994). These factors are dependent upon subjective situations in that the traditional theory is relegated to the “black box” of consumer tastes, where variables are “unobservable” and that depend on a set of socially determined factors of a demographic, economic, cultural nature (Belletti & Marescotti 1996).

5. The demographic drivers of food consumption

Population growth in Europe has remained stable, with less potential consumers, and a more elderly generation. This demographic aging also depends on the policies implemented in European countries, which aim to help citizens through specific social, economic and medical services: the average number of children per woman, “The decline in fertility in recent decades followed the post-war baby boom which is today causing the bulge in the size of the population aged 45 to 65 years” in Europe’s population, together with a life expectancy that continue to increase (EU Commission, 2006: 3). These trends will affect the European population, which will also become much older. All that constitutes a factor that will transform the structure of European families: the average size is decreasing, with a fertility rate in 2060 of 1.76 births per woman (EU Commission, 2015). All of this is increasing the presence of households consisting of pensioners living alone, or young singles, who generally eat more often outside the home or workplace, and often buy more “convenient meals” or try new products (Tyvimaa & Kamruzzaman, 2019).

Even the status of women in employment is an important element in evaluating consumption choices: the growth of family income levels and the decrement of time available for cooking are the main effects brought about by the different status of women.

The demographic changes that have caused the slowdown in the birth rate, the aging population and the reduction of family members, have all produced important effects on consumption choices. Consider, for example, attention to the time factor: consumers are particularly sensitive to different products with a high service time-saving factor, with obvious effects on the diet, which sees a shift towards simpler foods, by their very nature, requiring less food processing time (e.g. milk and fruit, to the detriment of fresh meat and fish, prepared salads, etc. (Belletti & Marescotti 1996; Caccetta & Platania 2006); or even towards pre-cooked foods, meals ready to eat, and in general, food that is time saving (Steenkamp 1997).

The older consumers are keen to reduce the energy value of their diet, choosing foods normally consumed in the past. Furthermore, worried about their health, they consume more fruit and more vegetables. The reason for the different growth of consumption, in terms of quantity, as compared to the total expenditure for food, is linked to increased sales of those products with a higher added value. Food consumption per capita, in quantitative terms, therefore, has not changed much in the European Union, but what has changed is the somewhat increment in the purchase of products with a higher added value (Albisu & Gracia 2001).

The food industry has been sensitive to such attention. It has created the simplification of preparation by introducing meal-ready segments in whole, or in part (Senauer 1990). Moreover, it has made food products that have covered the needs of convenience, rather than those of tradition.

But the conditions of purchase must be made in a time-saving way. The mass retailing has been adequate, and has been made so by increasingly skilled trade services, so that the consumer's choice on where to purchase, and how often, do become interdependent. Selections have been made by very large and very deep businesses, innovating the technology of services to sales, introducing the optical reading of prices, baby-sitting services, and by offering a general improvement in all environmental conditions at point-of-sale (Berry 1979). The diffusion of the large retail chains has also been determined by urbanization and the spread of means of transport. It has had the effect of spreading consumption patterns, quite different from those of local traditions (especially in big cities), making cheap non-traditional products more available (Platania et al. 2015). Moreover, it has helped to standardize the food model from the diet of "Mediterranean" to "Continental", with a greater presence of animal products.

Even the organization of the system of meals reflects the influence of the time factor in consumption choices, whilst, at the same time, affecting the types of food to which the consumer focuses his or her attention.

The effects are noticed in the ever-greater simplification of meals and in the growth of the phenomena of snacking that is a micro-power occasion (Senauer 1990). Products that have a good service content, and that are suitable for a plurality of occasions of consumption (such as the most innovative dairy products of fresh and soft cheese, yogurt), are often specially processed by the processing industry.

Finally, it should be noted that the increasing popularity of eating out, which responds to different needs and motivations, falls into two quite distinct markets, such as catering (businesses, schools, healthcare, and other partnerships) and that of the private dining-shopping.

6. The cultural drivers of food consumption

Besides time, there are some factors related to socio-cultural context. Each person reflects their aspirations and rules of conduct in consumption choices (Belletti & Marescotti 1996). The attention towards the future, respect for the environment, and the refusal for the urban-industrial way of life, are the effects of a personalization of consumption that concerns a growing proportion of users. "Food consumption is amongst the major drivers of environmental impacts" (Notarnicola et al. 2017) and biodiversity transformations (Chaudhary and Kastner, 2016). The consumer understands its role within the environmental context. He/she is aware of the effects of his/her behavior in the present - in terms of spatial dimension - and that is in relation to other people, other social classes, ethnic groups – and those in the future (Platania 2012; Nezlek & Forestell, 2020).

Vegan consumption, though born in the last century (Montanari 1996), is probably more representative of this attitude, which includes attention to green products; i.e. products made by the production processes that are "kinder" and with attention to packaging, with less material content, and above all, made of ecological materials.
For similar reasons, an attraction is born to develop products for the attention of "Fair Trade", an "organized social movement and market-based approach that aims to help producers in developing countries to make better trading conditions and promote sustainability" (Danciu 2013).
But consumer choices also affect another domain, more personal and intimate of the consumer, being connected to the subjective level. The consequences of this attitude are manifested by the demand for light products; i.e. food with less calories; the value of thinness seems to be linked to efficiency, representing a model that is aesthetic and cultural, as already mentioned, and starts a relationship with food that is now reversed, the fear of obesity as opposed to fear of hunger (Montanari 1996).
The attention to personal well-being also involves the consumer in returning to the values of rural life. This attention spread out through the growing interest in local products and/or ethnic lines. As if to compensate for the phenomenon of globalization of food markets, local products exert a strong attraction, being the result of an attitude that invites a return to the values of nature, away from the artificial world of the city (Poulain 2005; Bharucha et al. 2020).

7. Consumer worry and the demand for quality

Until the end of the last century, quality was defined as the ability to identify and meet needs. In the twentieth century, it has also become a certificate of conformity with corresponding requirements.
In reality, this attention is not really aware: many consumers do not know what they consume and the consequences of such behavior. The arrogance with how the food industry has changed our eating habits, turning food, from handmade products into an industrial series of production, has generated a lot of benefits, but it has also homologated and impoverished taste. Industrial food production has polluted, like many other forms of industrial production, revealing some cases that are dangerous to human health. The various scandals in recent years have generated a growing concern among consumers, and a significant cultural disorientation (Montanari 1996), so that on average, power over time has become part of TV broadcasts.
There are several definitions of "quality" used in the literature: it is a very complex concept, often associated with the meaning of safety that is controlled in all its stages of production. In this seat, it has adopted a multidimensional definition, for which quality is given by a series of factors that affect the processes of choice (Steenkamp 1989).
The behavioral, or perceived, quality approach gives attention to the quality perception process; that is, how "consumers make judgments about the quality of a product", when "they are imperfectly informed". In addition, this approach takes into account the "influence of personal and situational variables on the quality perception process" (Steenkamp 1989: 7).
The assessment of quality by consumers depends on their opinion, and on what products meet their needs. In this sense, there are many characteristics that may contribute to the quality of the food, meeting the needs of different consumers. Many of them concern factors not directly related to the products, and depend upon where the product is sold, or on the many services included with the product.

Attributes that influence consumer choices are the values of a healthy and nutritive capacity, appearance, taste, comfort, packaging and safety. But we must also remember that consumers are increasingly aware and become more critical with respect to food. In addition, consumers are increasingly concerned about the various aspects of nutrition, and with most of the health problems associated with diet and food safety (i.e. GM food products) (Platania & Privitera 2008).
The production system must, therefore, be careful not only to take care of a greater diversification of products, to ensure that food in its essence, both from a nutritional and caloric point of view, respect the aspect of health and hygiene. In general, these trends must have in common a crucial role, where communication and information play an important role in the business of the consumer.
Several interventions in political economy were dictated by this need, with a philosophy that protects both supply and demand. The White Paper on Food Safety (EU Commission, 2000) and EU Reg n.178/02 constitutes adequate responses: it contains the fundamental rules of European food law and establishes the Food Safety Authority. The Commission, together with the European Food Authority, seeks to encourage dialogue with consumers and to ensure that the concept of food safety is present in every aspect of food production. At the same time, by promoting policies that ensure adequate information is available to consumers, on matters of food safety, and the risks that certain particular foods pose for particular groups of people.
The goal is not easy: the strategies of traceability require complex procedures for the coordination of production processes. On the demand side, these tools increase the set of credence attributes from which one can infer the quality of a product, emphasizing the role of trust in the processes of choice.

8. Health related drivers of food consumption: the case of Mediterranean diet

Choosing a balanced and complete dietary style can lead to long-term health benefits (American Institute for Cancer Research 2001), for this reason it is important to study particular dietary patterns in relation to the prevention and management of certain diseases (Simopoulos 2001). There are various healthy and complete dietary styles; however, as we have seen previously in this chapter, the Mediterranean diet is one of the those most frequently called into question to explain drivers of food consumption. Over the years there has been a growing interest of researchers in the so-called "Mediterranean diet" which is widespread, with some differences, in countries along the coast of the Mediterranean Sea, such as Greece, Crete, southern Italy and France, Spain. This diet, closely linked to local culinary traditions, combines physical well-being and good taste. It is characterized by the presence of numerous vegetable (fruit, vegetables, bread, other cereals, potatoes, legumes), olive oil as the main source of fat; dairy products and their derivatives, fish and poultry eaten in moderate quantities, up to four eggs consumed weekly, an extremely low consumption of red meat, and a moderate consumption of wine, mainly during meals (Curtis & O'Keefe 2002; Trichopoulou et al. 2003; Willett et al. 1995).
The Mediterranean diet is rich in its content of carbohydrates and fibers (Karamanos et al 2002); moreover, since it contains many simple (unprocessed) foods, it is characterized by the low content of saturated fatty acids and "trans" fatty acids, that are often present in foods processed with hydrogenated oils. The consumption of these types of fats is closely linked to the incidence of coronary heart disease (Ascherio et al. 1999; Oomen et al. 2001; Willett and Ascherio 1994). On the contrary, the Mediterranean diet includes two types of fat considered "healthy": omega-3 fatty acids

and monounsaturated fatty acids. The omega-3 fatty acids can be found mainly in fatty fish (for example, salmon, tuna, and sardines) and in walnuts; the monounsaturated fatty acids derive mainly from olive oil. A longitudinal study showed that omega-3 fatty acids help prevent sudden cardiac death (O'Keefe and Harris, 2000), while monounsaturated fatty acids reduce hypercholesterolemia and coronary heart disease (Renaud et al. 1995). Furthermore, the reduction in one's diet of fats and proteins of animal origin reduces the incidence of colon, rectal and breast cancers (Byers 2000; Holmes et al. 1999), while fruit and vegetables are composed of molecules that exhibit anticarcinogenic properties (Greenwald et al. 2001; Nishino et al. 2000). The Mediterranean diet pattern also includes numerous micronutrients that perform various protective functions for the body (Gerber 2003).

Other studies have focused their attention not so much on single elements included in the Mediterranean diet, but on this dietary pattern in its entirety. For example, some studies (De Lorgeril et al. 1999; Kris-Etherton et al. 2001; Robertson & Smaha 2001) have linked the lower mortality rate due to cardiovascular disease - in particular coronary heart disease - in the southern regions of Europe compared to the northern ones, to adherence to the Mediterranean diet. Moreover, a longitudinal study conducted in several European countries found that adherence to the Mediterranean diet, linked to a healthy lifestyle (no smoking, moderate consumption of alcohol, and physical activity), is associated with a lower mortality rate from coronary heart disease, cardiovascular disease and cancer in old age (Knoops et al. 2004; Trichopoulou et al. 2003). It was then shown how the foods present in this diet contribute to increasing the concentration of carotenoids in circulation, linked to greater protection against cardiovascular disorders (Martinez-Gonzalez & Sanchez-Villegas 2004; Su et al. 2002). The Mediterranean diet also appears to be beneficial in the treatment of rheumatoid arthritis: in a research conducted in Sweden, patients affected by this disease reported less pain and swelling in the joints when eating following this style (Skoldstam et al. 2003).

As we have seen, the Mediterranean diet brings important health benefits, therefore, it is important to identify the cognitive, emotional, and motivational processes involved in the decision to the Mediterranean diet (Willett et al. 1995) in opposition with other kinds the diet rich in red meat, eggs, and butter. An interesting study carried out by Mari et al. (2007) analyzed these factors. Participants (University students) were first asked which between Mediterranean and traditional diet (rich in red meat, eggs, and butter) they intended to follow; then, participants filled in the questionnaire corresponding to the preferred diet. The results shown how the process that leads to choosing the Mediterranean diet is more elaborate; it implies, in addition to considerations relating to the gratifying character of foods (affective attitude), also considerations relating to their usefulness (evaluative attitude). The intentions to follow Mediterranean diet also depend on the perception of control over such behavior. Emotions also intervene: a stimulus to follow the Mediterranean diet, once chosen, is the prediction that one would experience feelings of guilt, discomfort and frustration, if one were not able to follow it (negative anticipated emotions). The distinctive influences of the intentions to follow the Mediterranean style are therefore: the assessments of the necessity of the act, the perceptions of its controllability, the expectation of feeling frustration and guilt if one fails to follow it. These antecedents configure the act of following the Mediterranean style not as an action that has value in itself, but as an act perceived to be due because it is the premise of healthy effects. The quality of the act-duty was also confirmed by a strong regulatory pressure for its execution.

9. Conclusion

Consumers are the final agents for the process of food choice. Their characteristics and their behavior are important factors in determining food consumption.
But there are several economic and social factors that intervene in the upstream and downstream sectors of final consumption. The value of multifunctional agriculture, which guarantees the quality of the landscape and the survival food, it has a fundamental role in the quality of the future of the world. Policy choices are necessary for less contaminated and contaminating agriculture, able to perform a function not only food but also social, especially in countries in the developing world.
It should also take into account the "carrying capacity" of the Earth, and this depends not only on the sustainability of available resources but also by the lifestyle practiced by each of us.
Wendell Berry (1990), a famous American poet and farmer, said that "eating is an agricultural act." This concept explains the complexity of nutritional choices, and somehow the responsibility that we have as consumers. Petrini (2004) recommends a virtual pact between workers and those who produce the food, with the aim of exchanging information to achieve sustainable choices.
If there are clear trends toward greater uniformity, and a standardization of diets among European countries, there are also emblematic behavior and consumption patterns that are often significantly different between European countries, where large disparities persist within individual categories of expenditure.
Moving on the principal results of the analysis, the literature analysis showed that one of the most characteristic aspects of the new patterns of consumption remains a strong information asymmetry. Consumers often do not know what they eat. And this is emblematic of how this aspect of socio-economic problems characterizes a phase in which information and knowledge reflects the traits of the emblematic society in which we live. The different food styles described are omnivores and irrational attitudes. The consumer states that diets in which traditional styles are contaminated with the modern ones inside a social scenario dominated by fears and beliefs about the effects of food.
With regard to health-related drivers of food consumption, we have shown as benefits associated with the Mediterranean diet are widely recognized (Gerber, 2001). For this reason, it is easy to deduce the importance of supporting the spread of this threatened diet in Italy (Alberti-Fidanza & Fidanza 2004) as in other regions of Europe (Tur et al. 2004), by changes in lifestyles. Practicality needs, changes in the organization of family life and food preparation at home, the easy availability of ready-made and processed foods and their low cost (Alberti-Fidanza et al. 1994; Perez-Llamas et al. 1996) favor the adherence to other eating styles, especially among young people. The Mediterranean diet is thus contrasted by a style, which can be defined as Continental; this style is characterized by a much higher consumption of red meats, animal fats, cheeses, sweets and a reduced consumption of fruit, vegetables, legumes and fish. Therefore, comfort or reasons of taste and not attention to one's health seem to push people towards eating habits other than the Mediterranean one. Following Mari et al. (2007), it is possible hypothesized social interventions aimed at favoring the Mediterranean diet. They should point out the pleasantness of the foods included in this alimentary style, accentuate the perception of controllability of the act (for example, showing that fish and vegetable dishes can be served for quick lunches during work intervals), and predicting frustration and lower self-esteem they would feel if they were unable to follow this healthy style.

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Appendix A11. Definition of key terms used in chapter

"Trans" fatty acids. A trans fatty acid is an unsaturated fatty acid containing one or more trans isomeric double bonds between two carbon atoms. They are naturally present in some foods (especially milk, its derivatives and some meats), but in absolutely reduced concentrations compared to those of industrial products containing hydrogenated fats.
Affective attitude. Affective attitude is the affective component involving the emotional or feeling segment of an attitude.
Anticarcinogen. An anticarcinogen is a substance that counteracts the effects of a carcinogen or inhibits the development of cancer.
Anticipated emotions. Anticipated emotions are Beliefs about one's own emotional responses to future out-comes.
Cardiovascular disease. Cardiovascular disease is a class of diseases that involve the heart or blood vessels.
Carotenoids. Carotenoids are yellow, orange, and red organic pigments that are produced by plants (e.g., carrots, pumpkins, and tomatoes).
Coronary heart disease. Coronary heart disease involves the reduction of blood flow to the heart muscle due to build-up of plaque in the arteries of the heart. It is the most common of the cardiovascular diseases.
Evaluative attitude. Evaluative attitude is the positive or negative evaluation of a given object.
Hydrogenated oils. Hydrogenated oils are the product of the catalytic hydrogenation of unsaturated fats. The process is called hardening and is generally used to make concrete fats from oils. The main product is margarine.
Hypercholesterolemia. Hypercholesterolemia is the presence of high levels of cholesterol in the blood.
Micronutrients. Micronutrients are nutritional principles necessary for humans and other living beings in small quantities, and which the same organisms are unable to produce, to give rise to a whole series of physiological functions indispensable for the purposes of metabolism.
Monounsaturated fatty acids. Monounsaturated fatty acids are characterized by having only one double bond among all those present between the various carbon atoms; they differ in this from saturated fatty acids (which have only single bonds) and polyunsaturated ones (which instead have numerous double bonds).
Omega-3 fatty acids. Omega−3 fatty acids are polyunsaturated fatty acids characterized by the presence of a double bond three atoms away from the terminal methyl group in their chemical structure. Foods rich in Omega-3 can be of vegetable (e.g., dried fruit) and animal (e.g., fish) origin.
Rheumatoid arthritis. Rheumatoid arthritis (RA) is a long-term autoimmune disorder that primarily affects joints.
Saturated fatty acids. Saturated fatty acids are those fatty acids consisting of a saturated carbon chain formed solely by single C-C bonds. They can be of natural origin or derived by hydrogenation of unsaturated fatty acids and are mainly found in butter, lard, or fatty meats.

Ch.11

THEORETICAL FRAMEWORK OF FOOD CONSUMPTION DRIVERS IN THE EUROPEAN SOCIETY

Research trends

OBJECTIVES:

- ✓ The student will be able to know the main factors that influence consumer behavior
- ✓ The student will be able to know the main characteristics of some eating styles
- ✓ The student will be able to deepen the characteristics of the Mediterranean diet in European countries.

SKILLS: Understanding of changes in the food market; Scenario analysis skills.

QUESTION 1 (PLEASE CHECK THE CORRECT ANSWER)

During the 1990-2017, is diminished the consumption of which of the following food?

- ☐ Cereals
- ☐ Meat
- ☐ Milk
- ☐ Fish

QUESTION 2 (PLEASE CHECK THE CORRECT ANSWER)

Which of the following aspect does not drive food consumption?

- ☐ Culture
- ☐ Age
- ☐ Wellbeing
- ☐ Income

QUESTION 3 (PLEASE CHECK THE CORRECT ANSWER)

Which of the following countries had the greatest evolution in food consumption?

- ☐ Italy
- ☐ Estonia
- ☐ Slovenia

- [ ] Lituania

QUESTION 4 (PLEASE CHECK THE CORRECT ANSWER)

Which of following food are mainly used in the Mediterranean diet

- [ ] Eggs
- [ ] Fish
- [ ] Meet
- [ ] Vegetables

QUESTION 5 (PLEASE CHECK THE CORRECT ANSWER)

Which of the following is considered and "healthy" fatty?

- [ ] Hydrogenated oils
- [ ] Saturated fatty acids
- [ ] Omega-3 fatty acids
- [ ] "Trans" fatty acids

IMAGINE A COMPANY WANTS TO LAUNCH A NEW LINE OF CULINARY PRODUCTS ON THE MARKET. WHAT CHARACTERISTICS SHOULD THEY HAVE TO MEET EUROPEAN FOOD CONSUMPTION?

12. Organic products and consumer behavior: a research on consumer motivation

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Abstract: The following chapter aims to investigate the reasons, and therefore the set of psychological determinants, underlying the consumption of the organic products. After having exposed the literature focused on the value of organic production, the chapter explores the theoretical foundations that over the years have driven the interest of researchers on the analysis of the psychological determinants of consumption. Finally, we present the results of an ad hoc survey designed to investigate the motivations which push consumers to buy organic products. The empirical study was conducted on a sample of 239 Italians, voluntarily recruited consumers of organic products, who answered a questionnaire administered online between November and December 2020. The results of the survey, analyzed both quantitative scale (through SPSS ver. 25) and in qualitative key (through NVivo), briefly tell us the motivation for consuming organic products is more significant in the sample of the female population and mainly in reference to the gastronomic sector. Trust in the product and a generic ethical foundation determines this type of consumption, anchoring it to reasons underlying the sustainability of the products and the positive consequences for personal well-being.

Keywords: Food consumption; Consumer behavior; Organic product; Consumption intensity.

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1. Introduction

There are a lot of researches on the organic agriculture sustainability at the international level in relation to economic, environmental and health aspects. Organic agriculture represents a cultural evolution based on an environmentally friendly culture that has spread among citizens (Platania & Privitera 2016).

Consumers look carefully at organic products also because they want safe foods, with higher standards of quality and lower impact on health, and which include a reduced use of chemical substances. The consumer beware to following a healthy lifestyle and this new formed interest also goes to the choice of food products (Asif et al. 2018).

Some economic data confirm this growth: in 2018 the EU organic market registered an increasing dynamism, reaching € 37.3 billion, even if it is not easy to quantify the real market, considering the relative unreliability of the statistics (Platania 2020).

The interest in studying the behavior of consumers of organic products has increased significantly in the recent period, together with the spread of these products (Boobalan & Nachimuthu 2020). Studies analyze the demographic and economic profiles of consumers who prefer organic food, and the findings point out some conflicting results (e.g., Wang & Sun 2003; Zhang et al. 2006). In particular, differences were found in the motivations for purchasing organic food, including concerns for individual health and the environment (Boccaletti & Nardella 2000; Zepeda & Deal 2009).

The purpose considered for this study is understanding why consumers buy organic food. With this research, we decided to (1) explore the possible reasons that push people into consuming organic food, (2) verify the correlation between the dimensions of organic food consumption intensity, Positive attitude towards organic food, Subjective Norms, Desire, Perceived Behavioral Control, and Behavioral Intentions and (3) verify the mediating role of Social activity between the Positive attitude towards organic food and Behavioral Intentions as outcome.

The chapter is structured as it follows: the first part develops an analysis of the literature on organic products consumption. The second part presents the results of a correlational research specifically conducted for this contribution and aimed at understanding the reasons for purchasing organic products and the behavioral characteristics of these consumers.

2. Analysis of the literature

The analysis of the consumer behavior considering organic food starts by defining the characteristics that influence the consumer choice. These characteristics are the determinants of the demand and can be endogenous and exogenous in nature. The endogenous variables are those that explain the psychological profile of the consumer and are: the motivations, attitudes and expected and perceived quality. The determinants of an exogenous nature are the socio-demographic variables (age, cultural level, income), the psychographic variables into which lifestyles fall, the marketing variables, the context in which the purchase is made and finally the political and institutional environment.

In the literature it is possible to find a large production of studies, albeit qualitative, on consumers awareness and their preferences in relation to organic productions (for example, Jolly et al. 1989; Ekelund 1990; Hutchins & Greenhalgh 1997; Kenanoğlu & Karahan 2002; Hill & Lynchehaun 2002; Janssen & Hamm 2012; Schleenbecker & Hamm 2013; Dangi et al. 2020).

The main motivation that drives consumers to choose organic products is linked to the healthiness of these products and to the presence of lower quantities of chemical components and / or pesticides (Aarset et al. 2004; Kuhar & Juvancic 2010; Padel & Foster 2005; Platania & Privitera 2016).

Literature analysis highlights that there is consumer awareness of organic foods benefit at global level, especially in the Western part of Europe. Here the organic market is better developed, in respect to other parts of the world. This propensity is greatly influenced by food scandals as their impact on food safety on public opinion (for example the BSE (Bovine spongiform encephalopathy) crisis) plays a significant role in the choice of purchasing organic food (Fotopoulos & Krystallis 2002). The result is a lack of confidence in consumers' interest in some mass food producers (Davis et al. 1995) and an increase in choosing foods with superior quality and safety features, including organic foods.

Actually, the reasons are more complex and may depend on various factors. Overall, it is possible to distinguish the studies that try to investigate the determinants of the purchase of organic products in four large groups (Hemmerling et al. 2015). The first concerns the issue of benefits deriving from consumption, the second analyses the relationship with the price, the third the importance of the labels and finally the fourth the issue related to the availability and place of purchase.

The first area of study is the one related to the possible benefits offered by the consumption of organic products. This study area collects all the research that refer to preferences, selection and consumption of organic food and to the characteristics of the products, those influence the consumer behavior.

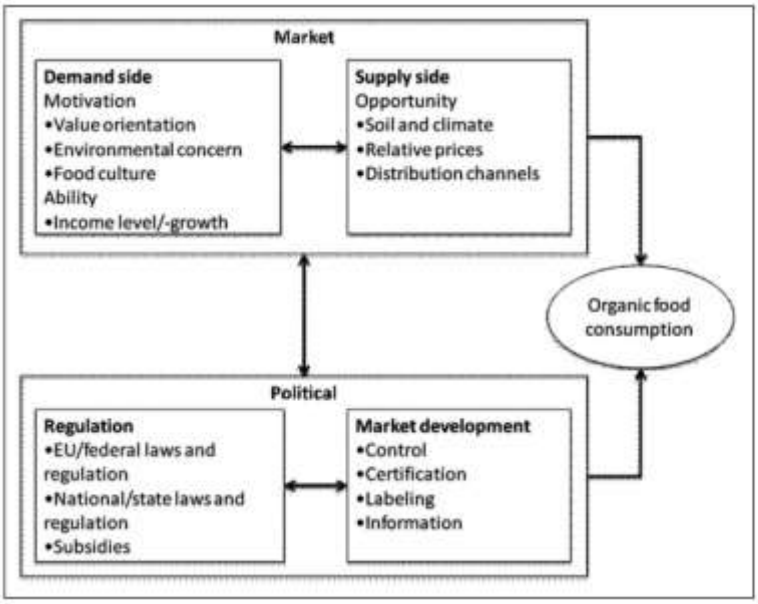
Some scholars have tried to investigate the barriers to organic consumption in order to identify the causes of the so-called gap between attitudes and consumption (Vermeir & Verbeke 2006). These studies are motivated by the contradiction between the positive attitude towards organic products, found in numerous consumer surveys, and the limited market shares in many countries where organic crops have established. In this sense, Aertsens et al. (2009) propose an integrated framework of individual determinants, considering attitude as one of the determinants of purchase intention. Saba & Messina (2003), adopting the expectation-value theory, found on their sample of Italian consumers that organic fruit and vegetables are considered, on average, healthier, more environmentally friendly, tastier and with higher nutritious properties than conventional fruit and vegetables. These positive opinions are an important predictor of the attitude towards a diet based on organic fruit and vegetables and therefore, the attitude is a good predictor of the consumption intention for organic fruits and vegetables. In this sense Rana & Paul (2020) state that there is the need for diet composition studies to identify health effects. In their review, these authors show the importance of diet composition. In fact, it can push consumers to consider more organic foods rather than conventional foods.

Several other authors focus on the gap between attitudes and behaviors, also considering the non-consumers.

Padel & Foster (2005) start from the evidence of a qualitative survey on a sample of British consumers according to which non-consumers share the positive perception of consumers regarding organic products in terms of quality, production methods and the product value of organic products, but are skeptic on health benefits. What emerges is that the motivations and barriers of organic food consumption vary with product categories. The reasons that encourage people into consuming organic products are related to the attention to health (individual and public), to having had problems with health, to living food as a moment of fun, and to altruistic issues.

Following several studies on the gap between attitudes and consumption, in 2010 Thøgersen studies the dynamics of consumption of organic products, shifting the focus from the individual psychosocial level to the structural and macro factors of national systems. Faced with the geographical heterogeneity of the market indicators of organic products consumption among European countries, the author retains that greater emphasis must be given to structural, political and institutional factors so that we can better understand the geographical gaps in the sustainable consumption of consumers. Therefore, following a review of studies that address differences and similarities in the consumption of organic food products between European countries, Thøgersen (2010) proposes a new comprehensive conceptual model for interpreting the consumption of organic food products (Figure 12.1).

Figure 12.1. Determinants of organic food consumption (Thøgersen, 2010)



The two basic dimensions of influence for consumption relate, on the one hand, to the political-institutional context; on the other, to that of the market. Political intervention plays a highly important role in the creation and development of the market and is achieved through the regulation of production of organic food, various forms of financing, and the assumption of the independent role of certifier and, controller of the labeling procedures.

National interests are also part of the motivation for buying organic products. For example, Worner & Meier-Ploeger (1999) describe support for organic farmers by German consumers, while Meier et al. (1989) highlight the importance of animal welfare for the British.

Another area concerns the importance of the "organic" attribute correlated with other attributes of the product. In this regard, Verdurme et al. (2002) compare organic foods with genetically modified (GM) foods, examining whether Belgian organic consumers are automatically against genetically modified foods. They find that only about 40% of organic consumers refuse the use of genetic modification in organic food production. This suggests that the prohibition of GM technology from organic food production is not exactly corelated with the views of many Belgian organic consumers (Verdurme et al. 2002). Platania & Privitera (2016) through an empirical survey of a significant sample of the Italian population, evaluate the knowledge on organic products, in particular compared to other similar products (integrated agriculture, zero residue and GM free products). The results indicate a low level of knowledge and a lot of confusion.

According to Zepeda & Deal (2009), cooking routines are also linked to purchases of organic food. These authors argue that consumers who tend to learn to cook in early years of their life, learn the associated purchasing routines. As many consumers of organic products have considered cooking in later years of their life, they may be less influenced by family customs and also, they might have been exposed to larger diversity of organic foods when they started cooking.

As far as nutritional and sensory attributes are concerned, these also influence consumer choice (Bourn & Prescott 2002). Goldman & Clancy (1991) observed a relationship between the consumer's availability to accept product imperfections and his purchasing behavior of organic products. The results of this study show that appearance is less important among organic consumers (Lin et al. 1996). although it should be noted that several authors have shown that differences in taste, freshness, where they exist, they appear to be connected to consumers' food (organic and non-organic) purchasing habits.

In the studies on the consumer behavior of organic products, another much discussed topic concerns the knowledge of labels and certification standards. These studies attempt to investigate the efficiency of such labels in informing and the attention that consumers give to such information. For example, Janssen & Hamm (2012) analyze the perception of different organic labels in a sample of European countries (such as Denmark, Germany, Italy, the Czech Republic). Their results clearly show the ignorance of many consumers about organic production controls and that the differences between labels are not understood. Cicia et al. (2002) note that the consumers of organic extra virgin olive oil are very different from those of conventional extra virgin olive oil and highlight how some factors, such as the knowledge of the certifying body, are fundamental elements for the purchase. Sandalidou et al. (2002) deduce that consumers need more information, in particular on the label and on the packaging, to be able to understand better the organic origin of the product. Hoogland et al. (2007) carry out a study in the Dutch market to understand how consumers in that area understand and evaluate information regarding animal welfare and packaging of organic production. Their study states that many consumers do not realize that an organic logo can cover all standards. This obviously leads to an underestimation of the value of the organic label. Padel & Foster (2005) and Eden et al. (2008) state that consumer knowledge on organic certification and labeling is rather poor in the British area. Chang and Zepeda (2005) and Hamzaoui & Zahaf (2008) distinguish between organic consumers and non-organic consumers, highlighting the different levels of awareness and understanding of organic concepts. What distinguishes the behavior is related to the regularity of consumption, whereby consumers of organic products are better informed and have more confidence in brands and stores of organic food. Moving on to an analysis by country, Wier et al. (2008) observe a good understanding of regulations on organic farming for the Danish market, while for Greek consumers, Fotopoulos et al. (2011) examine whether self-declaration awareness of the organic regime is indeed true. Their findings show that a low real awareness has been proved as a major cause for the low penetration of organic products in the Greek market.

Many studies on organic markets have highlighted the importance of consumer confidence in certification bodies. Sonderskov and Daugbjerg (2011) make an important contribution to understanding the role of Government involvement in certification processes. In fact, they analyzed the reliability of ecological labels in some countries (United Kingdom, United States, Denmark, Sweden) demonstrating how trust in organic labeling is greater where there is real involvement of the Government. In their study on studied the level of trust in the organic certification system in some European countries, Aarset et al. (2004) found a low level of confidence in the Great Britain, Germany and Norway. As for Italy, Cicia et al. (2002) show that consumers are critical of certification institutes and show a preference for the more widespread certification program (those of AIAB: Italian Association for Organic Agriculture). Panico et al. (2011) note that Italian consumers have a significant demand for clearer rules.

Further studies concern competition between organic brands. Some authors (Pivato et al. 2008; Perrini et al. 2010) study consumer perception of organic products marketed under a private label, considering the social responsibility of the retailer.

These studies suggest an increase in the level of consumer confidence linked to aspects of social responsibility.

Truninger (2008) analyzes how different retail outlets give different meanings to organic quality. While supermarkets and specialized natural food stores give more objective information, using European regulations, small businesses, such as food cooperatives, represent a definition beyond the regulations, trying to highlight environmental, local aspects and ethics.

Following the approach of Hemmerling et al. (2015), a second field of study concerns the costs to the consumer. In the consumption of organic products, the price is still seen as a barrier. Consumers consider price in relation to their disposable income, but they also consider value for money. Studies confirm that consumers perceive organic food as more expensive than comparable conventional food (Abrams et al. 2010; Hill & Lynchehaun 2002; Platania & Privitera 2016; Zepeda et al. 2006). Chang & Zepeda (2005) show that most consumers have difficulties in quantify the difference. Davis et al. (1995) refer to studies specifying the extra price as 5% in 1987, which increased to about 49% just until 1989, calculating it to approximately 30% in a sample of Irish consumers in 1995. In the study of Padel & Foster (2005), in a survey carried out in the United Kingdom, non-consumers share the positive perception of consumers of organic products but are critical for the high price. In this sense, it appears that non-buyers perceive the price as a barrier not in absolute terms but in relation to the premium price. The high price of the product is therefore an important factor even if this is mitigated by the healthy characteristics of the product.

In the studies on price importance, researchers have examined the issue of willingness to pay (WTP). As for the premium price, Hemmerling, et al. (2015) state that the results are very different from each other both in the same country and for the same type of products, while other contributions analyze the factors that influence the WTP, such as socio-demographic variables and attitudes, and arrive at heterogeneous results. According to Katt & Meixner (2020) there are some significant differences in the motivations that drive willingness to pay for organic food between advanced and developing economies. Common outcomes point to the positive impact of higher levels of income and education, as well as to being married (Botonaki et al. 2006; Charatsari & Tzimitra-Kalogianni 2007; Coulibaly et al. 2011; Haghiri et al. 2009; Loureiro & Hine 2002; Loureiro & Lotade 2005). Furthermore, according to several authors, some attributes of the product, such as perceived quality, appearance and taste, have a positive influence on WTP (Ghorbani & Hamraz 2009; Loureiro & Hine 2002; Shuzzler et al. 2003; Tsakiridou et al. 2008). In all this studies, the awareness and knowledge of organic products are fundamental in the consumer's decision to buy. If a consumer is unable to distinguish between the available options, a surcharge on the organic product can confuse and influence the individual's purchase decision in favor of the product with a smaller price (Yiridoe et al. 2005).

The WTP for organic products seems to also depend on the consumption frequency (Botonaki et al. 2006; Canavari et al. 2002; Haghiri et al. 2009).

The third area of literature review is on communication and information. Some studies discuss the general aspects of communicating organic products. For example, Lyons et al. (2001) highlight the importance of the information on organic consumption. Hill & Lynchehaun (2002) emphasize consumer education. They retain information on organic farming methods should also be provided. Sandalidou et al. (2002) analyze the satisfaction of Greek consumers with regard to the promotional effort for organic olive oil. They believe that promotional activities are an efficient tool for increasing organic olive oil sales.

The fourth area is related to the issue of the convenience and distribution of organic food. Many studies address the issue of convenience with respect to where consumers buy organic products. A first group concerns the availability of organic and the choice of the retailer. According to Zepeda and Deal (2009) consumers of organic products appreciate knowing where their food comes from and want to have a relationship with farmers, indicating support for values, beliefs and norms that influence food purchasing habits.

Consumers from various countries report that they are dissatisfied with the number of points of purchase of organic food and that they want an expansion of the network of places of purchase (Aryal et al. 2009; Cerjak et al. 2010; Chang and Zepeda 2005; Govindasamy et al. 2006; Hill & Lynchehaun 2002; Kuhar & Juvancic 2010; Lyons et al. 2001; O'Donovan & McCarthy 2002; Zakowska-Biemans 2011).

Regarding the choice of places to buy, the results are heterogeneous, also due to the country's specific organic market background. Several authors (Padel & Foster 2005; Ergin & Ozsacmaci 2011; Wier et al. 2008) demonstrate through empirical studies that in some markets there is a greater relevance of conventional retailers for the supply of organic food, that is supermarkets are preferred to the markets of farmers and specialized shops.

Other studies disagree with these results, pointing that chain supermarkets have a lower priority, while farmers' markets are considered as the prime places for purchasing organic food (Cicia et al. 2002; Fotopoulos & Krystallis 2002; Akbari & Asadi 2008). In a survey of Croatian consumers, Radman (2005) notes that the majority of respondents, who claim to buy organic fruit and vegetables, are doing these purchases from city markets (46.3%) or directly from producers (19,1 %). Yet, at the time of the study, the authors highlight that there are not producers in Zagreb city markets with organic labels. Therefore, the authors assume that respondents have an informational gap, so they independently nominate the purchased products as organic.

Considering the contributions that focus on the psychological determinants of consumer behavior, it should be noted in advance that in the last thirty years, motivation to buy and consumer behavior have been the focal points of much research. Consumption concerns things and services, but also free time and various dimensions of our daily life but above all a general search for greater personal well-being and higher levels of quality of life. Currently, the accepted notion of consumerism tends to indicate the role that the consumer has in relation with himself and his identity. Besides the mere utilitarian logic, there are therefore, other dimensions of approaching consumption that concern the emotional aspects, symbols, aesthetics, relationships and desires. The logic of desire, in fact, happens before (in time-based order) the clear and sensible-instrumental one: desire is felt from birth, while the thinking-related abilities related to perception and learning will increase over time (Siri 2004). Desire (instinct) and imagination (the mental way in which people wish to accomplish) are the first experiences in the world and together they reveal the first significant way to question oneself in favor of one's own well-being. The consumer society raises the logic of the want to allow postmodern people to re-explore the reality; this would allow people to tolerate the feeling of lack of responses and the sense of their own needs. In essence, this knowledge constitutes the choice to adhere to a specific lifestyle through numerous ranges of meaningful experiences.

The theoretical background used refers to two important concepts: the intensity of consumption (Martinez-Carrasco et al. 2005) and the theory of self-discipline (Bagozzi 1998; Bagozzi et al. 2002). The choice of these two theoretical constructs was made both to identify the influencing variables of the consumption intensity in general, and to predict the others that correspond to influencing the purchase intention of consumers in general (Platania et al. 2016).

Various research highlights the interest in studying the intensity of consumption and the variables involved in it. Innovative in this regard was Twedt's (1964) study, in which he argues that demographic characteristics alone cannot explain differences in consumer behavior, but it is also necessary to identify and investigate further variables. Martinez-Carrasco et al. (2005), for example, have developed a model that explains how three different variables (social activity, concern for a healthy life and interest in gastronomy) influence the intensity of consumption.

As for the identification of the determinants of consumer choice, the Theory of Self-Discipline (Bagozzi 1992) is proposed, born as an extension of the Theory of Reasoned Action developed by Ajzen & Fishbein (1980), and of the Theory of Planned Behavior elaborated by Ajzen in 1991. Bagozzi's theory, in detail, does not limit itself to considering cognitive factors, but considers another element, past experience, to determine both intention and actual behavior. Therefore, according to the author: "evaluative and affective attitude, social identity, subjective norms, desire and perceived behavioral control" (Bagozzi 1992) are the main influencers of behavioral intentions.

3. A research on the determinants of the consumption of Organic Food

3.1 Introduction

There are many reasons behind the choice of consumption of any category of goods and services. For example, the consumption and purchase of foodstuffs (wine, beer, cheese and dairy products, vegetables and fruit) are based on two different reasons: on the one hand, there are objective reasons such as nutritional needs; on the other hand, there are subjective and intrinsic motivations that allow consumers to satisfy their needs, desires, expectations and also their manifestation of social identity, which go beyond mere consumption (Garavaglia 2010; Santisi et al. 2017). Among the phenomena that contribute to influencing consumer choices, an important role is played by fashion, trends in lifestyles and identification with a specific group. As already mentioned, in fact, for several decades there has been a growing success of local and artisanal products but also of the so-called "territorial brands". A clear example of this is the high percentage of consumption of green products and the advent of the so-called "zero kilometer" products (De Magistris 2006; Aquilani et al. 2015). This product-territory link, defined in the oenological tradition as "terroir" (Seguin 1988), represents in fact one of the most powerful identifying and distinctive tools of specific products together with the other historical and cultural characteristics that give the product a unique and high-quality connotation. In this sense, the terroir becomes a competitive lever and potentially a brand, of a wider territory to which the company and its offer belong, and also allows the crossing of globalization and the consequent claim of the "country of origin" (Rea & D'Antone 2010; Pilato et al. 2015). The place of origin therefore delivers multiple meanings to the brand. This is due to the fact that the territory itself has a rich heritage of meanings, traditions and characteristics, rooted over time and widely recognized. Therefore, territorial brands are used to protect and pass on the value of the territory and its entire heritage (Rea & D'Antone 2010), even more so if these "territorial brands" respond to production processes that adhere to ethical foundations oriented to respect for the person and the care of physical and mental well-being, such as organic products.

This is the premise that motivated the research, the results of which are set out below.

3.2 Participants and Procedures

The participants were 239 Italians voluntarily recruited who consume organic products. Data collection was conducted anonymously, using an online survey through a self-assessment questionnaire. The socio-demographic profile of the sample are male 21,3 %; female 78,7 %, aged between 18 and 65 years. They are employed (87, 36,4 %) or unemployed/students (152, 63,6 %). The majority of them had high school diplomas (140, 58,6 %); some of them had university degrees (55, 23 %) or postgraduate degrees (44, 18,4 %).

Descriptive characteristics of the sample are found in Table 12.1.

Table 12.1. Sample characteristics

variable	N (%)
Gender:	
Male	51 (21,3)
Female	188 (78,7)
Age:	
18 – 25	150 (62,8)
26 – 35	30 (12,6)
36 – 45	27 (11,3)
46 – 55	21 (8,8)
56 - 65	11 (4,6)
Educational attainment:	
graduates high school	140 (58,6)
graduates	55 (23)
postgraduate degree	44 (18,4)
Occupational state:	
Employed	87 (36,4)
Unemployed/student	152 (63,6)

3.3 Measures

We used the measures described below.

Organic food consumption intensity

We used a scale adapted by other measures (Martinez-Carrasco et al. 2005). The scale is composed of 26 elements with a 7-steps Likert scale (from “absolutely disagree” to “absolutely agree”). The dimensions evaluated are: Social Activity, Healthy Life, and Interest in Gastronomy. Specifically, 13 items assess Social Activity, referred to the importance that people place to the consumption of organic food (simple item: I consume organic food during meals with friends); 6 items characterized Healthy Life, referred to the link between healthy living and consumption of organic food (simple item: organic food consumers are concerned about their health); and Interest in Gastronomy includes 7 items which refer to the liking of organic food (simple item: I consume organic food because I like its taste). In this study, Cronbach’s alpha was 0.82, 0.52, and 0.66.

Positive attitude towards organic food

We used a semantic differentiation. This method was proposed by Osgood (Osgood et al. 1957) and measures the perception of concept on a seven-point bipolar rating scale (Robson & McCartan 2016; Martin & Hanington 2012). In this case, the object to be evaluated was organic food and we used 17 pairs of polar adjectives (useful-useless, beautiful-ugly) to evaluate the positive attitude towards organic food. Cronbach’s alpha was 0.94.

Subjective Norms

The statement "*Most of the people who are important to me approve my decision to buy organic food*" was used to assess Subjective Norms. We adopted a 4-steps scale (from "completely false" to "completely true").

Desire

We used a 4-stepts statement (from "completely false" to "completely true") to evaluate the desire: "I would like to buy organic food again".

Perceived Behavioral Control

The dimension was assessed with the following sentence "*If I wanted to, it would be easy for me to buy organic food again*". Participants could respond using a 4-steps scale (from "completely false" to "completely true").

Behavioral Intentions

We asked the participants "*How likely are you to buy organic food again?*" using a 4-steps scale (from "very unlikely" to "very likely").

Reasons that lead to the consumption of organic food

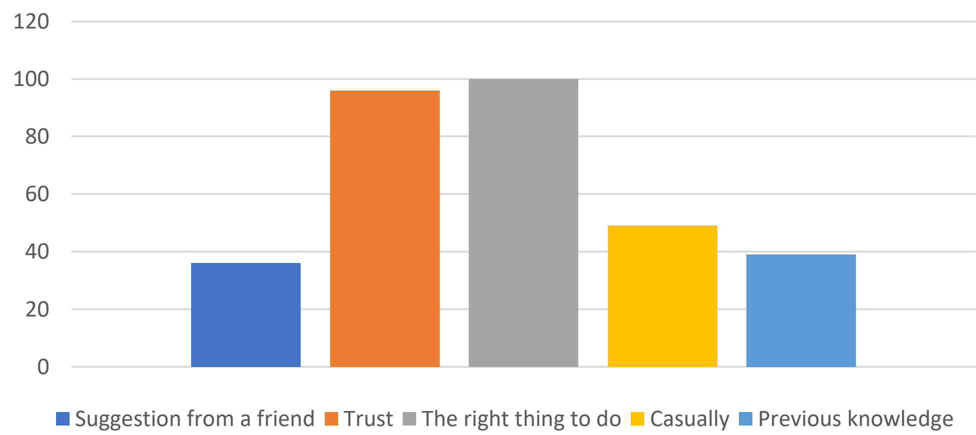
We asked the participants to indicate the reasons that push them to turn to an organic style of food consumption. We also asked what are the reasons why the respondents chose to consume organic products, providing alternative answers.

3.4 Results

Statistical analyses of data were performed using SPSS version 25.0 for quantitative analysis and Nvivo Software version 12.0 for qualitative analysis.

The reasons why the participants chose to consume organic food are mainly the belief that it is the right thing to do (100) and trust in the product (96). Other participants stated that their choice was a coincidence (49), because they had known the product for some time (39) or because they received a suggestion from a friend (36). Figure 12.2 summarizes the results.

Figure 12.2. Reasons to consume organic food



Most of the participants, claimed to have used organic products the week previous to responding the questionnaire (174 participants, 73 %), while a lower part did not use them (65 participants, 27 %)

We checked for gender differences. Significant differences regarding gender emerged for one dimension: Interest in Gastronomy. In particular, females have higher scores in this dimension (means and standard deviation were: M_{female} = 5,68; DS = 0,79; M_{male} = 5,39; DS = 0,81).

Differences also emerged regarding the age range of the sample about Social Activity. Specifically, those who belong to the age group between 18 and 25 years, show lower scores (M = 4,21; DS = 0,78) than those who belong to other age groups: 26 – 35 (M = 4,91; DS = 0,72), 36 – 45 (M = 4,98; DS = 1,02) and 46 – 55 (M = 4,94; DS = 0,71).

We observed significant levels of correlation among the investigated dimensions. Table 12.2 shows these correlations, along with summary of means and standard deviations.

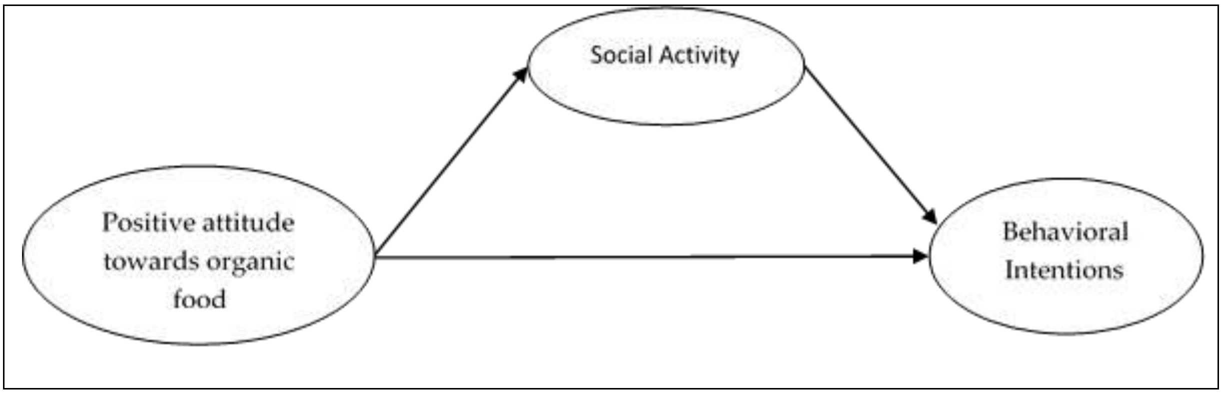
Table 12.2. Means, standard deviations, and variable correlations

	M	SD	1	2	3	4	5	6	7	8
1. Social Activity	4.48	0.88	1							
2. Interest in Gastronomy	5.62	0.81	0.56**	1						
3. Healthy Life	5.59	0.79	0.37**	0.44**	1					
4. Positive attitude towards BIO	5.78	0.92	0.37**	0.47**	0.33**	1				
5. Subjective Norms	2.87	0.71	0.31**	0.41**	0.23**	0.32**	1			
6. Desire	3.25	0.66	0.38**	0.47**	0.38**	0.52**	0.41**	1		
7. Perceived Behavioral Control	2.79	0.79	0.35**	0.27**	0.19*	0.19*	0.23**	0.10	1	
8. Behavioral Intentions	3.17	0.72	0.47**	0.49**	0.39**	0.44**	0.46**	0.59**	0.28**	1
*** p < 0.05; ** p < 0.01**										

All variables positively correlated with each other, except Perceived Behavioral Control and Desire.

We also verified the validity of the mediation model presented in Figure 12.3.

Figure 12.3. Hypothesized model predicting behavioral intentions with positive attitude towards organic food mediated by social activity



To do this, we checked whether the indirect effects were significant, using the bootstrapping method in SPSS and it was possible to confirm the suitability of the hypothesized model.

In Table 12.3 we show the results of the mediation, with the standardized β which indicates the intensity of the effect, that is the change in dependent variable for every change in independent variable.

Table 12.3. Effects of Positive attitude towards organic food on Behavioral Intentions Through Social Activity (Standardized β)

	Indirect effect			**Direct effect**			**Total effect**		
		CI			CI			CI	
	β	Lower	Upper	β	Lower	Upper	β	Lower	Upper
Positive attitude towards organic food – Social Activity – Behavioral Intentions	0.22	0.14	0.30	0.32	0.19	0.45	0.54	0.42	0.67

The standardized β give information on the strength of individual paths in the mediation model (Fairchild et al. 2009). The results indicate that the total effects of Positive attitude towards organic food on Behavioral Intentions is significant ($\beta = 0.54$, $p < 0.001$) as well as its direct effect on it ($\beta = 0.32$, $p < 0.001$).

Qualitative analysis was conducted using NVivo Software; two researchers, belonging to the research group, conducted the analyzes separately, and then discussed the issues identified to reach an agreement. The researchers agreed on 80% of the coding. For the remaining 20%, the intervention of a third researcher was requested. First, we corrected all the answers, eliminating words written in dialect, or correcting grammatical errors. All analyzes were conducted in Italian, no translation was done at the time of coding. We used the "word frequency" query to identify nodes (QSR International 2015). We included the articles and adverbs in the "list of non-significant words" and we have combined the words expressed in the masculine and feminine or the singular and plural. The words most used to describe the reasons for consuming organic food are summarized in Table 12.4.

Table 12.4. Word frequency for the reasons for consuming organic food

Word	Count	Word	Count
Products	49	Pleasant	15
Health	44	Environment	14
Healthy	44	Respect	18
Chemists	35	It helps	14
Natural	32	Foods	11
Pesticides	27	Preservatives	11
Good	24	Animals	10
Substances	21	Sustainable	10

Based on the word frequency, we have codified the following nodes. *Product characteristics*: this node includes the answers that refer to the fact that organic food does not require the use of pesticides and preservatives. For example: "*I choose organic food as it is a product that does not contain pesticides*" (participant n ° 34). *Positive consequences for personal well-being*: the answers that refer to the taste of organic food and the positive effects on health are part of this node. For example: "*organic food* *contains ingredients that are good for health*" (participant n ° 88). *Product sustainability*: this node refers to the fact that organic food respects the environment and animals, so it is linked to the concept of sustainability: For example: "*I consume organic food because it is more sustainable from an ecological point of view*" (participant n ° 142).

4. Conclusion

What conclusive reflections does the reading of the results lead to? In relation to the reasons that support the consumption of organic food, two points emerge with clarity: everything that indefinitely recalls the "correctness" of this behavior, as well as trust in the product. Consumption appears frequent, as most participants say they used organic products in the week previous to when the survey was conducted. In relation to gender, it is the female sample that shows higher scores than the male sample. With statistically significant differences.

Statistically significant differences also emerge with reference to age. The sample of the younger age group does not show particular sensitivity in this type of consumption, unlike the more mature groups: in fact, the participants over 26 years old reveal the highest scores.

The suggestions that emerge from the correlation of the variables investigated are interesting (Table 12.2). With the exception of perceived behavioral control and desire, all others are positively related to each other: social activity, interest in gastronomy, healthy living, positive activity, subjective norms and behavioral intention. These data, despite being in contrast with what emerged in previous research that used the same model (Caprara et al. 1998; Pierro et al. 1999), lead us to consider organic consumers as “mature” buyers. Organic consumers are "attentive" and "aware", little inclined to indirect influences based also on trust in past experiences and therefore strongly anchored to the characteristics of the current economic-social situation and to subjective priorities. This explanation would seem supported also by the results shown by the Desire variable, the one that, in other words, mostly evokes the emotional dimensions. Attitudes towards the organic product, subjective norms and behavioral intentions appear instead as the variables that can explain in a more decisive way the reasons for this type of purchase and therefore the predictivity of the theoretical model used. The hypothesis is also confirmed in the mediation model presented later, in which, by verifying the significance of the indirect effects, it was possible to confirm that the hypothesized model is valid. The results indicate that the overall effects of the positive attitude towards organic food on behavioral intentions are significant ($\beta = 0.54$, $p < 0.001$). The direct effect was also significant ($\beta = 0.32$, $p < 0.001$).

With regard to the results of the qualitative analysis, it emerged that the words mostly used to describe the reasons for the consumption of organic food focus on three dimensions:

a) the “characteristics of the product”: organic food does not require the use of pesticides and preservatives.

b) the “positive consequences for personal well-being”: the value of the taste of organic food and the positive effects on health.

c) “product sustainability”: organic food respects the environment and animals.

In conclusion, some propensities and consumption habits appear to be confirmed, which have been hypothesized both by economic and psychosocial research. The extremely important anchoring to reasons inherent to the healthiness of the organic product and individual well-being emerges significantly, as well as confirming the importance of the sales channel and the frequency of products purchasing. From the first point of view, the local channel is much preferred, territorially identifiable also with respect to the origins of the product and its identity with respect to the territory, a circumstance that identifies an extremely short supply chain in the production / distribution channels. Frequency also conforms as an important indicator and this also involves minimal sacrifice in the cost of the product. Finally, as regards the more internal and subjective motivations, the determinant of the “fashion product” is lost, thus tending to favor the profile of a “critical” and “mature” consumer over that of an exclusively “emotional” consumer.

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Appendix A12. Definition of key terms used in chapter

Attitudes = In the process of segmentation and in studying consumer behavior, the concept of attitude defines a coherent and unique attitude or behavior towards an object and / or an idea.

Awareness = The notoriety (or awareness) of a brand or a type of product defines the threshold of awareness of them by consumers.

BSE = Bovine spongiform encephalopathy that is more commonly known as the mad cow disease, is a neurodegenerative illness affecting cattle. BSE is considered to be caused by an infection of a misfolded protein, named "prion". It is considered that cattle are infected by the feed containing meat-and-bone meal (MBM) which has either the remains of cattle who spontaneously developed the illness or scrapie-infected sheep products. The outbreak of this disease increased all over the Great Britain caused by the custom of feeding the mentioned meal to young calves of dairy cows.

GM = Genetically modified organisms; they may refer to plants, micro-organisms or animals that have a part of their genetic heritage modified by genetic engineering techniques.

WTP = Willingness to pay is the maximum amount that a person would pay to receive an improvement or to avoid a loss in their level of well-being

Ch.12

ORGANIC PRODUCTS AND CONSUMER BEHAVIOUR: A RESEARCH ON CONSUMER MOTIVATION

Psychological determinants underlying the consumption of the organic products

OBJECTIVES: This chapters aims to present the results on consumer behavior research.

SKILLS: The student should have acquired the principal characteristics of an empirical research and psychological determinants underlying the consumption of the organic product.

QUESTION 1 (PLEASE CHECK THE CORRECT ANSWER)

Based on the literature, what are the elements that influence the consumption of organic food?

- ☐ Healthiness
- ☐ Size of the urban center
- ☐ Online selling
- ☐ Wealth of the country

QUESTION 2 (PLEASE CHECK THE CORRECT ANSWER)

Which psychological determinants is a good predictor of the intention to consume organic fruits and vegetables?

- ☐ Lifestyle
- ☐ Age
- ☐ Attitude
- ☐ Income

QUESTION 3 (PLEASE CHECK THE CORRECT ANSWER)

Considering the research results, which commercial strategy would be preferable to increase BIO consumption??

- ☐ Product innovation
- ☐ Distribution policy
- ☐ Promotion

- [ ] Pricing policy

QUESTION 4 (PLEASE CHECK THE CORRECT ANSWER)

According to Bagozzi's theory, behavioral intentions are influenced by:

- [ ] Age
- [ ] Knowledge
- [ ] Health
- [ ] Past experience

QUESTION 5 (PLEASE CHECK THE CORRECT ANSWER)

Considering the results of the research, what is the word most used to describe the reasons for the consumption of organic food?

- [ ] GM
- [ ] Against pollution
- [ ] Product sustainability
- [ ] Rural atmosphere

THE RESULTS OF THE RESEARCH CONFIRMED THE IMPORTANCE OF THE SALES CHANNEL AND THE FREQUENCY OF PURCHASE OF THE ORGANIC PRODUCTS. CONSIDERING THE TOWN IN WHICH YOU LIVE, WHERE CAN YOU BUY ORGANIC PRODUCTS? ARE THERE DIFFERENT DISTRIBUTION CHANNELS? DO THEY HAVE DIFFERENT PRICES OR QUALITY? EXPLAIN IN THE BOX.

13. Quality and Safety of Organic Food: Estimation and Perception

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Abstract: A review on definitions and perceptions of key food-related topics, such as food quality, healthy food, organic food as well as on instruments of quality assessment was carried out. A research on papers related to food quality assessment, published in Medline database in the last five years was carried out. The study underscores the multitude of techniques and technologies used for detection and quantification of food nutrients/additives/pesticides/ antibiotics/heavy metals content, and detection of allergens and microorganisms in food. Recent advances in technologies for food assessment development pave the way for easier and larger scale information on food, along the food system. Awareness on healthy food, environmental consciousness, and knowledge on techniques and technologies for food quality assessments are changing perception of food.

Keywords: food quality; product safety; organic food; instruments

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1. Introduction

In 2011, between May and July, an outbreak caused by E. coli (STEC O104:H4 that produce Shiga toxin) occurred in Northern Germany, and Western France (Hauswaldt et al. 2013, EFSA 2012). During this E. coli variant outbreak were reported 4075 cases of bloody diarrhea, and 909 of hemolytic uremic syndrome (FSN 2015; EFSA 2012). Throughout 22 European states, the estimated total loss to agriculture and industry induced by the outbreak was $1.3 billion, and the cost of medical care for affected people exceeded $236 million (FSN 2015). The wrongly accused Spanish cucumber growers were heavily affected. Before the investigation determined that fenugreek sprouts from a German farm were really to blame (FSN 2015), the Spanish farmers lost as much as $200 million a week. This example underscores the complexity of interactions between food systems (food production, food assessment, food transport, food storage, food sales, etc.) and health, agriculture, economy, etc. of one country.

During the Covid-19 pandemic an increase of organic food among urban consumers was reported, not only driven by more frequent environmental consciousness among younger people (Xie et al. 2020) but also by increasing people awareness on healthy food, in the last decades. In Europe, one of the goals of European Commission (European Commission 2020a) is to ensure both animal and plant health as well as high level of food safety. Farm to Fork measures (European Commission 2020c) and adequate monitoring would meet these goals and make the market more effective.

Actions are proposed in the EU for the implementation of integrated Food Safety policy, "*to assure effective control systems and evaluate compliance with EU standards* *in the food safety and quality, animal health, animal welfare, animal nutrition and plant health sectors within the EU and in non-EU countries in relation to their exports to the EU*' (European Commission 2020a).

Directive 2001/95/EC of the European Parliament and of the Council of 3 December 2001, article 2, b) defines a safe product as "*any product which, under normal or reasonably foreseeable conditions of use including duration and, where applicable, putting into service, installation and maintenance requirements, does not present any risk or only the minimum risks compatible with the product's use, considered to be acceptable and consistent with a high level of protection for the safety and health of persons, taking into account the following points in particular:*

(i) *the characteristics of the product, including its composition, packaging, instructions for assembly and, where applicable, for installation and maintenance;*

(ii) the effect on other products, where it is reasonably foreseeable that it will be used with other products;

(iii) the presentation of the product, the labelling, any warnings and instructions for its use and disposal and any other indication or information regarding the product;

(iv) the categories of consumers at risk when using the product, in particular children and the elderly."

Worldwide there is increasing demand for food traceability for ensuring targeted withdrawals of food that would be hazardous for human consumption. Traceability is defined in the Regulation (EC) No 178/2002 of the European Parliament and of the Council of 28 January 2002 as "*the ability to trace and follow a food, feed, food-producing animal or substance intended to be, or expected to be incorporated into a food or feed, through all stages of production, processing and distribution*". Therefore, knowledge on food quality assessment is currently of great importance to ensure food quality and safety.

In this work, information on healthy food, organic food, quality of food, food quality assessment and food perception are presented. Further, this study underscores the multitude of techniques and technologies used for food quality assessment, and their importance for improving food quality perception. In our knowledge this is the first study that summarizes information on different techniques and technologies for detection and quantification of food nutrients/additives/pesticides/antibiotics/heavy metals content, and detection of allergens and microorganisms in food. In this chapter the term instrument is used as defined by Merriam Webster Dictionary – "*a means whereby something is achieved, performed, or furthered*" and the term technique as in Cambridge Dictionary – "*a way of doing an activity that needs skill*". Different definitions of technology are currently published, one of which is used in this chapter – "*something that is itself, always inherently intelligent enough either to perform, or to be imbued with, a function, purpose, or benefit, that only intelligent species, human or otherwise, have the ability to appreciate*" (Carroll 2017).

The chapter present in section I the methodology used for data synthesis. In section II the definition and relevant information on perception of food quality are presented. In section III are presented the definition, different legislative acts for organic food and principles of organic agriculture for better understanding the differences between food products resulted from conventional, organic and sustainable agriculture. Different techniques and technologies for food assessment are presented in section IV, followed by conclusions on the analyzed information.

2. Methodology

A search of academic and grey literature was carried out to summarize the relevant literature on healthy food, organic food, quality of food, food quality assessment, and food perception was conducted. The main search was performed on the Medline database on articles published between November 2015 and November 2020, in the English language. The following keywords were sought: «food quality», «food assessment», «food perception», «organic food», «food safety». To pass an initial selection of papers, title and abstracts needed to include relevant information on food quality assessment. 77 full papers identified as eligible for analysis were read and information on techniques and technologies for food quality assessment was extracted, and later organized considering the following issues: food perception; detection and quantification of food nutrients content; detection and quantification of food additives content; detection and quantification of food pesticides content; detection and quantification of food heavy metals content; detection of microorganism in food. The QSR NVivo software was used to organize and manage qualitative data from the selected papers. For comprehensive descriptions of relevant terms used in this chapter, a search on their definitions on web pages of different institutions (e.g., European Commission, World Health Organization, Food and Agricultural Organization) was carried out.

3. Perception of food quality

A broad definition of quality is provided by Standard ISO 9000:2000 - "*the totality of features and characteristics of a product, process or service that bear on its ability to satisfy stated or implied needs*".

At the 24th Food and Agricultural Organization of the United Nations Regional Conference (FAO 2004) has defined the food quality considering three levels of approach:

a). the absence of defect, fraud and adulteration - public authorities prevent commercialization of low quality, fraud and adulteration;

b). expected properties such as organoleptic and nutritional characteristics or resulting benefits - the legitimate expectations of users on food quality are taken into account, and the State assumes the role of defending the interest of its citizens by implementing regulations concerning food safety and other normative related to nutritional balance or food services;

c). characteristics that indicate added value - forms of production (e.g., organic farming, protection of environment, animal welfare), production areas (e.g., from mountain region), authenticity, their associated traditions, contents related nutrition, safety, shall be explicitly communicated to the people in order to generate expected added value, and for understanding when and what interventions are necessary and what are the responsibilities of each stakeholders.

Public authorities, operators and consumers are acting in the three levels of approach described in the text above. The attributes of food that people associated with food quality (European Commission 2020b) are depicted in the Figure 13.1.

Figure 13.1. Attributes of food.

Source: European Commission 2020b

Food quality concept is complex and multi-dimensional and is influenced by a wide range of situational (e.g., aesthetical, functional, sensorial, nutritional characteristics) and contextual factors (e.g., convenience; ethical issues) (European Commission 2020b).

Important drivers for products quality and sales differentiation are the provision of seals related to quality and "*specific quality*" of food (FAO 2004). Therefore, researchers are currently investigating the factors related to perception of food quality, mainly for better understanding of consumers' decision-making. Following are presented several studies related to perception of different attributes of food, considering the three levels of food quality definition (FAO 2004).

3.1. The absence of defect, fraud and adulteration

The people perception of food materiality - taste, forms, colours, texture, might be understand by investigating people perception of food (i.e., taste, pleasure), which can influence their attitudes and behaviour towards food (Turner 2014). Food, particularly his gustatory taste, is animated by "*agency*" - defined by Jane Bennett as "*the curious ability of inanimate things to animate, to act, to produce effects dramatic and subtle*". According to Turner (Turner 2014) taste of food could be seen as a "*social/cultural phenomenon shaped by the ideas related to the environmental, economic and health concerns*". The consumers, when discussing about food, their statements are on variety, freshness, taste of food, and nostalgia for the "*way food used to be*" (Turner 2014). Moreover, distinct food preferences were identified on different generation (Conley et al. 2018). Millennial consumers actively and meaningfully add new values to traditional food, and they are attracted by new ways of experiencing food than older generation (Conley et al. 2018).

Awareness on foodborne disease is increasing. Foodborne diseases are currently considered an important food safety issue, having related to social anxiety, economic loss, clinical and health costs (Cho et al. 2020). From production to shopping and to consumption, consumers' food and meal preparation behaviours have been associated with various human health issues, including foodborne diseases (Cho et al. 2020). An increasing threat to human health and food security are the agrochemicals (pesticides and fertilizers), chemicals that are used to boost agricultural production. Many agrochemicals users did not receive comprehensive information for correct application of toxic chemicals, and the risks and precautions they should be aware. Sometimes after a single or short-term exposure, certain pesticides are so toxic that they can kill or seriously injure a person. It is estimated that every year, some pesticides cause 25 million severe farmer poisonings, resulting in 220 000 deaths, mainly in developing countries (Public Eye 2020). Guidelines for differentiation of hazardous forms of selected pesticides considering their acute risk for health (probability to affect health by single or multiple exposures of a pesticide in a given interval of time, generally a short period of time) was realized by WHO team (WHO 2020a). The guidelines describe methods for the classification of formulations based on the toxicity of the technical active substance (WHO 2020a).

Different methods and instruments are currently used to investigate adulteration or contaminants in food. However, the presence of contaminants (pesticides, heavy metals, pathogen, etc.) in food are sometimes difficult to assess, as contaminant exposure vary on space and time, and can be influenced by natural and anthropogenic factors that are changing the environment and integrity of locally harvested food sources (Ratelle et al. 2018). Moreover, as the research in the framework of the COMPARE project (funded by European) have shown, even skilled person required more knowledge and awareness for correctly categorization of dangerous species and contaminants (Höper et al. 2020).

3.2. Expected properties such as organoleptic and nutritional characteristics or resulting benefits

Currently, people procure food to be healthy, to have nutritional contents and medicinal properties, to be delicious, or for increasing their functionality and longevity. However, these terms are differently defined by consumers or scientists (Hawkes 2009; Lobstein & Davies, 2009; Plasek et al. 2020). The words "*healthy*" and "*nutritious*" are sometimes treated as synonyms (Dickson-Spillmann & Siegrist, 2011; Rodman et al. 2014). Moreover, what can be considered healthy differs on individual features (e.g., age, gender, metabolism, diseases or sensitivities). One diet that benefits some people in the treatment of one disease, can be harmful for other people suffering from other disease (Plasek et al., 2020). At least in Europe, unhealthy diets are characterized by "*energy imbalance and excessive intake of saturated fats, trans fats, sugar and salt, largely due to increased consumption of highly processed, energy-dense manufactured foods and sugar-sweetened beverages and inadequate consumption of vegetables, fruits and whole grains*" (WHO 2018). Furthermore, the perceived healthiness that is defined as "*a consumer's expectation of a product's influence on his or her state of health*" (Mai & Hoffman 2015) can influence the food procurements - the likelihood of a product to be purchased is related to the level of its perceived healthiness (Steinhauser et al. 2019; Plasek et al. 2020).

People are increasingly interested on green and healthy products. During new coronavirus crisis, people have been procuring organic food, because they perceive it as being safer (i.e., organic food is perceived as having lower microbiological risks and less chemical contaminants) (Xie et al. 2020). Anxiety related to their health was a potential factor, as studies have shown that food safety crises can change attitudes towards food (e.g., make organic food more popular), and increase consumption of food perceived as more natural (Murdoch et al. 2020). However, people are purchasing organic food because they perceive it as having health benefits, higher quality and nutritional value than conventional food, as this food are perceived being tastier and as being produced without pesticides, synthetic fertilizers or using genetically modified organism (Plasek et al. 2020). In addition, environmentally conscious consumers also believe that nutritious, fresher, and safer organic food (comparing with conventional food) is contributing more to their health and to the sustainability of environment (Mai & Hoffman 2015; Plasek et al. 2020). Environmental consciousness refers to "*psychological factors that determine consumers propensity towards pro-environmental behaviors*" (Mishal et al. 2017). Considering the cultural and social influence on food quality perception, the quality of fresh horticultural crops was defined as "*a dynamic composite of their physicochemical properties and evolving consumer perception, which embraces organoleptic, nutritional and bioactive components*" (Kyriacou & Rouphael 2018). Cultural, socioeconomic and marketing factors create a great variety of people expectations about food quality, in addition to variety of perception related to qualitative characteristics of crops that are determined by the genetic, agriculture techniques and technologies, environmental factors.

3.3. Desirable characteristics likely to justify added value

Food choice is dynamic and complex process which is the combination of the sensory and cognitive analysis of food materiality, the cultural, socio-affective factors and the information available about the food (Chen & Antonelli 2020). Nowadays, people can obtain various information on products both as a result of the progress in food labelling regulation as well as the development of digital technology. Therefore, it is not surprising that the increasing number of environmentally conscious people link food quality and safety with ethical and environmental issues of products (Huang et al. 2020; Wang et al. 2020a). Environmentally conscious consumers are supposing that by purchasing green products would reduce their ecological footprint (Wang et al. 2020a). As a result of environmental consciousness, the numbers of direct marketing networks (e.g., alternative food networks - community supported agriculture, organic farmer's markets, buyers' clubs etc.) are worldwide developing (Si et al. 2015; Wang et al. 2020a). Alternative food networks distinguish themselves in their practices involving the production and commercialization of food, from the processes used on big agri-business (Harris 2010; Whatmore et al. 2003).

The purchase behavior is also influenced by characteristics of food storage and product price as well as corporate social responsibility beliefs (Hwang & Chung 2019). From the buyer perspective the seller shall provide good quality and safe food, which are resulted from ethical and sustainable way of production. The seller expects the consumers to accept products at higher prices, food at a non-standard appearance and to have more flexibility and patience regarding the quantity and the diversity of the produce on sale (Lee 2000). Studies have categorized the consumers of organic food as: i) price-sensitive - when price have a positive direct relationship with consumers' intention to purchase that food (when the price of organic food is high, the consumers may choose conventional food instead of organic food); and price-insensitive - the consumers do not care much about the price and evaluate the food in terms of non-price factors, such as freshness, nutritional content, safety, or a taste of food (Wang et al. 2020a).

4. Organic Food in Europe

Organic food in Europe is considered the food obtained by organic farming and production that comply with Council Regulation (EC) 834/2007, the General Food Law (Regulation 178/2002), and the Official Controls Regulation 882/2004, which has been amended by Regulation (EC) 2017/625 (ECA 2020). U.S. Department of Agriculture (USDA) defined organic food as "*products that have been produced using cultural, biological, and mechanical practices that support the cycling of on-farm resources, promote ecological balance, and conserve biodiversity*" (USDA 2017). The European and the USDA consider a soil quality, the way of animal raising, pest and weed control on standards for production, handling and labelling of organic food. Synthetic fertilizers and genetic engineering may not be used (NOP 2020).

The first regulation on organic production and labelling was introduced in Europe in 2007. The EU Council agreed on Council Regulation 834/2007 that establishes the principles, aims and rules of organic production and labelling. Since then more legislative acts were introduced in Europe related to organic food:

- EU regulation 710/2009 on organic aquaculture animal and seaweed;
- EU regulation 203/2012 on rules for organic wine;
- Regulation (EU) 2018/848 on organic production and labelling of organic products;
- EU implementing regulation 2020/464 on rules for the production of organic products and for the periods for conversion to organic;
- EU implementing regulation 2020/479 on the rules concerning import of organic products from third countries;
- EU regulation 1235/2008 and EU implementing regulation 2020/25 on rules concerning import of organic products from third countries.

According with article 4 of Council Regulation (EC) 834/2007, organic production shall be based on the following principles:

"*(a) the appropriate design and management of biological processes based on ecological systems using natural resources which are internal to the system by methods that:*

(i) use living organisms and mechanical production methods;

(ii) practice land-related crop cultivation and livestock production or practice aquaculture which complies with the principle of sustainable exploitation of fisheries;

(iii) exclude the use of GMOs and products produced from or by GMOs with the exception of veterinary medicinal products;

(iv) are based on risk assessment, and the use of precautionary and preventive measures, when appropriate;

(b) the restriction of the use of external inputs. Where external inputs are required or the appropriate management practices and methods referred to in paragraph (a) do not exist, these shall be limited to:

(i) inputs from organic production;

(ii) natural or naturally-derived substances;

(iii) low solubility mineral fertilisers;

(c) the strict limitation of the use of chemically synthesised inputs to exceptional cases these being:

(i) where the appropriate management practices do not exist; and

(ii) the external inputs referred to in paragraph (b) are not available on the market; or

(iii) where the use of external inputs referred to in paragraph (b) contributes to unacceptable environmental impacts;

(d) the adaptation, where necessary, and within the framework of this Regulation, of the rules of organic production taking account of sanitary status, regional differences in climate and local conditions, stages of development and specific husbandry practices"

Codex Alimentarius defines organic agriculture as "*a holistic production management system which promotes and enhances ecosystem health, including biological cycles and soil biological activity. Organic agriculture is based on minimizing the use of external inputs, avoiding the use of synthetic fertilizers and pesticides. Organic agriculture practices cannot ensure that products are completely free of residues, due to general environmental pollution. However, methods are used to minimize pollution of air, soil and water. Organic food handlers, processors and retailers adhere to standards to maintain the integrity of organic agriculture products. The primary goal of organic* *agriculture is to optimize the health and productivity of interdependent communities of soil life, plants, animals and people.*"(Codex Alimentarius 2001). Based on this definition Food and Agriculture Organization of the United Nations defined organic agriculture as "*a holistic production management system which promotes and enhances agro-ecosystem health, including biodiversity, biological cycles, and soil biological activity. It emphasizes the use of management practices in preference to the use of off-farm inputs, taking into account that regional conditions require locally adapted systems. This is accomplished by using, where possible, agronomic, biological, and mechanical methods, as opposed to using synthetic materials, to fulfil any specific function within the system.*" (FAO 2020a). International Federation of Organic Agriculture Movements (IFOAM) defined organic agriculture as a "*production system that sustains the health of soils, ecosystems, and people. It relies on ecological processes, biodiversity and cycles adapted to local conditions, rather that the use of inputs with adverse effects. Organic agriculture combines tradition, innovation, and science to benefit the shared environment and promote fair relationships and good quality of life for all involved*" (IFOAM-Organics International 2005).

By considering the principles of organic production several differences could be underscored between organic agriculture, ecological agriculture, sustainable agriculture and conventional agriculture. In ecological agriculture the focus is on ecosystem conservation, and implement strategies that consider pest ecology, plant ecology or soil ecology. For instance, ecological agriculture contributed to increase fertility and productivity of soils by considering the importance of soils biota (FAO 2002). Ecological farming is about nature's diversity – take advantage of what nature offers as natural enemies of pests, wild and crop seed diversity, soil regeneration, etc. (Greenpeace 2015). Combining these strategies with other management elements into a single approach is proper to organic agriculture. Therefore, organic food management focuses on agro-ecosystem's stability, element cycling, and food networks (FAO 2002).

According to FAO (United Nations Food and Agriculture Organization) and also the NCR (National Research Council) sustainable agriculture aims to achieve a food production system where the efficiency of the use of natural resources and the productivity of agricultural systems are maximum, in this way allowing producers to respond to the augmented food demand produced by population growth and by economic development (FAO 2020b). Sustainable agriculture shows us the need to conserve soil, water, and all other resources in order not to degrade the environment and to be economically acceptable and viable. According to FAO "*to be sustainable, agriculture must meet the needs of present and future generations for its products and services, while ensuring profitability, environmental health and social and economic equity*" (FAO 2020b). Sustainable agriculture is more focused on techniques and technologies of food production that seek maximum economic efficiency, with the least impact on the environment, without jeopardizing future generations to meet their needs. Considering the three components of sustainable development - economic sustainability, environmental and social sustainability (Purvis et al. 2018) the ecological and organic agriculture addresses the environmental, ecological aspects of sustainability. However, in sustainable agriculture, techniques and technologies from ecological agriculture, organic agriculture or conventional agriculture would be used to increase the efficiency and safety of resource use and systems resilience (e.g., renewable energy; technologies and techniques based on low energy consumption; waste sorting; wastewater treatment; the use of pro-ecological solutions and technologies enabling the consumption of specific raw materials in the circular formula economy). By helping farmers improve their techniques and quality of life, sustainable agriculture contributes to social and economic component of sustainable development.

5. Instruments for food quality assessment

In the following section, instruments that are currently used to assess different aspects related to food quality are presented. Instruments for detection and quantification of food nutrients/additives/pesticides/antibiotics/heavy metal content, detection of allergens and microorganisms in food are considered in this presentation. A short presentation of studies on biosensors for food assessment is also included in this section, underscoring the advantage of these to obtain easier and larger scale information on food all along the food system.

5.1. Instruments for detection and quantification of food nutrients content

Different instruments are used for determination of food contents. Nutrients determination are recently important for production and selling healthier food and for increasing food value.

Amino acid ingredients (i.e., L-lysine, L-aspartic acid, L-threonine, L-serine, L-glutamic acid, etc., from *Camellia nitidissima Chi*) were detected using MALDI-TOF MS (Cheng et al. 2017a) or by GC-MS combined with SBSE/GC-MS technology with linear graphene nanocomposite coating (Cheng et al. 2017b). *Camellia nitidissima* Chi, that is known as the "*Giant Panda of Botany*" (Cheng et al. 2017a) is rich in amino acids, vitamin C, gross sugar and protein, etc. The contents of some essential amino acids (for example, leucine, isoleucine, threonine, valine) in cultivated *Camellia nitidissima* Chi, were higher than those in the FAO/WHO reference contents (Xiong et al. 2012).

HPLC, UV, and NIR have been used for simultaneously detection and quantification of multiple flavonoid compounds. Flavonoids that are widely present in different plants have a variety of activities beneficial for human health, such as anti-free radicals, hormone levels control, or antibacterial action.

Verification of adulteration, fraudulent activities related to nutrients in different categories of food (e.g., in meat) is currently realized by techniques of metabolomics and proteomics (Scalbert et al. 2009; Liu et al. 2013; Trivedi et al. 2016), lipidomics (Namasivayam et al. 2015), PCR (Yin et al. 2016), ELISA (Kotoura et al. 2012), electronic nose (Wang et al. 2019b). Many powerful analytical techniques have been applied to the field of metabolomics, such as GC-MS (Cui et al. 2015), LC-MS (Dannenberger et al. 2017), QTOF (Fardet et al. 2008), NMR spectroscopy (Xiao et al. 2019). Technology for semi-quantitative detection of solid samples without any need for sample preparation in a liquid solution, has recently been developed by enabling direct ionization from the samples, based on REIMS (Balog et al. 2016; Strittmatter et al. 2014). Untargeted metabolomics approach based on UHPLC-QTOF and REIMS was recently proposed to discriminate at molecular level the lamb and mutton meat (Wang et al. 2020b).

Evaluation of total polyphenolic compounds (PPhC) and ascorbic acid (vitamin C) content in fruits, vegetables, fruit drinks, etc. is made by several methods. Fluorospectroscopy (Wu 2003) titrimetry (Suntornsuk et al. 2002), HPLC (Bassi et al. 2017; Islam et al. 2016; Chen et al. 2016; Zapata & Dufour 1992), Raman spectroscopy (Mazurek et al. 2018; Khodabakhshian 2019), FTIR (Li et al. 2015a) technologies are used for the qualitative and quantitative evaluation of these compounds. The HPLC method is extensively used in the food industry due to its capacity to measure with high accuracy both the ascorbic acid and his oxidized form – the DHA. The antioxidant capacity of PPhC and ascorbic acid is tested by spectrophotometric assays such as ferric reducing antioxidant power (FRAP) (Apak et al. 2004), cupric reducing antioxidant power (CUPRAC) (Benzie & Strain 1996), total radical-trapping antioxidant parameter (TRAP) (Miller et al. 1993), 2,2-diphe- nyl-1-picrylhydrazyl (DPPH) (Brand-Williams et al. 1995), 2,2′-azinobis-(3-ethylbenz- thiazoline-6-sulfonate) (ABTS) (Re et al. 1999), Folin-Ciocalteu (Singleton & Rossi 1965), and Kampfenkel (Kampfenkel et al. 1995).

5.2. Instruments for detection and quantification of food additives content

Food additives are substances that may be used for preservation, colouring, sweeting, antioxidants, etc. They are defined by European legislation as "*any substance not normally consumed as a food in itself and not normally used as a characteristic ingredient of food, whether or not it has nutritive value*" (European Commission 2020c). For instance, Allura Red (E 129 is usually added to syrups, candies, etc. to give a red color to food. However, food additives have become nowadays an increasingly health concern. Some food additive, especially if they are excessively consumed can lead to severe health issues (e.g., cancer) (Tanaka 2006; Dinç et al. 2002). Therefore, the use of food additives is rigorously controlled by legislation in many countries. Several technologies are used to assess the presence of additives in food including spectrophotometry (Dinç et al. 2002; Soylak et al. 2011), HPLC (Minioti et al. 2007; Li et al. 2015b; Yoshioka & Ichihashi 2008), cloud point extraction (El-Shahawi et al. 2013; Pourreza et al. 2011), capillary electrophoresis (Huang et al. 2002), electrochemical sensors (Wu et al. 2019a; Li et al. 2020).

5.3. Instruments for detection and quantification of food pesticides content

"*Pesticides are chemical compounds that are used to kill pests, including insects, rodents, fungi and unwanted plants (weeds). Over 1000 different pesticides are used around the world. Pesticides are used in public health to kill vectors of disease, such as mosquitoes, and in agriculture to kill pests that damage crops.*" (WHO 2020c). Pesticides can be classified as insecticides, acaricides, fungicides, bactericides, herbicides, repellents, and considering their chemical composition into organochlorines, organophosphates, carbamates, pyrethroid, dinitrocompounds, neonicotinoids or triazines, among others (Hassaan & El Nemr 2020; WHO 2015). Pesticides that are widely used to control pests in agriculture, affect not only their target organisms (e.g., insects, fungi) but also on other organism - earthworms, plants, birds, fish and human beings (Iyaniwura 1991). Many studies have demonstrated that pesticides cause unwanted effects to the environment and pose health risks to human beings (Ullah et al. 2018; Aktar et al. 2009). Their impact on health ranges from short-term (e.g., skin irritation, headaches, nausea) to chronic impacts (e.g., asthma, diabetes, cancer) (Kim et al. 2017), and some compounds have a high toxicity being classified as carcinogenic, neurotoxic or teratogenic. Therefore, evaluation of their presence in food and drinking water is of great importance for population health.

There is a great variety of methods for the determination of pesticides such as GC, (Torres et al. 1997), GC-MS (Yang et al. 2018), HPLC (Ito et al. 1998), ELISA and HPLC (Bushway et al. 1995), LC-TOFMS (Gilbert-López et al. 2010), UHPLC-QTOF-MS (Hernández et al. 2009), HRGC-HRMS (Santelli et al. 2006), capillary electrophoresis (Picó et al. 2003), ELISA (Moreno et al. 2014).

5.4. Instruments for detection and quantification of food heavy metals content

Heavy metal pollution is a widespread environmental problem. Heavy metal ions can be accumulated in different organisms that could be eat by humans (Gan et al. 2018). Heavy metal pollution is currently associated with mining, metal melting operations, thermal power stations, the use of metal compounds in agricultural activities (He et al. 2005; Shallari 1998). Certain levels of heavy metals such as Zn (II), Cu(II), Cd(II), Pb(II), Hg(II), in human body would have toxic effect on cells that lead to many severe diseases. Cd and Pb accumulation in body tissues can be one of the causes of different type of cancers (Barton et al. 2016), and these elements can seriously damage the brain and kidneys (Dong et al. 2015). The high level of Hg causes acrodynia, Hunter-Russell syndrome, and Minamata disease (Zhang et al. 2018). Zn is essential for many body functions, but excess Zn arouses anosmia, and affect the liver or kidney (Wang et al. 2017). Excess Cu can initiate Wilson's disease, and damage DNA, and great concentration in the blood may lead to death (Xiong et al. 2016). More importantly, the simultaneous presence of excess concentration in body tissues of Cd (II), Pb (II), Hg (II), Zn (II), and Cu (II) can increase the complexity of the mechanisms through which these heavy metals induce toxicological effects in humans (Gao et al. 2018).

Traditional analytical techniques for heavy metal analysis are: ET-AAS (Alvarez & Carrillo 2012; Afshar et al. 2017), GF-AAS (Paixao et al. 2019; Dos Santos et al. 2018), AAS (Chahid et al. 2014), AFS (Zou et al. 2018), ions via fabric phase sorptive extraction in combination with HPLC-UV detection (Kaur et al. 2016), colorimetric analysis (Azmi & Low 2017), X-ray absorption spectroscopy (Sitko et al. 2015), ICP-MS (Balcaen et al. 2015; Nawab et al. 2018; Wang et al. 2019a; Li et al. 2019), inductively coupled plasma atomic emission spectrometry (Song et al. 2017).

5.5. Instruments for detection and quantification of food antibiotics content

Antibiotics, sometimes called antibacterials or antimicrobials, are medicines used to prevent and treat bacterial infections (WHO 2020d). Antimicrobials (antibiotics, antivirals, antifungals and antiprotozoa) are essential for curing diseases in humans, animals and plants (WHO 2020d). Since first use for public health in 1940s, antibiotics have saved many lives. However, misuse of antibiotics leads to antibiotic-resistant bacteria that already is considered currently one of the biggest threats to global health, food security, and societal development (WHO 2014; WHO 2020b). Infection with bacteria that are antibiotic-resistant in humans and animals, are increasingly common, and are harder to treat than those caused by bacteria which are non-resistant at antibiotics (WHO 2020b). As estimated by Centers for Disease Control (CDC) each year in the US, 35,000 people die as a result of antibiotic resistant infections, and 2.8 million people acquire antibiotic-resistant bacterial infections (CDC 2019). While once antibiotic resistant bacteria were associated with hospitals and other health-care facilities, currently many factors are known to be involved in promoting antibiotic resistance (Landers et al. 2012). There's also evidence of the natural process of producing antibiotic-resistant bacteria, usually through genetic changes, which is highly accelerated by "*misuse and overuse of antimicrobials; lack of access to clean water, sanitation and hygiene for both humans and animals; poor infection and disease prevention and control in health-care facilities and farms; poor access to quality, affordable medicines, vaccines and diagnostics; lack of awareness and knowledge; and lack of enforcement of legislation*" (WHO 2020b). For instance, the conditions from intensively managed livestock with high population density, which facilitate the rapid dissemination of pathogens, are conducive to high use of antibiotic therapy (Landers et al. 2012). While in many countries were implemented different protocols to control antibiotic misuse in medicine, the antibiotic abuse in agriculture is less controlled. According to the FDA, in 2014, about 80 percent of all antibiotics were sold for use on livestock farms (FDA 2016). The industrial farms have using the antibiotics not only for treatment of animal's diseases, but also for livestock, poultry or fish to grow faster (The

World Counts 2021). The human health is affected from inappropriate antibiotic use in food made of animals, both by the antibiotic presence in meat but also the pathogenic-resistant organisms, which propagated in these livestock and enter the food supply. Moreover, antibiotics from animal's manure enter the environment, contaminating surface and groundwater (Food Print 2021). There is evidence dangerous concentration of antibiotics in water and food as well as on transformation patterns of antibiotics in nature (Dong et al. 2020). Although the concentration of antibiotics in wastewater ranges from a few ng to tens of thousands of μg, and they have short half-lives, the long-term use of antibiotics produces chronic organic pollution (Dong et al. 2020). Commensal bacteria found in livestock are frequently present in fresh meat products (Landers et al. 2012). Disease produced by bacteria resistant to antibiotics are associated with prolonged hospitalization, higher medical costs, and increased mortality (WHO 2020b).

Quantification of the antibiotics is currently done by combining solid-phase extraction with liquid chromatography, colorimetry, spectrophotometry, polarography, HPLC, and reductive flow-injection amperometry (Dong et al. 2020, Hwa & Sharma, 2020).

5.6. Instruments for detection of microorganisms in food

From ancient to modern time people have described the food borne pathogens as a main cause of food safety problems. More than 250 diseases, most of them are infections, caused by a variety of bacteria, viruses or parasites are currently known to be transmitted by food products and their raw materials (CDC 2020). In Table 13.1 are presented common food borne pathogens, the diseases that they produce, and the food sources.

Table 13.1. Common food borne pathogens

Pathogens	Diseases	Food Source
Listeria monocytogenes	Listeriosis	Frozen food, cheese, milk, meat products, ice, vegetable salad, ready-to-eat food, commercial cold food dishes
Staphylococcus aureus	Suppurative infection, pneumonia, pseudomembranous colitis, pericarditis, sepsis, septicemia	Milk, meat, eggs, fish and their products, commercial cold food dishes
Salmonella enterica	Typhoid fever, paratyphoid fever, gastroenteritis, and septicemia	Egg, raw milk and their products, commercial cold food dishes, raw poultry and meat
Escherichia coli O157:H7	Acute gastroenteritis and acute dysentery	Meat, fruits, vegetables, commercial cold food dishes, ready-to-eat food, drinking untreated water
Shigella spp	Bacterial dysentery	Cooked food and raw material
Yersinia enterocolitica	Yersiniosis, diarrhea	Raw or undercooked pork, fresh-cut vegetable
Cronobacter spp	Necrotizing colitis, neonatal meningitis, and bacteremia	Powdered infant formula and milk powder
Vibrio parahemolyticus	Food poisoning, and acute diarrhea	Seafood such as fish, shrimp, crab, shellfish, and seaweed
Proteus mirabilis	Food poisoning, and acute diarrhea	Food of animal origin, bean products
Clostridium botulinum	Muscle relaxation paralysis, and respiratory paralysis	Canned products, cured meat
Bacillus cereus	Food poisoning	Leftovers of different meals, commercial cold food dishes
Campylobacter jejuni	Diarrhea, dysentery	Raw undercooked poultry and by-products or eating something that touched it, seafood, meat, drinking untreated water

Source: adapted from Wu et al. 2019b

Various methods for detection of foodborne pathogens that are currently in use are based on microbiological culture and colony counting (MILNE Library 2020), immunological methods (e.g. ELISA, IMS), GICT (Poli et al. 2002; Chunglok et al. 2011; Zhu et al. 2011; Chen et al. 2015; Jin et al. 2012), nucleic acid-based amplification assays (e.g., PCR) (Mullis et al. 1994; Wei et al. 2018), loop-mediated isothermal amplification (Notomi et al. 2000), rolling circle amplification (Schweitzer et al. 2002). Metagenomics-based HTS is becoming to be used for outbreak investigations of non-culturable, difficult-to-culture or slow-growing microorganisms (Koutsoumanis et al. 2019).

5.7. Instruments for detection of allergens in food

European Food and Safety Authority defined the term allergen as "*the proteins or peptides responsible for the allergenicity of allergenic foods/ingredients*" (EFSA 2014a) being also aware that in some allergenicity of foods, could be involved also different carbohydrates. The term allergenicity is frequently defined as "*the ability to induce allergy and/or trigger an allergic reaction*" and not refer to the ability to induce sensitization (EFSA 2014a). Cereals containing gluten, dairy products, eggs, nuts, soy, fish, crustaceans, celery, lupin, sesame, mustard etc. are the categories of food responsible for allergic reactions in sensitized subjects (EFSA 2014a). About 75% of allergic reactions among children are caused by egg, peanut, cows' milk, fish and nuts (EFSA 2014b). More than half of allergic reactions among adults are related to several fruits (e.g. apples, cherries, raspberries, strawberries), to vegetables of the Apiaceae family (which includes celery, carrots and aromatic herbs) and various nuts and peanuts

(EFSA 2014b). Food processing may decrease, remain unchanged, or even increase the allergenic activity of a food (EFSA 2014a).

According to EFSA's Panel on Dietetic Products, Nutrition and Allergies (NDA) the prevalence of food allergies is difficult to establish, due to lack of date for some geographical areas and the heterogeneity of methodologies to gather prevalence data (EFSA 2014a). The high uncertainty of the influence of the type of process and its conditions, on the food or ingredients that could be transformed in allergens, is related to the multiplicity of the allergenic proteins contained in a whole food, and the different impact on the proteins produced by the same treatment (EFSA 2014a).

Methods for detection of known allergens and for the identification of new immunoreactive proteins are: chromatography (mainly LC) for the preliminary separation of proteins (Papageorgiou et al. 2018; Köse et al. 2011), dipstick tests (Samsonova et al. 2018) and lateral flow devices (Chen et al. 2019), ELISA (Zeng et al. 2019; Orcajo et al. 2019), LC-MS (Croote & Quake 2016) in combination with techniques such as SDS-PAGE, PCR, proteomics, gene cloning (EFSA 2014a), DNA-based LAMP (Allgöwer et al. 2020). Allergen databases can be used for their subsequent identification (Radauer & Breiteneder 2019; Allergen Bureau 2017).

5.8. Biosensors for food quality assessment

Traditional laboratory-based assay for food quality assessment generally requires samples to be transported to centralized diagnostic laboratories for testing, long and complex sample pretreatment techniques, a large number of chemical reagents (i.e., sometimes toxic solvents), specialized laboratory materials and equipment, expensive detection instruments, experienced and highly trained personnel. In the last years progress in the development of biosensors have shown a possibility for new way on testing food quality. The progress in nanotechnologies (i.e., nanomaterials - carbon nanotubes, graphene, carbon/graphene quantum dots, metal nanoparticles, dendrimers, metal-organic framework; micro/nanofluidics; signal amplification techniques) largely contributes to miniaturization, portability, increased sensitivity, specificity, good stability, rapid response, easy operation, and low cost of biosensors.

A biosensor is defined by International Union of Pure and Applied Chemistry (IUPAC), as "*a self-contained integrated device, which is capable of providing specific quantitative or semi-quantitative analytical information using a biological recognition element (biochemical receptor or bioreceptor), which is in direct spatial contact with a transducer. The transducer is used to convert (bio)chemical signals resulting from the interaction of the analyte with the bioreceptor into an electronic one. The intensity of signal is proportional to analyte concentration*" (Thevenot et al. 1999). Biosensors can be based on: optical transducer (based on fluorescence, absorbance, reflectance, colorimetry, chemiluminescence, surface plasmon resonance, surface-enhanced Raman scattering, resonance Rayleigh scattering spectra); electrochemical transducer, piezoelectric, mass sensitive transducer; thermal transducer. In electrochemical biosensors, the signal that is used for detection and measurements can be provided by different techniques: voltammetry, amperometry, conductometry, potentiometry, electrochemical impedance spectroscopy (Kovacs et al. 2020). Biosensors were developed using as bioreceptors different biomolecules (i.e., antibody; enzyme; cells; oligonucleotide sequence - DNA, phage, etc.) or biomimetic molecules (molecular imprinted polymer - aptamer; nanozyme; etc.). For instance, a novel nanocomposite - graphene/In2 O3 (GR/In2 O3) nanotubes obtained by one-pot solvothermal treatment, together with reduction and annealing treatments was used for a selective electrochemical sensor for L-lysine detection in *Camellia nitidissima Chi*, having good chiral recognition (Cheng et al. 2020). Different reviews on biosensors were recently published (Hu & Zhan 2020; Sanati et al. 2019; Phopin & Tantimongcolwat 2020; Chalklen et al. 2020; Sfragano et al. 2020; Campuzano et al. 2020; Mungroo N.A. & Neethirajan S. 2014). For instance, a review on electrochemical sensors for detecting flavonoids in food are presenting different biosensors based on carbon nanomaterials, including carbon nanotubes, graphene, carbon and graphene quantum dots, mesoporous carbon, and carbon black (Hu & Zhan 2020). Research are ongoing to improve sensitivity and detection speed of electrochemical sensors.

6. Conclusion

The main goal of this chapter was to comprehensively present the meaning of food quality, organic food, sustainable agriculture, the instruments for detection and quantification of food nutrients/additives/pesticides/antibiotics/heavy metals content, and detection of allergens and microorganisms in food. It is a review of definitions of food quality, food safety, healthy food, organic food as well as techniques and technologies for food assessment. In our knowledge no other study summarizes currently used technologies or techniques for food nutrients/additives/pesticides/antibiotics/heavy metals content, and detection of allergens and microorganisms in food. The study was not a systematic review of published academic studies from all relevant academic database. However, the overview of the identified technologies and techniques as well as definitions of different terms related to food safety may be an important learning tool for understanding the complexity of food quality and safety issues.

Food assessment has a great importance for survival and for good health. For millions of years, the knowledge that helped to distinguish the foods that favored survival from those that were harmful or poisonous, has been incorporated and passed down from generation to generation. Nowadays, people often evaluate food considering the colors, taste, nutrients, freshness, and price. However, in different sectors of economy, a multitude of instruments and techniques are currently used for detection and quantification of food nutrients/additives/ pesticides/antibiotics/heavy metals content, detection of allergens and microorganisms in food. Biosensors for food assessment would contribute to easily obtain in real/time and in larger scale data on food, along the food system.

Given that organic agriculture promotes and enhances agro-ecosystem health, including biodiversity, people often hold positive attitudes and behaviors toward products obtained from this type of agriculture. Organic food is perceived as more environmentally friendly than conventional, and food produced and distributed in alternative food networks are progressively became the key for sustainable development. Environmental consciousness and knowledge on techniques and technologies for food quality assessments are changing perception of food.

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Appendix A13 – Definition of Key Terms

Organic food – "products that have been produced using cultural, biological, and mechanical practices that support the cycling of on-farm resources, promote ecological balance, and conserve biodiversity" (USDA, 2017).

Product quality – "the totality of features and characteristics of a product, process or service that bear on its ability to satisfy stated or implied needs" (Standard ISO 9000:2000).

Safe product – "any product which, under normal or reasonably foreseeable conditions of use including duration and, where applicable, putting into service, installation and maintenance requirements, does not present any risk or only the minimum risks compatible with the product's use, considered to be acceptable and consistent with a high level of protection for the safety and health of persons" (Directive 2001/95/EC of the European Parliament).

Instrument – "a means whereby something is achieved, performed, or furthered" (Merriam Webster Dictionary).

Ch.13

QUALITY AND SAFETY OF ORGANIC FOOD: ESTIMATION AND PERCEPTION

Instruments for food quality assessment

OBJECTIVES: After analysis of the chapter, the readers shall be able to give example of instruments for detection and quantification of food nutrients/additives/pesticides/ antibiotics/heavy metals content, and detection of allergens and microorganisms in food.

SKILLS: The students shall be able to use EU legislation and scientific database to recommend instruments for food traceability.

QUESTION 1 (PLEASE CHECK THE CORRECT ANSWER)

Atomic fluorescence spectrometry is used to assess:

- ☐ flavonoids
- ☐ pesticides
- ☐ heavy metals
- ☐ microorganisms

QUESTION 2 (PLEASE CHECK THE CORRECT ANSWER)

As a result of the progress in technology, the biosensors for food quality assessment have different features. Choose the incorrect feature:

- ☐ increased sensitivity
- ☐ low cost
- ☐ small dimension
- ☐ low response

QUESTION 3 (PLEASE CHECK THE CORRECT ANSWER)

Considering the definition of European Council (EC) Regulation 834/2007 on organic agriculture indicates what is NOT characteristic for this type of agriculture:

- ☐ use of mechanical production methods
- ☐ no use of GMO and products produced from or by GMO
- ☐ products completely free of contaminants

- ☐ minimal pollution of soil.

QUESTION 4 (PLEASE CHECK THE CORRECT ANSWER)

Food traceability refer to:

- ☐ food labelling;
- ☐ the ability to assess a food through all stages of production;
- ☐ the ability to trace and follow a food through all stages of production, processing and distribution;
- ☐ the ability to monitor distribution of food.

QUESTION 5 (PLEASE CHECK THE INCORRECT ANSWER)

The analytical signal in an electrochemical biosensor can be provided by:

- ☐ voltammetry
- ☐ electrochemical impedance
- ☐ amperometry
- ☐ resonance Rayleigh scattering spectra.

QUESTION 6 (PLEASE WRITE THE CORRECT ANSWER WITHIN THE BOX)

List at least 3 applications of high-performance liquid cromatography (HPLC) for food quality assessment.

PRACTICAL APPLICATION: THE MANAGER OF A FOOD STORE WANT TO CHECK THE QUALITY OF THE ORGANIC FOOD RECEIVED FROM ONE BIG PRODUCER. HE WANT TO KNOW WHAT INSTRUMENTS SHOULD BUY TO DETECT AND QUANTIFY PESTICIDE IN FOOD. LIST 4 INSTRUMENTS THAT WOULD BE RECOMMENDED.

14. Consumers Perceptions on Rebranding Strategies for Romanian Food Products

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Abstract: The following research aims at presenting the basic role of a rebranding campaign using some of the food products available in Romania, as a case study, for a better exemplification. Defining the main aspects of marketing strategies, branding and rebranding decisions and the role of consumer behavior aim at creating a primary stage of knowledge for the interested readers. The fact that food products are a particular type of products, that satisfy a basic need of every human being transforms them into a particular case to be studied. Even more so in the case of the marketers who should address custom made messages, promoting their products, to their potential consumers, according to their regional specificities and expectations. The chapter allows its readers to understand the main concepts regarding rebranding strategies and, also, to practically understand how the consumer perception on rebranding strategies for Romanian food products may influence future marketing strategies of food companies. As the analysis shows, using consumer-targeted campaigns may ensure the revival of an obsolete brand, while general-messages may contribute to the market rejection of a food product.

Keywords: marketing strategy; brands; rebranding; consumer perceptions; consumer acceptance; Romanian products.

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1. Introduction

The topic of rebranding is not new. Yet, it is on an increasing trend around the world (Kaikati & Kaikati 2003; Collange 2015). The decision of adopting such a strategy is not easy to make, no matter the dimension and financial stability of a company, as it should take into consideration several aspects such as:

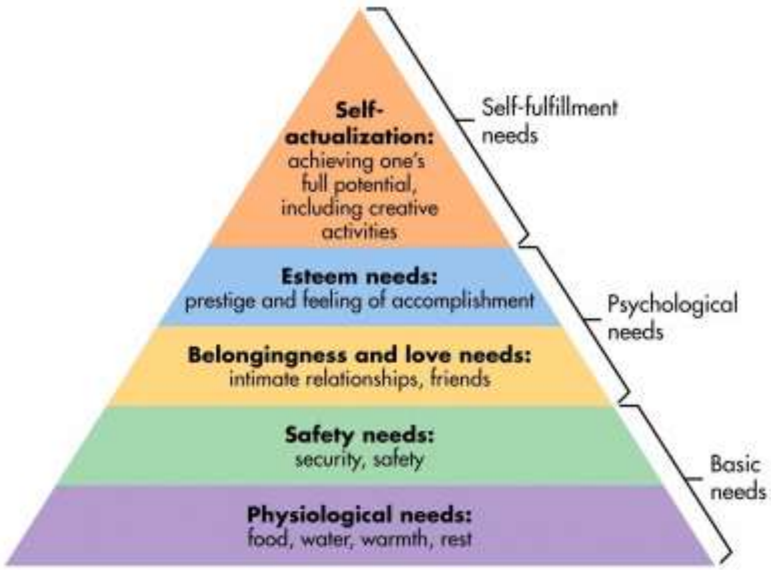
- implicated stakeholders (consumers, employees and owners);
- the financial resources needed;
- the necessary time allocated;
- the risk of losing all the investments if the rebranded products are rejected by the market.

In this case, the decision of rebranding comes most often in two situations (Spaeth et al. 2005) if the company has to or if the company wants to.

For example, the rebranding of an Onitsuka Tiger subsidy into what we know today as Nike (Kaikati & Kaikati 2003) is, maybe, one of the most famous models of success, while the rebranding of Swissair into "SAirGroup" and then returning to the original name is one of the loudest examples of failure (Kaikati & Kaikati 2003), due to the significant losses encountered.

In the case of food products, the marketing strategies, including here the rebranding strategy, have particularities that separate them from other types of products, since they are at the base of Maslow's pyramid of needs, that can be followed in figure 14.1.

Figure 14.1. Maslow's pyramid of needs



Source: https://www.simplypsychology.org/maslow.html

The hierarchy (or pyramid) suggests that food is one of the basic needs of any human (Schiffman & Kanuk 1997; Kotler & Keller 2012). So, for a consumer, satisfying the need for food must be done quick and safe. Hence, specific choice patterns are developed by the human brain in order to ensure food rapidly and based on individual preferences (Mostert 2006).

In this case, the food producers had to develop marketing strategies that would deliver simple messages to the consumers, and that would make their product so easily recognized by the consumers, that the choice process would be almost eliminated once a consumer becomes loyal to a brand. But this process is not a standardized one, so some strategies may succeed, while others fail, and the reasons behind success or failure are still not fully understood (Collange 2015).

For example, some renowned food companies such as Coca-Cola, McDonalds, Taco Bell or Guinness (https://brandfolder.com/blog/important-rebrands) choose to take up on a rebranding strategy in order to revive their consumers interest or to gather new consumers (Alshebil 2007).

The current chapter aims at presenting an analysis of consumer perception regarding rebranding strategies of Romanian food products, trying to understand what are the factors that influence most the consumer behavior in this particular case.

The chapter is structured in two main parts, the theoretical part – that clears up the main concepts used in the study, and the practical part – based on a mixed methods analysis (using both qualitative and quantitative interpretation for the data collected through a questionnaire).

2. Defining marketing strategies and categories of strategies

According to Kotler and Keller (2012) marketing is more than a science, is everything that surrounds us, from the food that we eat, the clothes that we wear, the music that we listen to the smart devices or the perfumes that we use. Through the choices that we make and because we share them with other people, we are ways of communication for the brands that we represent with or without our knowledge.

To give it a short and comprehensive definition, marking represents "satisfying the needs of consumers in a profitable way" (Kotler & Keller 2012).

A more detailed definition of marketing is given by The American Marketing Association: "the activity, set of institutions, and processes for creating, communicating, delivering, and exchanging offerings that have value for customers, clients, partners, and society at large" (American Marketing Association 2020).

Broadly, a marketing strategy is the long-term plan that a company has for placing its products or services in the attention of the consumers, by using its competitive advantages and differentiating from other similar products or services. To construct a marketing strategy, a company must be totally aware of the marketing mix components (Kotler & Keller 2012), or the four P's, that can be seen in figure 14.2.

Figure 14.2. The marketing mix components

Source: Authors' abstracting after Kotler and Keller, 2012

Based on the various combinations of factors that characterize each of the P's, a company may choose a specific marketing strategy. In this case, a summing up of the possible marketing strategies is (Blankson 2016; Kotler & Keller 2012; Welling & Chavan 2010):

1) Positioning strategies – the actions made by a company in order to develop and present their product or service to the possible consumers, in relation to other similar products already known by these consumers. In this case, the strategies may be based on:

- presenting the advantages of the new product (attributes of the new product/service; benefits of consuming it; usage possibilities or user identification in a specific hierarchical class due to consumption);
- the relation with competitors (against competitors; compared to competitors or away from competitors).

2) Pricing strategies – the company must establish a price range that would ensure at least the recovering of the production costs. Further on, the promotions, discounts, subsidies should be taken into consideration. In this case, a company might choose:

- a penetration price (lower than other similar product prices, used for attracting new consumers);
- skimming price (a price higher than the similar product prices, used mostly for products with a small market such as luxury products and consumers that are willing to pay the higher price).

3) Promotion strategies – it includes the activities undertaken by a company in order raise awareness around their product/service. This refers to any form of advertising, personal selling, or promotional programs.

4) Placing strategies – it regards the choice of distribution channels, so the most effective ways of transferring the product to a possible consumer should be used. In this case, the categories of potential consumers should be well known, so to provide the products through their preferred channels.

In the case of food products, the marketing strategies are not different, but the decisions marketers must take are more sensitive due to the consumers accustoms (Kotler & Keller 2012), level of satisfaction and quality - price expectation ratio (Kotler and Keller 2012), regional or national preferences (Skaggs et al. 1996), health aspects (Glanz et al. 2012) and, more recently developed, sustainability related aspects (Guido 2009; Belz & Schmidt-Riediger 2010). Even more, once a consumer is accustomed to a specific brand, the marketing battle is even harder.

According to Kotler & Keller (2012), people, as consumers, do not necessarily buy the product that satisfies only their physiological needs, but also their social needs, so to be easily recognized by their peers.

In this case, we might choose an expensive coffee from a renowned coffee shop, that also offers a branded cup with our names on it, rather than a cheaper and tastier product, but without the branded cup. This is generally known as the power of the brand (Davis 2000; Hughes & Ahearne 2010).

Also, according to the range of applicability, and because we live in a globalized world, other scholars have identified four worldwide types of strategies (Bartlett et al. 2004; Christodoulides et al. 2006):

1) **international strategies** – the decisions and plans are developed in the mother branch and then transferred to the local branches to be adapted to the local contexts.
2) **multinational strategies** – decisions are made in each local branch so that the products respond to the local demand.
3) **global strategies** – standardized products are developed for all markets, the decisions are made only in the mother branch
4) **transnational strategies** – the decisions are made by coordination and integration of activities in all local markets where the company is present.

2.1 Defining brands

We might ask ourselves then, if the brand makes a product better, but first we need to understand what this concept means. According to the American Marketing Association (2020) and other scholars (Thompson 2003; Damoiseau et al. 2011), the brand is an abstract concept that includes:

- a name;
- a design;
- a symbol;
- other features that differentiate a product/service from other similar products/services from other sellers.

According to Daly and Moloney (2005), the brand is not just an abstract symbol, but it has meaning for all the stakeholders that are involved with it (producer, consumers, competition), because it represents the identity of a company, its vision, values and the promises that it makes to its buyers.

Regarding how good products from different brands are, the debate is far from being over. Subjectivity is the one dictating how good or bad we consider a product from a specific brand, depending on several factors that scholars have identified as:

- consumer engagement with a brand – influenced by trust in a brand and emotional attachment to the brand (Li et al. 2020);
- brand loyalty (considering the experience with the brand) (Schmalz & Orth 2012; Li et al. 2020);
- brand warmth (intention to buying a brand) and brand competence (ability to pursue those intentions) (Kolbl et al. 2020);
- brand strength (how preferred is the brand against other competitors) (He & Calder 2020);
- whether is a private, national or international brand (Tran et al. 2020);
- whether is a healthy or unhealthy brand (Masterson et al. 2020)
- whether is an organic (Ryan & Casidy 2018) or sustainable (Franco & Cicatiello 2019) brand;
- the education to recognize a brand (Harrison et al. 2017);
- the affordability of the brand (Singh & Kathuria 2016; Zorbas et al. 2020);
- the availability of the brand (Loy et al. 2020).

2.2 The life cycle of a product

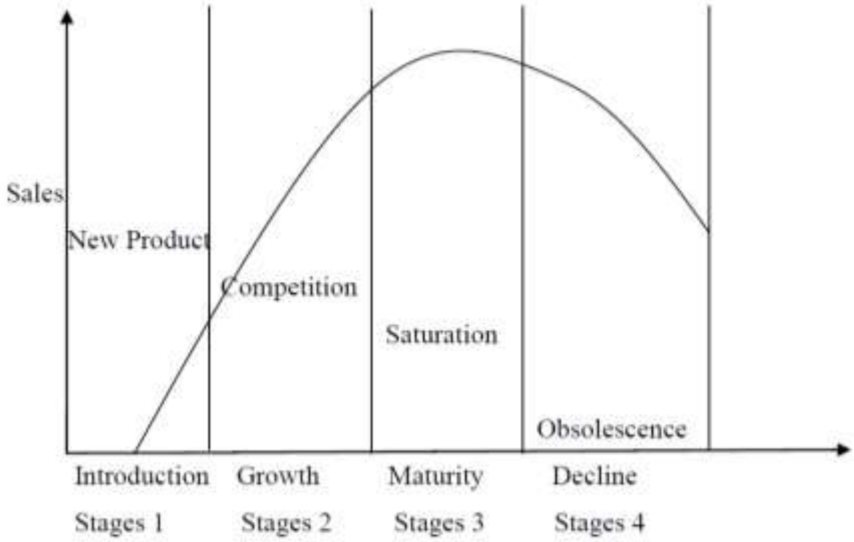
Considering that some products are preferred to others to the consumers, what would be the point in trying to bring on the market a new product? What would be the chances to change the consumers mind into preferring the new product to their already preferred brands?

The new product might offer something new in terms of quality, price or respond to a unsatisfied need, so it might gain consumers (Kotler & Keller 2012). Yet, it does not mean that these consumers are guaranteed forever. Their needs change along with newly obtained knowledge, trends, health issues, income, personal beliefs, and these are only some examples. Since the consumer preferences change over time, every product has a specific life cycle with four different stages (Levitt 1965; Wong & Ellis 2007):

- **introduction to the market** – when there are few competitors with the same product characteristics, allowing price skimming strategies to be implemented;
- **growth** – the product awareness increases and so are the sales, this attracts new market entries;
- **maturity** – eventually the market gets saturated with similar products and consumers start searching for other products;
- **decline** – the consumers find products that satisfy their needs better than the current one and the sales decrease dramatically, until the product becomes obsolete.

A graphical representation of the product life cycle can be seen in figure 14.3.

Figure 14.3. The product life cycle



Source: Chavan, 2014

2.3 Possibilities and motivation for implementing a rebranding strategy

As previously mentioned, there are situations when the brand is more important than the product itself, because it provides the consumer with psychological reassuring along with need satisfaction. This is not the case with a specific category of products, but with every category, such as: cars (Kirca et al. 2020), luxury items (Desmichel & Kocher 2020), pharmaceuticals (Dewulf et al. 2015), and even food products (Van Loo et al. 2020).

So, if consumers search for brands, in what situation should a company consider a rebranding strategy?

The answer includes a long range of possible situations, discussed by both scholars (Muzellec et al. 2003; Spaeth et al. 2005; Daly and Moloney 2005; Luck 2012) and marketing agencies (Hinge, 2020).

The situations can be mainly included in two large categories:

1) When a company **needs to / has to** pursue a rebranding strategy:

- the company needs to compete at a higher level or in a new market (marketing positioning/repositioning);
- the company is a spin-off from an existing brand;
- the company has legal reasons to change the brand;

2) When a company **wants to** pursue a rebranding strategy:

- there is a new marketing team / director / policy that should reflect on the company brands;
- when there is new product / service launching;
- when a company wants to revitalize a brand;
- when the company wants to change / simplify the message and logo for different reasons.

Since a brand represents the company identity, it is an intangible asset (Sinclair & Keller 2014) that significantly contributes to the value of the firm. Hence, adopting a rebranding strategy means, by definition (Daly & Moloney 2005) a change or a building up of that identity, so a change in the promises to clients and in promoted values. From this perspective, such a change cannot come sudden, but it should be based on studies on consumer preferences and implemented in a structured way, based on a marketing plan (Daly & Moloney 2005; Le et al. 2014). Also, a rebranding strategy might come as a response from a company to market pressures, such as the outdated image, reputation issues, erosion of marketing position (Lomax & Mador 2006; Le et al. 2014; Collange 2015).

Other scholars (Luck 2012) address a logical question: what a company can do when its brand its easily recognized by the consumers, but it is no more in line with the company policy.

The answer is to plan a rebranding strategy so skillful that would preserve the values and promises to the consumers, and avoid becoming stale, at the same time (Luck 2012). Of course, there is always a high risk of losing balance in the rebranding process and so the change becomes a failure (Luck 2012), due to the modification or complete change in a set of values and meanings associated by the consumers with the original brand, which may worsen the firm's reputation and image (Balmer et al. 2006; Le et al. 2014).

There are two types of rebranding strategies recognized by the literature (Muzellec & Lambkin 2007; Le et al. 2014):

1) Evolutionary strategies – less perceptible; small modifications to the logo or/and slogan, along with minor modifications to the marketing position and marketing aesthetics. They are preferred when consumers have a positive attitude towards the original brand;

2) Revolutionary strategies – easily identifiable; major modifications or creating a totally new brand name, along with major changes in marketing aesthetics. They are preferred when consumers have a negative attitude towards the original brand.

2.4 Consumer behavior influence on rebranding strategies

Previously it has been discussed that the impact of a rebranding strategy is related to several stakeholders, but the most important and unpredictable one is the consumer. Why consumers react better to some rebranding strategies than others or why consumers in different regions react different to the same strategy are problems that puzzled researchers since the appearance of marketing. Therefore, understanding consumer behavior and the most possible reactions towards rebranding strategies, under different circumstances is essential for constructing a successful strategy (Le et al. 2014).

A standardized definition of consumer behavior is not yet available, due to constant changes and understandings concerning human behavior. However, some definitions may be considered when trying to comprehend it, for example:

- Walters (1974): "the process whereby individuals decide whether, what, when, where, how, and from whom to purchase goods and services"

- Kotler and Keller (2012): the way in which goods or services are selected, bought, used and disposed of by individuals, groups or organizations.

Other scholars (Wilkie 1990; Vermeir & Verbeke 2006; Quester et al. 2007), have researched the processes that should be taken into consideration when defining consumer behavior:

- Consumer perception (referring to a persons' mental capability of observing, understanding and judging external and internal stimulus);
- Consumer's learning process (referring to the elements through which a person gets accustomed with a product / idea);
- Consumer's attitude towards a product / service (feelings, tendencies, reviews);
- Consumer motivation (the impulse to act in order to fulfil their needs / goals);

- Consumer manifested behavior (the single element that can be observed, measured and compared in a direct manner).

A person is supposed to make a significant number of decisions each day, from various points of view, the consumer point of view being only one of them. As a consumer, a person is exposed to choosing from a tremendous variety of goods and services.

The analysis of its buying decisions is the basis of understanding the levels of influence to which the consumer is exposed, the process of deciding and could lead to attracting new customers and keep them loyal to a brand.

Other scholars identified some of the factors behind a consumers' buying decision. For example, George Katona (1975), considered the following factors:

- the financial possibilities of the consumer (how much can someone spend for a specific product/service);
- the regional level of purchasing power (with its increases and decreases);
- the consumer routine;
- possible obligations (such as insurances);
- the consumer's general state of mind;

While Kotler and Armstrong (2010) consider the following categories of factors: cultural (culture; subculture; social class), social (reference groups; family; roles and status), individual (age and life cycle stage; occupation; economic situation; lifestyle; personality and self-concept), and psychological (motivation; perception; learning; beliefs and attitudes).

Therefore, the choice of rebranding should consider the general characteristics of consumers, since they offer some guiding into their expectations, perceptions and purchasing possibilities. Some consumers might fear that the change of brand includes changing in their perceived quality of a product/service, and reject the rebranded product based on their personal beliefs, while the new consumers cannot cover the losses of the company (Collange 2015). Also, the consumer's evaluation and attitude towards the rebranded product depends on its expertise, being either an **expert** or a **novice** consumer (Le et al. 2014).

2.5 Acceptance of new or rebranded food products in Romania

According to the Eurostat Database (Eurostat a 2020), Romania, as one of the 27 European Union member states has an annual gross domestic product (GDP) per capita of only 9,130 euro per capita in 2019, compared to an EU 27 average of 27,980 euro per capita, which indicates a lower purchasing power than the one in other EU member states. Even more, according to the same database, 25% of the total population in Romania in at risk of poverty, hence their level of expenditure in extremely low (Eurostat b 2020). Considering the low level of income, and the fact that 26.2% of the average income per household in Romania is spent on food products, compared to an average of 12.1% at the EU level in 2018 (Eurostat c 2020), rebranding food products might be an even riskier lottery than it already is.

According to Hofstede's cultural dimensions (Hofstede 2020) the Romanians have a high level of commitment to the extended family, they value common activities and caring for every family member, so sharing quality meals is a form of expressing this characteristic.

In this case, for assessing the consumers' perceptions on rebranding strategies for food products available in Romania, the results of an empirical study, based on a qualitative-quantitative approach, will be further presented.

3. Case study: consumers' perceptions on rebranding strategies of Romanian food products

3.1. Description of the research methodology

The tool used for collecting data from the consumers is an online questionnaire. The proposed research methodology combines both quantitative analysis, through the use of statistical description for the collected data, that will elicit numerical interpretation of the closed questions included in the questionnaire, and also qualitative analysis that will provide information regarding feelings, personal interpretation and motivation related to specific brands of food products available at some point on the Romanian market. The qualitative analysis is facilitated through the data collected in the open questions included in the questionnaire.

In the first part, the questionnaire refers recurrently to seven brands of food products that have gone through a rebranding strategy and are currently available on the Romanian market: “Abatorul Periș” (fresh meat products); “Elit Cugir” (prepared meat products); “Gambrinus” (beer); “Jerry’s Pizza” (ready cooked food); “Prince Stirbey” (wine); “Rom” (chocolate products); “Zuzu” (dairy products).

In the second part, the questionnaire is referring to specific branding and rebranding campaigns, two of them considered successful: “Rom chocolate” (Romanian Copywriter 2014) and “Elit Cugir” (infoGROUP MEDIA INVEST 2019), and one of them considered to be a failure: “Yoplait” (Business Magazine 2013).

The questionnaire is structured into 31 questions, 4 of them refer to the socio-demographic profile of the respondents, 14 of them refer to the 7 selected brands and 13 refer to the 3 rebranding campaigns previously mentioned.

The sets of questions contribute to answering several objectives related to the consumer perceptions on rebranding strategies of Romanian food products. In the following table, the objectives and hypothesis considered for this study are presented along with the designated questions for each of them.

The questionnaire was uploaded on Google forms and shared to multiple Facebook pages and groups to gather varied answers. Since the questionnaire has not followed statistical methods for sampling, the study is an empirical one.

3.2 Objectives and hypothesis of the study

The research **objectives** are, as it follows:

O1: Determining the respondents’ profile - Q28, Q29, Q30 and Q 31

O2: Determining whether the respondents have a minimum knowledge regarding the selected brands – Q1, Q2

O3: Determining the motivation for choosing a specific brand – Q3, Q7

O4: Determining the perception regarding the fitness between the name of the brand and the category of products that it represents - Q4

O5: Determining the auto evaluated expertise towards the brands - Q5, Q6

O6: Determining the attitude towards the brand logos - Q8, Q9, Q10, Q11, Q12, Q13, Q14

O7: Determining the level of knowledge and understanding regarding the concept of rebranding – Q15, Q16, Q17, Q18, Q19

O8: Determining the feelings elicited by the selected rebranding campaigns - Q20, Q21, Q22, Q24.

O9: Determining the engagement with the selected brands – Q23, Q25, Q26

The **initial hypotheses** for this empirical study are:

H1: Since the chosen brands are available on the Romanian market for a few years, the respondents are expected to have a medium knowledge regarding the selected brands.

H2: The main motivation for choosing a brand is the publicity for the specific brand, followed by the individual experience with the brand.

H3: The respondents prefer the brand names that are suggestive for the products that they represent.

H4: Most of the respondents consider themselves as expert buyers (Le et al. 2014).

H5: Most of the respondents will choose the more known logos, opposed to those of the rebranded ones.

H6: Most of the respondents have a minimum knowledge regarding the concept of rebranding and are expected to see a rebranding campaign as necessary only if something has changed in the products that they know.

H7: The feelings elicited by the proposed commercials are powerful for the successful campaigns and mild or are missing for the failed campaigns.

H8: Most of the respondents have tried the products of the proposed brands but did not become highly involved with them after the campaign.

3.3 Research results

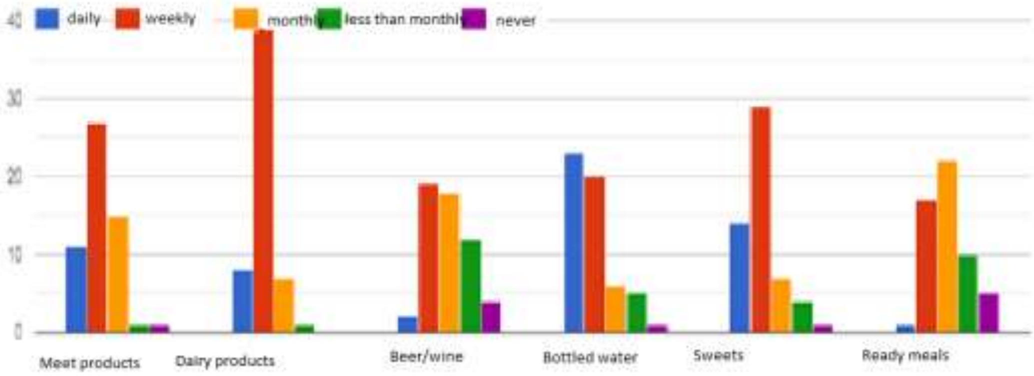
As previously mentioned, the results of the study are empirical, and they serve well for forming hypothesis and objectives for a larger scale study. In this case, the total number of answers received was of 55, all the answers were considered in the interpretation of the results.

The respondents are mostly young of age, 80% of them are below the age of 30. The other age categories are similar, all of them summing up 20%. The majority of the respondents are women, only 27.3% are men. The most important occupation of the respondents is that of student (49.1%), closely followed by the employee's category, with almost 41.8% of the answers. The other options are retired (5.5%) and freelancer (3.6%). Considering the available income, most of the respondents subscribe to the lower income categories, 40% earn between 2,000 and 3,000 lei per month for each family member and 36.4 % earn less than 2,000 lei per month for each family member, while 16.4% earn between 3,001 and 4,000 lei and only 7.3% earn more than 4,000 lei per month for each family member.

In this case, the average respondents to this questionnaire are young women, employees or students and earn an income below 3,000 lei per month for each family member.

Through first and second questions, the level of acquaintance with the proposed rebranded products has been tested. Considering that the proposed rebranded products come from basic categories of food products, we expected that the respondents would be aware of their existence, even if they did not purchase them. The distribution of the answers may be followed in figure 14.4.

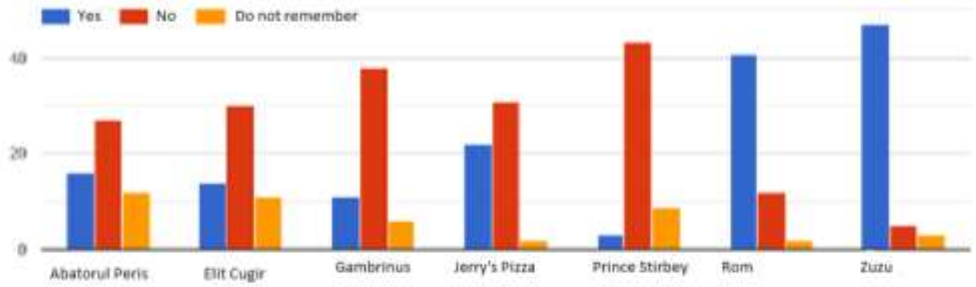
Figure 14.4. The buying frequency of the respondents for the specific food categories



Source: internal data of authors'

For testing the level of acquaintance with the selected brands the respondents were asked if they bought products from these brands at least once in the last six months. Yet, this does not mean a negative answer is equivalent to not knowing the brand at all. The distribution of responses to this question may be seen in figure 14.5.

Figure 14.5. The level of accustomedness with a brand



Source: internal data of authors'

The brand that is most familiar to the respondents is Zuzu, formed by dairy products, followed by Rom chocolate. Both of these brands are heavily promoted on media, both classic media and online, as well as outdoors. The brands that most unfamiliar for the respondents to this study are Prince Stirbey, a wine that has been recently rebranded and targets wine consumers interested in the history of the winery and wine tourism, that is sold as a classy product and not an everyday product (SC Cezar Connaisseur SRL, 2020). It is followed by Gambrinus, another mild alcoholic product (beer) that has been recently relaunched. The initial product was one of the few beers available in the communist period in Romania and it disappeared once the international brands reached the Romanian market. It now functions under Heineken's large umbrella of brands as a local competitor for craft beers (Universitatea De Bere, 2020). It needs to be mentioned that most of the respondents recall they did not buy five of the seven selected brands in the last six months. Considering the respondents' answers, the first hypothesis is confirmed. The respondents have a medium level of knowledge regarding the proposed brands.

Considering the third objective, that of determining the motivation behind choosing a brand, the responses may be seen in Table 14.1.

Table 14.1. Motivation for choosing a specific brand

	I am a loyal consumer of these brands (%)	I saw different commercials and I wanted to try (%)	I received the recommendation of other people for these products (%)	I occasionally change brands to see if I like something more than the usual options (%)	I did not pay special attention to the choice of these brands (%)	I did not choose these brands (%)
Abatorul Peris	14.55	9.09	5.45	9.09	10.91	54.55
Elit	3.64	20.00	3.64	7.27	18.18	49.09
Gambrinus	1.82	5.45	10.91	7.27	12.73	65.45
Jerry's Pizza	10.91	16.36	9.09	14.55	9.09	41.82
Prince Stirbey	3.64	1.82	1.82	3.64	21.82	67.27
Rom	40.00	16.36	9.09	9.09	12.73	12.73
Zuzu	60.00	9.09	7.27	9.09	7.27	9.09

Source: internal data of authors'

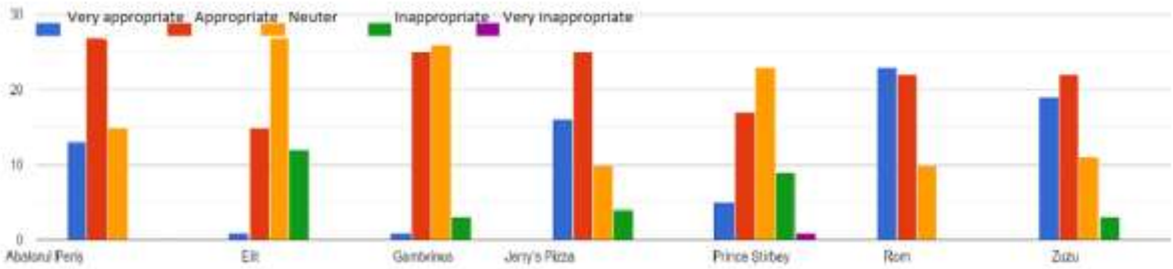
The main motivation is registered as brand loyalty, in the cases of Zuzu and Rom, with the highest percentages registered for this question. For Abatorul Peris, most of the buyer's answers stand in the area of loyalty, followed by curiosity generated by the publicity and the regular need for changing brands. For Elit and Jerry's Pizza, the most important motivation came from the publicity, followed by the curiosity from changing brands. For Gambrinus, the main motive comes from other people's recommendations. For Prince Stirbey, the few respondents who consume it are either loyal to the brand or have tried it out of curiosity. As an average, the main motivation that stands behind the choice of a specific brand is loyalty to the brand. It is followed by the curiosity generated mainly by publicity campaigns and then by the occasional switch of brands. The recommendations of other people are the last way of motivation. It is also important to mention that an important percentage of the respondents does not pay any specific attention to brands (13.25%).

Since the reference to specific brands might influence the respondents, a follow-up question asks them to classify the criteria considered in choosing a food product, no matter the brand. Considering the average answers for each criterion, the most important thing in choosing a food product is quality, followed by the previous experience with the brand, the ease of recognizing the brand on the store shelves and the fact that is a local brand. The last four criteria considered by the respondents are: brand tradition or history; the price of the products; promotion campaigns on the main media channels and finally the story behind the brand.

It turns out that the respondents are more attentive to their perceived quality of a specific brand and the publicity campaigns, that is consistent with their previous answers. The fact that they do not emphasize the brand history or the story behind it reveals pragmatism, rather than attachment towards specific brands. Hence, the second hypothesis is partially confirmed. The individual experience with the products has a high importance, generating brand loyalty or the opposite brand avoidance. Publicity has a higher impact when the campaigns are more aggressive, but do not generate a high percentage of loyal consumers.

The following objective was to evaluate the fitness between the brand name and the type of products that it represents. The distribution of answers for each brand may be seen in Figure 14.6.

Figure 14.6. Fitness of brand names



Source: internal data of authors'

For a better appreciation of the average answer, different types of scales may be used. In this case, the Likert scale is considered to be appropriate.

The Likert scale has been designed by the researcher named Rensis Likert, in 1932 and presented in his paper "A Technique for the Measurement of Attitudes" (Likert 1932). It is most commonly used for assessing the respondents' attitude towards a specific issue by giving the respondent the option to choose an answer from a five step (or more) scale. The issue is stated as a sentence to which the respondent agrees or not with. The scale may start from a strongly positive answer and end with a strongly negative answer or vice versa, and between there must be answers with milder degrees of agreement and disagreement. The number of negative answers must be the same with the number of positive answers. An example of such scale is: strongly agree / agree / neuter/ disagree / strongly disagree. For each of the answers there should be an associate grade, for example +2 / +1 / 0 / -1 / -2, according with the number of possible answers.

The average answer is calculated by the following formula:

Average = [(sum of 'strongly agree' answers*(+2) + sum of 'agree' answers*(+1) + sum of 'neuter' answers*0 + sum of 'disagree' answers*(-1) + sum of 'strongly disagree' answers*(-2)]/sum of answers.

The average answer must remain between the lowest and highest grade, in order for the scale to be correctly used.

In the case of name fitness, the scale and grades associated, as well as the average appreciation for the brand name fitness is presented in Table 14.2.

Table 14.2. Average appreciation of brand name fitness by Likert Scale

	Very appropriate	Appropriate	Neuter	Inappropriate	Very inappropriate	Average
Grade	**2**	**1**	**0**	**-1**	**-2**	
Abatorul Peris	13	27	15	0	0	0.96
Elit	1	15	27	12	0	0.09
Gambrinus	1	25	26	3	0	0.44

	Very appropriate	Appropriate	Neuter	Inappropriate	Very inappropriate	Average
Jerry's Pizza	16	25	10	4	0	0.96
Prince Stirbey	5	17	23	9	1	0.29
Rom	23	22	10	0	0	1.24
Zuzu	19	22	11	3	0	1.04

Source: internal data of authors'

In the case of the first brand, the respondents consider the name to be appropriate, expressing the location of the producer and the type of activity ('abator' meaning slaughterhouse), yet it does not bring anything remarkable to it. For the brand 'Elit', most of the respondents have a neuter opinion regarding the fitness of the name, the suggesting that a more expressive name for the brand may be considered. 'Gambrinus' beer has a slightly appropriate name, considering that it has a historical resonance for the Romanian consumer. The name of 'Jerry's Pizza" is considered to be fit for its products. 'Prince Stirbey' does not offer a clear opinion for the respondents, while Zuzu and Rom have the most appreciated name-brand associations. The neuter appreciation of brands and names is not a positive situation, this might suggest that the products are outdated or are not of interest with the market demand (Lomax & Mador 2006; Le et al. 2014; Collange 2015). The third hypothesis is therefore confirmed, the names that suggest some specificities of the product or refer to it directly are preferred to those which are more metaphorical. For example, people prefer the name Rom, a chocolate product with an intense liquor taste, the English translation of 'Rom' being rum, while 'Elit' refers to the exclusive quality of the products.

For the following objective, of evaluating the expertise as buyers of the respondents, another type of scale will be used, that of semantic differential scale. The method was proposed by Charles Osgood in 1957 (Messick 1957) and it resumes to asking the respondents for their opinion regarding a specific issue or stimulus. The answers are constructed as pairs of opposed attributes (from the very least favorable to the most favorable). The scale might have 5 / 7 / 9 levels and the attributes may be replaced by pairs of phrases. For interpreting the answers grades are associated to the number of attributes, for example very least favorable - +1 to most favorable - +5. The average is than calculated by the formula:

Average = [(sum of 'very least favorable' answers*(+1) + sum of 'least favorable' answers*(+2) + sum of 'neuter' answers*(+3) + sum of 'favorable' answers*(+4) + sum of 'most favorable' answers*(+5)]/sum of answers.

For exemplifying this method, the answers to question five will be presented in Table 14.3.

Table 14.3. Evaluation of buyer's expertise by Semantic Differential Scale

	I know this brand very well	I know this brand well	I have medium knowledge of this brand	I have minimum knowledge of this brand	I do not know this brand	Average answer
Grade	**5**	**4**	**3**	**2**	**1**	

	I know this brand very well	I know this brand well	I have medium knowledge of this brand	I have minimum knowledge of this brand	I do not know this brand	Average answer
Abatorul Peris	7	4	8	12	24	2.24
Elit	1	6	15	16	17	2.24
Gambrinus	2	6	18	15	14	2.40
Jerry's Pizza	7	13	23	8	4	3.20
Prince Stirbey	2	3	8	16	26	1.89
Rom	28	15	8	4	0	4.22
Zuzu	34	14	4	3	0	4.44

Source: internal data of authors'

Because the grade three represents the neuter answer, the averages that are below three will be considered to represent "novice buyers of the brand" and the averages above three will be considered to represent "expert buyers of the brand" (Le et al. 2014). Hence, respondents are evaluated as expert buyers in the cases of: Jerry's Pizza, Rom and Zuzu, while for Prince Stirbey, Abatorul Peris, Elit and Gambrinus the respondents are evaluated as novice buyers, the fourth hypothesis being only partially rejected, the auto evaluated expertise is influenced by brand preference.

Considering the probability to choose one of the brands during the following shopping session, the respondents offered the answers summed up in Table 14.4.

Table 14.4. Probability of choosing the brands during the next shopping session

	Very high	High	Average	Low	Very low
Abatorul Peris	7	7	19	13	9
Elit	2	9	19	14	11
Gambrinus	2	4	19	17	13
Jerry's Pizza	6	11	22	9	7
Prince Stirbey	3	2	16	20	4
Rom	14	22	16	2	1
Zuzu	27	16	8	1	3

Source: internal data of authors'

The brand with the highest probability to be chosen by the respondents during future shopping is Zuzu, followed by Rom. Jerry's Pizza, Abatorul Peris and Gambrinus have average / neuter changes of being selected, while Elit and Prince Stirbey have low chances of being in the respondents shopping baskets.

For the answers to questions eight to fourteen, the answers are summed up in Table 14.5.

Table 14.5. Preference for brand logo

Question	Brand 1	Percentage	Brand 2	Percentage
Q8	Abatorul Peris	87.3%	Tonnies	12.7%
Q9	Elit Cugir	52.7%	Reinnert	47.3%
Q10	Gambrinus	9.1%	Heineken	90.9%
Q11	Yoplait	9.1%	Zuzu	90.9%
Q12	Jerry's Pizza	67.3%	Cocosul Rosu	32.7%
Q13	Prince Stirbey	63.6%	Bovier el Fils	36.4%
Q14	Rom	36.4%	Milka	63.6%

Source: internal data of authors'

The choice of brands presented to the respondents follow the same criteria, one of the brands is local/national and the pair is a foreign brand that was or is available on the Romanian market. In the case of meat producer brands, the respondents prefer the Romanian brand. The German brand has no promotion campaigns in Romania, so the probability of the respondents to be familiar with it is extremely low. The preference for cured meat brands is not as different as in the first case, Elit is slightly more preferred than the other brand. Gambrinus has an extremely low preference from the respondents, while the umbrella brand Heineken is preferred by more than 90% of them. Zuzu is highly preferred by the Romanian consumers, while Yoplait is a brand that was available for only a few years on the Romanian market. Jerry's Pizza is preferred to the local restaurants Cocosul Rosu probably to the different products offered correlated with the young age of the majority of the respondents. In the wine category, the Romanian brand is preferred to the foreign one, and in the chocolate category the international brand is preferred to the national one, even if Rom is one of the most popular brands in the respondent's opinion. The fifth hypothesis being confirmed, the respondents prefer the logos they are more familiar with.

Considering the section dedicated to rebranding in the questionnaire, 54.5% of the respondents affirmed that they have knowledge regarding the concept of rebranding, 38.2% consider that they have partial knowledge on this topic, and 7.3% affirm that they have no knowledge on the topic. The opinions of the final category are particularly important because they come as natural reactions to the following questions.

Considering the hierarchization of the five proposed criteria that should be considered when conducting a rebranding campaign, in the respondents' opinion, the order is the following (where 1 is the most important and 5 the least important), calculated as the average of answers for each criterion:

1) The brand registers significant decreases in sales
2) The product recipe changes
3) It changes the entire marketing strategy of the company
4) There are a significant number of complaints regarding that brand
5) The brand owner is changing

When considering the criteria that make a rebranding campaign inappropriate, for the three proposed criteria, the order calculated as the average of answers for each criterion is:

1) When the product is easily recognized by consumers and their number is constant

2) When there is already an emotional connection between the brand and the consumers who choose it
3) When addressing issues that are not relevant to the target consumers.

The order of the factors considered to influence the success of a rebranding campaign, from the proposed list are, in the respondents' opinion (from 1 – the most important to 6 – the least important):
1) Creating an emotional connection with the target audience
2) The story behind the brand
3) The history or tradition of that brand
4) The origin of the products of that brand
5) Promoting quality improvement issues
6) Using people known to the public (celebrities / influencers) in the campaign.

Considering the seventh objective, the respondents show a certain level of knowledge regarding the concept of rebranding. They consider that a rebranding campaign should be taken into consideration when the company has specific issues (has to) and not just because it wants to, since the emotional connection between the consumers and the brand, the story behind the brand and its tradition are considered factors of success in a campaign. Also, disturbing the emotional connection between consumers and a brand is seen as a factor of inappropriateness by the respondents. Even if most of the respondents chose not to offer a response regarding the first rebranding campaign that comes to mind, considering food products, the campaigns that were mentioned include: Rom chocolate (six mentions), Zuzu (four mentions), Doncafe coffee (two mentions), Elit Cugir, Angst – cured meat, Danone, Nestea, Ciucas beer, Bergenbier beer, Tedi juice, Milka chocolate.

For the following three questions, the respondents were asked to watch three commercials, as parts of different rebranding campaigns that were implemented in Romania at some point. After each commercial, the respondents were asked to describe the feelings they had, in order to see if the powerful feelings, both positive and negative, may be associated with the success of a campaign, while mild feelings or boredom may be associated with the lack of success.

The first selected commercial is part of a rebranding campaign for Rom chocolate, the idea of the campaign to provoke the consumers by changing the wrapping of the chocolate from the easily and traditional Romanian flag to the American flag. By using references to "the American dream", the agency that designed this campaign managed to trigger powerful nationalist feelings, long forgotten by the Romanian consumers at that point. In the case of this study, after watching this commercial, the respondents mentioned feelings such as: amusement or fun, triggered mostly by the fact that they remembered the campaign and watching it again generated positive thoughts, while others mentioned negative feelings, such as: disappointment, annoyance, disagreement and even more powerful ones, for example: sadness, inferiority and revolt. Other mentioned feelings are: curiosity, of intrigue, patriotism or skepticism.

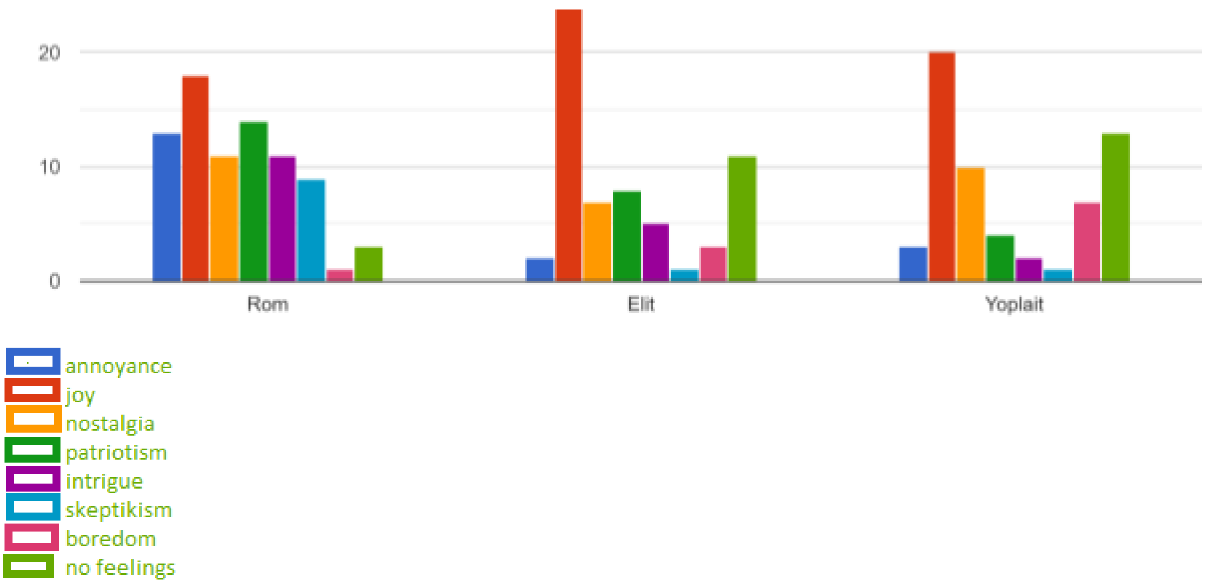
For the second commercial, part of the recently started rebranding campaign from Elit Cugir, a cured meat producer, announcing in an amusing way, by using the Brexit context, that their products remain the same, but the packaging is different the main feeling mentioned by the respondents is that of amusement and appreciation for keeping the traditions, which can be associated with nationalism, traditionalism. Other respondents mentioned that they were curious to try the products after seeing the commercial, some mentioned that the humor used is specific to the Romanian people, some considered that the commercial elicits trust/safety feelings regarding the products, while others criticized the choice of context, music and approach made by the producers of this commercial, considering that the choices are not appropriate.

It needs to be mentioned that few respondents considered that the commercial elicits no feelings and the choice of buying or not is only made in the store.

For the third commercial, one for a brand of yogurt that was only available for a few years in Romania and that was retired from the market due to exceedingly small sales, the respondents have mixed opinions. While some of them consider the products in the commercial as interesting and would like to try them out o curiosity, others consider the choice of commercial as bad, they find it disturbing, unpleasant, inappropriate, and even irritating. Others mention that they find the commercial as funny, while others see it as too long, boring and focusing too little on the products. It needs to be mentioned that none of the respondents remember actually buying these yogurts when they were available.

Considering the summing up question, that offers alternative feeling for each of the three previously mentioned campaigns, the distribution of answers may pe seen in figure 14.7.

Figure 14.7. Feelings elicited by the commercials



Source: internal data of authors'

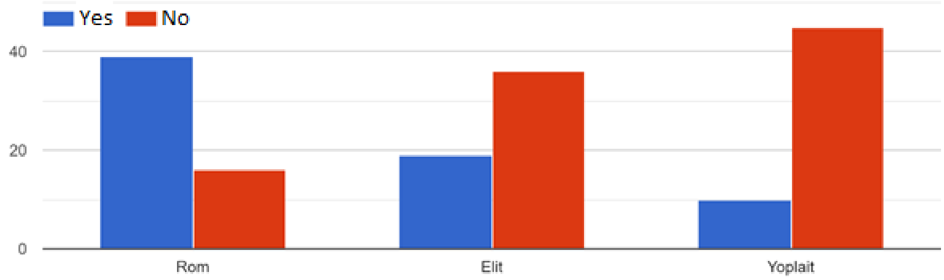
For the Rom commercial, most of the feelings mentioned by the respondents are above 10 answers and encompass a variated area of options. The most selected option is that of joy or amusement. There are few answers for the boredom option or no feelings at all. For the Elit commercial, the most selected option is again that of joy or amusement, while the other options register fewer answers. Yet, the no feelings option is selected by eleven respondents.

The case of Yoplait commercial also registers joy as a preferred option, but this commercial also registered more options of boredom and no feelings than the other brands. In addition to the seventh hypothesis, for this study it may be observed that aiming for amusement in a rebranding campaign is not enough for ensuring the success of the products.

The eighth objective, that of determining the feelings elicited by rebranding campaigns in the respondents to this study shows that the most mentioned feeling is that of amusement. Yet, amusement does not necessarily mean curiosity to try the product, so more powerful feelings, with specific meanings for a targeted market segment should be used for successful campaigns.

Considering the engagement with the three brands after the campaign ended from the consumers, meaning if the actually bought the products, the most of the respondents consider that they followed the Rom brand after the campaign, but not the other two. The distribution of answers may be seen in figure 14.8.

Figure 14.8. Following the brand after the campaign ended



Source: internal data of authors'

Considering the resemblance of the commercial with the real life of the respondents, useful in creating an emotional connection with the consumers, the results were interpreted using the Likert Scale and can be seen in Table 14.6.

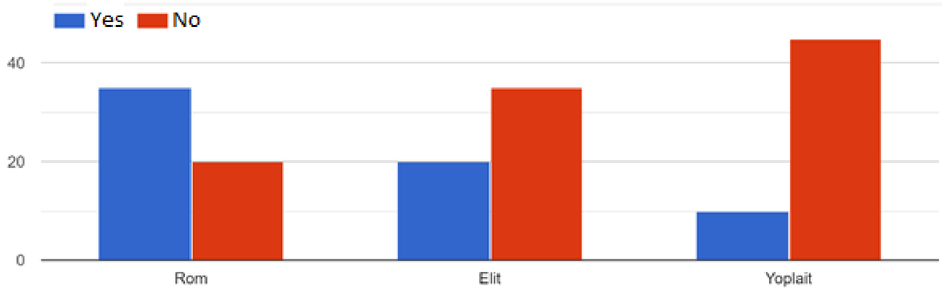
Table 14.6. Average correspondence between respondents and the context of the commercials by Likert Scale

	Very high	High	Neuter	Little	Not at all	Average
Grade	**2**	**1**	**0**	**-1**	**-2**	
Rom	7	11	15	9	13	-0.18
Elit Cugir	2	18	21	8	6	0.04
Yoplait	5	5	22	9	14	-0.40

Source: internal data of authors'

The context in which the respondents find themselves at most is the one in Elit commercial, while the context that is mostly apart for the respondents is that in Yoplait commercial. The successful campaign of Rom has a context that even if it amuses or infuriates the respondents does not create an emotional connection. Considering the actual process of buying one of the three brands, the consumers admit that they bought the chocolate, but did not really cared about the other two brands. The distribution of answers may be seen in figure 14.9.

Figure 14.9. Buying the brands



Source: internal data of authors'

The number of respondents who bought the brand decreases from Rom, to Elit and is the lowest for Yoplait, only ten respondents remember trying the products form the last brand.

The loyalty towards these brands was calculated using the Semantic Differential Scale, the frequency of buying the brands being the analyzed factor. The results may be seen in Table 14.7.

Table 14.7. Average brand engagement by frequency of shopping using the Semantic Differential Scale

	Frequently	Occasionally	Disappointed in the products	Not interested	I do not know if the brand is still on the market	Average answer
Grade	5	4	3	2	1	
Rom	18	24	2	11	0	3.89
Elit	1	22	3	22	7	2.78
Yoplait	0	11	5	22	17	2.18

Source: internal data of authors'

Considering the average answer calculated by Semantic Differential Scale, the brand that provoked the highest level of engagement for the consumers is the chocolate Rom, being occasionally bought by the respondents. The average answer for the Elit Cugir products indicates that the respondents are mostly disappointed by them, because the number of occasional buyers and not interested buyers is the same, while for the Yoplait brand, the respondents are mostly not interested.

What needs to be mentioned is the fact that the answers in the occasionally category for this last brand are not valid, since the brand has not been available on the Romanian market for several years. Hence, the actual average for this brand is 1.58, considering that these respondents do not know if this brand is still available.

Considering the ninth objective, the respondents are nor really engaged with the proposed brands. The rebranding campaigns brought attention on the products, but the respondents choose other products regularly and the rebranded ones only out of curiosity, but do not become loyal. The brand that has produced the most engagement is Rom chocolate, a brand that after the rebranding campaign ended remained publicly active both through publicity and new products, so it would remain in the consumers radar. The eight hypothesis is therefore confirmed, the respondents have a low level of involvement with the proposed brands.

4. Conclusion

The main aspect of the present chapter is presenting introductory information related to rebranding campaigns with accent on food products, as a particular category of products due to their purpose of satisfying a basic human need, that of hunger.

Rebranding campaigns are an important aspect of the marketing strategy. They should be considered as a possibility for the revival of a product that has started to decline in sales, for bringing positive attention to a product with a negative image or encountered legislative issues, and even if the producers wish for it to be under constant attention from the consumers.

Considering the empirical study conducted, it seems that the respondents have basic knowledge regarding the concept of rebranding. They see a rebranding campaign as appropriate if there are significant loses in sales or if the products have changed, while the inappropriateness of such a campaign is generated by changing an easily recognizable product. The advantage of easily recognizing a product is a secondary quality of a brand, important mostly for people who wish to save time, as one of the respondents clearly points out: "I don't have the time to search for the products, I want to go blindfolded to the shelf and pick what I want". This is also confirmed by the choice of logos, the respondents picking the logos that they are more familiar with, rather than those that need research from their part.

The respondents have pointed out another important aspect regarding the expertise in buying. They only evaluated themselves as expert buyers for the products that they know most, and not having preconceptions related to the products they know less.

The personal experience with a product is the one generating brand loyalty or brand avoidance. Aspects related to appreciation of quality and price are more important to the respondents in creating an opinion, rather than the recommendations from other people or the publicity for that brand.

Regarding the relation between emotions and brand preference, the respondents partially confirm that powerful emotions / feelings generated by a rebranding campaign are a tool that significantly influences the success of that campaign but does not necessarily create loyalty. As it can be seen, the campaign for Rom chocolate has reminded people of their country and revolted them against the possibility of changing the traditional packaging. Yet, when they have to choose between Rom and Milka, most of them choose the international brand.

Aiming for amusing the public in a rebranding campaign is not a powerful emotion, as emerges from this study. The respondents were amused by all three proposed commercials, but it raised their curiosity, at most. Some respondents mentioned that if they are amused by the commercial it is not equivalent to choosing that brand. The choice is made while shopping, based on the quality and price of the products.

Nevertheless, researching the consumer behavior from the regional markets where the products might be rebranded is a key component of each marketing strategy, because of the differences in thinking, incomes, and expectations of the consumers. Sending a message that would interest the consumer in a truly short period is also essential. One of the respondents mentions, for the failed campaign, that for the first half of an exceedingly long commercial, you cannot even understand what the promoted product is.

In conclusion, a rebranding campaign is an important tool in any marketer's portfolio, that may bring the success of a brand if the product, the market, and the consumer specificities are all considered. Yet, the success is not guaranteed by any secret recipe.

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Appendix A14. Definitions of key terms

Marketing strategy: a long-term plan that a company creates for placing its products or services in the attention of the consumers, by using its competitive advantages and differentiating from other similar products or services.

Evolutionary rebranding strategy: refers to small modifications to the logo or/and slogan, including minor modifications to the marketing position and marketing aesthetics. They are preferred when consumers have a positive attitude towards the original brand;

Revolutionary rebranding strategy: refer to major modifications or creating a totally new brand name, include major changes in marketing aesthetics. They are preferred when consumers have a negative attitude towards the original brand.

Brand: an abstract representation (including a name, a logo or a slogan) that represents the identity of a company, its vision, values and the promises that it makes to its buyers.

Consumer behavior: It does not have a standardized definition, but it can be explained as the way in which individuals or different types of groups choose to select, buy, use and dispose of goods or services (Kotler and Keller, 2012).

Cultural dimensions: common characteristics of people living in the same region, that have been developed in a long period of time and include pattern reactions to specific situations as a response to the historic specificities that have been encountered by them.

Appendix B14. Building the questionnaire

Consumers' perception of rebranding campaigns for Romanian food products

Q1. How often do you purchase the following product categories?

	Daily	Weekly	Monthly	A few times per year	Never
Meat products (raw or cured)					
Dairy products					
Low alcohol drinks (beer/wine)					
Water (flat or bubbled)					
Sweets					
Ready to eat food					

Q2. Have you purchased products from the following brands at least once in the last six months?

	Yes	No	I do not remember
Abatorul Peris (meat products)			
Elit (cured meat)			
Gambrinus (beer)			
Jerry's Pizza (ready to eat food)			
Prince Stirbey (wine)			
Rom (chocolate)			
Zuzu (dairy)			

Q3. What was the main reason you chose these brands? More possible answers.

	I am a loyal consumer of these brands	I saw different commercials and I wanted to try	I received the recommendation of other people for these products	I occasionally change brands to see if I like something more than the usual options	I did not pay special attention to the choice of these brands	I did not choose these brands
Abatorul Peris						

(meat products)						
Elit (cured meat)						
Gambrinus (beer)						
Jerry's Pizza (ready to eat food)						
Prince Stirbey (wine)						
Rom (chocolate)						
Zuzu (dairy)						

Q4. How appropriate do you think it is to associate the names of the following brands with their products?

	Very appropriate	Appropriate	Neuter	Inappropriate	Very inappropriate
Abatorul Peris (meat products)					
Elit (cured meat)					
Gambrinus (beer)					
Jerry's Pizza (ready to eat food)					
Prince Stirbey (wine)					
Rom (chocolate)					
Zuzu (dairy)					

Q5. How well you know the following brands?

	I know this brand very well	I know this brand well	I have medium knowledge of this brand	I have minimum knowledge of this brand	I do not know this brand
Abatorul Peris (meat products)					

Elit (cured meat)					
Gambrinus (beer)					
Jerry's Pizza (ready to eat food)					
Prince Stirbey (wine)					
Rom (chocolate)					
Zuzu (dairy)					

Q6. What is the possibility to choose the following brands for the next food purchase?

	Very high	High	Medium	Low	Very low
Abatorul Peris (meat products)					
Elit (cured meat)					
Gambrinus (beer)					
Jerry's Pizza (ready to eat food)					
Prince Stirbey (wine)					
Rom (chocolate)					
Zuzu (dairy)					

Q7. Rank the following criteria in order of their importance in the decision to purchase a food product according to its brand (1 - most important, 8 least important):
- brand tradition / history
- the ease of recognizing it on the shelf
- promotion on the main media channels
- previous experience with that brand
- the fact that it is a local brand (Romanian)
- the story behind the brand
- the quality of products
- the price

Q8 – Q14. Choose a variant for each of the following pairs of brands based on the probability of purchasing them:

Q8	Periş	TÖNNIES

Q9	elit	Reinert
Q10		
Q11	yoplait original	ZUZU
Q12	JERRY'S pizza	
Q13	PRINCE ȘTIRBEY	CHABLIS BOYER & FILS
Q14		

Q15. Are you familiar with the notion of rebranding?
- Yes
- Partially
- No

Q16. Prioritize the situations where you think a rebranding campaign is needed (1 - most important, 5 least important):
- The brand registers significant decreases in sales
- The product recipe changes
- It changes the entire marketing strategy of the company
- There are a significant number of complaints regarding that brand
- The brand owner is changing

Q17. Prioritize situations where you think a rebranding campaign is inappropriate (1 - most important, 3 least important):
- When the product is easily recognized by consumers and their number is constant
- When there is already an emotional connection between the brand and the consumers who choose it

- When addressing issues that are not relevant to the target consumers

Q18. Considering the food category, tell us briefly what is the first rebranding campaign that comes to mind. Did you consider this campaign to have a positive or negative impact on the brand? (Open answer)

Q19. Rank the following according to their importance in a successful rebranding campaign, in your opinion:
- Creating an emotional connection with the target audience
- The story behind the brand
- The history or tradition of that brand
- The origin of the products of that brand
- Promoting quality improvement issues
- Using people known to the public (celebrities / influencers) in the campaign

Q20. Watch the following video and describe your feelings about it: https://www.youtube.com/watch?v=lB13CQ0WfMM (open answer):

Q21. Watch the following video and describe your feelings about it: https://www.youtube.com/watch?v=JZ0EQchmfU0 (open answer)

Q22. Watch the following video and describe your feelings about it: https://www.youtube.com/watch?v=U5OLGdrZaGk (open answer)

Q23. I was attentive to the brand even after the end of the campaign:

	Yes	No
Rom chocolate		
Elit Cugir		
Yoplait		

Q24. The campaign gave me feelings of (several possible options):

	Nervousness / irritation	Joy	Nostalgia	Patriotism	Intriguing	Skepticism to change	Boredom	No feeling
Rom chocolate								
Elit Cugir								
Yoplait								

Q25. I found myself in the video I watched because the context is real**:**

	Very much	Much	Neuter	Little	Very little
Rom chocolate					
Elit Cugir					
Yoplait					

Q26. I bought products with this brand after the campaign to try them

	Yes	No
Rom chocolate		
Elit Cugir		
Yoplait		

Q27. I became a customer of the brand after the campaign:

	Yes, I buy frequently	Yes, I buy occasionally	No, I was disappointed of the products	No, the campaign didn't get my interest	I don't even know if this product still exists
Rom chocolate					
Elit Cugir					
Yoplait					

Q28. What age category do you fall into?
- <20 years old
- 20-30 years old
- 3140 years old
- 41-50 years old
-51-60 years old
- >60 years old

Q29. What is your gender?
- female
- male

Q30. What is your occupation?
- student
- employee
- free lancer
- entrepreneur
- retired
- looking for a job

Q31. What income category do you fall into?
- <2000 lei/month/family member
- 2000-3000 lei/month/family member
- 3001-4000 lei/month/family member
- >4000 lei/month/family member

Ch.14

CONSUMERS' PERCEPTIONS ON REBRANDING STRATEGIES OF ROMANIAN FOOD PRODUCTS

Understanding the importance of rebranding strategies for food products

OBJECTIVES: The students will be able to:

- develop basic knowledge regarding marketing strategies;
- develop basic knowledge regarding the concept of rebranding applied on the case of Romanian food products;
- identify the main characteristics of consumer behaviour in designing a rebranding strategy;
- identify a successful versus a failed rebranding campaign;
- design a questionnaire for gathering the consumers' opinion on a specific topic, specifically, the perception on rebranding strategies for Romanian food products.

SKILLS: Design an experimental market research on consumers' perceptions on rebranding strategies for Romanian food products; Include the consumer behaviour as a component in designing a marketing strategy; Critical thinking on rebranding strategies; Challenge the arguments of other peers on rebranding strategies; Managing information collected through a questionnaire.

QUESTION 1. (PLEASE CHECK THE CORRECT ANSWER)

What are the four stages in the life cycle of a product?

- ☐ entry, growth, stagnancy, revival
- ☐ growth, maximum point, obsolescence, forgetting
- ☐ introduction, growth, maturity, decline
- ☐ introduction, maturity, decline, revival

QUESTION 2. (PLEASE CHECK THE CORRECT ANSWER)

What are the four components of the marketing mix?

- ☐ Product; price; placement; promotion
- ☐ Promotion; clients; quality; transportation
- ☐ Price; consumer behavior; commercials; products
- ☐ placement; transportation; consumers; products

QUESTION 3. (PLEASE CHECK THE CORRECT ANSWER)

Choose the right answer for defining a revolutionary rebranding strategy.

- ☐ Includes small modifications to the logo or/and slogan, along with minor modifications to the marketing position and marketing aesthetics.
- ☐ Is preferred when the consumers' perception towards the brand is a positive one, in general.
- ☐ Includes major modifications or creating a totally new brand name, along with major changes in marketing aesthetics
- ☐ Is less perceptible to the consumers.

QUESTION 4. (PLEASE CHECK THE CORRECT ANSWER)

Factors that have a high influence on consumer behaviour are?

- ☐ The financial possibilities and the general purchasing power at regional level;
- ☐ The financial possibilities and the sustainability expectations towards the chosen product;
- ☐ The peer's recommendations and the online promotion;
- ☐ The tradition of the brand and the previous experience with the brand.

QUESTION 5. (PLEASE CHECK THE CORRECT ANSWER)

Choose the right answer for defining an evolutionay rebranding strategy.

- ☐ Includes small modifications to the logo or/and slogan, along with minor modifications to the marketing position and marketing aesthetics.
- ☐ Is preferred when the consumers' perception towards the brand is a negative one, in general.
- ☐ Includes major modifications or creating a totally new brand name, along with major changes in marketing aesthetics
- ☐ Is easily perceptible to the consumers.

QUESTION 6 (PLEASE WRITE THE CORRECT ANSWER WITHIN THE BOX)

Name at least three possile motives for pursuing a rebranding strategy

PRACTICAL APPLICATION 1. PLEASE DISCUSS THE RESULTS OF THE QUESTIONNAIRE REGARDING THE FEELINGS ELICITED TO THE RESPONDENTS BY THE PROPOSED REBRANDING CAMPAIGNS AND THE SUCCESS OR FAILURE OF THESE CAMPAIGNS WITH YOUR PEERS THROUGH THE DEBATE TECHNIQUE

PRACTICAL APPLICATION 2. CALCULATE THE AVERAGE PROBABILITY OF CHOOSING THE PROPOSED BRANDS BY THE RESPONDENTS BY USING THE SEMNATICAL DIFFERENTIAL SCALE AND THE ANSWERS IN TABLE 14.4

CORRECT ANSWERS TO THE QUESTIONNAIRES

First section: Descriptive information

Chapter 1. Question 1. The invention of the tractor; Question 2. All the above; Question 3. Northern and Central Europe; Question 4. Well-known and applicable by all; Question 5. New accessible and practical solutions; Question 6. The innovation represents new ideas/solutions for current and future problems in a field by complying with the criteria of applicability and accessibility. For example: 1. Developing digital platforms for knowledge transfer on agri-food innovation; 2. Developing the research capacity and infrastructure; 3. Improving the public procurement system related to food.

Chapter 2. Question 1. 1. Increasing methods appropriate to organic farming systems and practices; 2. Permanent collaboration between farmers, agricultural consultants, researchers, consumers; 3. Integrating the social, technological, environmental aspects of innovation.; Question 2. It sets the agenda for organic research by supporting an assumed process involving the various stakeholders of the organic movement.; Question 3. www.orgprints.org; Question 4. Organic farming should get resources from the program.

Chapter 3. Question 1. Producer organizations are sectorial associations formed at the initiative of farmers and controlled by farmers with the primary objective to advocate for the economic interests of their members and regulating contractual relations between farmers and purchasers of their products on the agricultural market.; Question 2. Strengthening bargaining power, better integration of farmers into agri-food chain, and improving farmers' competitiveness; Question 3. Fruit and vegetable sector; Question 4. Yes, it is; Question 5. Organic farming is a production where small-scale farmers and small plots aren't an obstacle for farm development, and consolidation isn't necessary for competitiveness;

Second section: Sustainable entrepreneurial strategies

Chapter 4. Question 1. it improves human well-being and social equity, while significantly reduce the environmental risks and ecological scarcities; it is a resilient economy that provides a better quality of life for all; it is a low carbon, resource-efficient, and socially inclusive; Question 2. discovery opportunities and creation opportunities; Question 3. climate change; crises and government stimulus; digitalization; Question 4. entrepreneurial vision; creativity; ethics; Question 5. control over time; control over compensation.

Chapter 5. Question 1. Low; Question 2. Facilitate the transition of small farms to organic production; Expanding the range of products that can be marketed as organic; Question 3. In the local community; Question 4. Those who already have a farm and want to convert it to organic farming. Those who start a business in agriculture directly with organic farming; Question 5. Organic food products; Practical application: by engaging people in production activities, unemployment can be reduced in certain areas;

attracting foreign investors and raising the living standards of locals; a reduced pressure on the environment (because organic agriculture is not intensive); improving the health of local populations, because part of the organic production is consumed locally.

Chapter 6. Question 1. Pursuing the current generation needs, without compromising the possibility of future generations to pursue their own needs; Question 2. The GDP/capita; Question 3. Economic, Social and Environmental Objectives; Question 4. Coca-Cola Romania; Question 5. Using technologies based on fossil fuels; Question 6. For example: 1. Training and development programs for employees; 2. Philanthropic and sponsorship activities and initiatives; 3. Choosing input suppliers based on social criteria.

Chapter 7. Question 1. Europe; Question 2. Europe; Question 3. Organic products on every table, Improve – Inspire – Deliver, Fair work – Fair payment; Question 4. Production and development of the supply chain; financial support for farmers; regulated rules on production and labeling; recognition of the contribution to the general objectives of public policy; Question 5. Enable markets that are based on ecological standards;

Third section: Economic estimations in the agri-food sector

Chapter 8. Question 1. its Pp is lower than a specified cutoff (period); Question 2. the NPV is higher than 0; Question 3. the IRR is higher than the cost of capital; Question 4. the PI is higher than 1.0; Question 5. the NPV is higher than 0;

Chapter 9. Question 1. Cows used for breeding; Question 2. Fair value less costs to sell; Question 3. It is used in the production or supply of agricultural produce; it is expected to bear produce for more than one period; and it has a remote likelihood of being sold; Question 4. It is difficult to measure fair value reliably for certain assets that do not trade in active markets; Question 5. Property, plant and equipment, because they are not used for an agriculture activity;

Chapter 10. Question 1. Aspects of economic, ecological and social sustainability; Question 2. Costs of raw agricultural material, food additives, energy, water, packaging material; Question 3. Difference between the incomes and overall variable costs derived from the certain line of agricultural production at the farm; Question 4. Size of fall in contribution margin due to fall in yields/market price of product, or increase in overall variable costs of production; Question 5. CP = (VC - S) / EY.

Forth section: Consumption perspectives in agri-food sector

Chapter 11. Question 1. Meat; Question 2. Income; Question 3. Estonia; Question 4. Vegetables; Question 5. Omega-3 fatty acids.

Chapter 12. Question 1. Healthiness; Question 2. Attitude; Question 3. Pricing policy; Question 4. Past experience; Question 5. Product sustainability.

Chapter 13. Question 1. heavy metals; Question 2. low response; Question 3. products completely free of contaminants; Question 4. the ability to trace and follow a food through all stages of production, processing and distribution; Question 5. resonance Rayleigh scattering spectra; Question 6. Flavonoids, Pesticide, Antibiotics; Practical application: Enzyme-linked immunosorbent assay technique (ELISA), High performance liquid chromatography (HPLC), Gas chromatography coupled to mass spectrometry (GC-MS), Electrochemical biosensors for pesticides.

Chapter 14. Question 1. introduction, growth, maturity, decline; Question 2. Product; price; placement; promotion; Question 3. Includes major modifications or creating a totally new brand name, along with major changes in marketing aesthetics; Question 4. The financial possibilities and the general purchasing power at regional level; Question 5. Includes small modifications to the logo or/and slogan, along with minor modifications to the marketing position and marketing aesthetics.

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