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Luminita Chivu
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Crisis after the Crisis: Economic Development in the New Normal

2021 International Conference of Economic Scientific Research - Theoretical, Empirical and Practical Approaches (ESPERA)

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Preface

The International Conference on "Economic Scientific Research – Theoretical, Empirical and Practical Approaches" (ESPERA) represents a fruitful opportunity to test the relevance and topicality of the subjects covered, to invite our partners from the Romania and abroad to debates, and to start new collaborations. This event found its roots in the academic vocation of the institutes and research centres, and for this effervescence and scientific freedom, we are grateful and honoured to thank the Romanian Academy, the highest forum for research and academic consecration from Romania, under whose aegis "Costin C. Kirițescu" National Institute for Economic Research (Institutul National de Cercetari Economice, INCE) has been conducting its activity for more than three decades.

The ESPERA 2021 was also an opportunity to take stock of the activity of institutes and centres in the field of academic economic scientific research between the past two editions. During the period(s) between its editions, ESPERA tends to become a platform of opinion and scientific dialogue, which proposes to connect researchers, representatives of the academic environment, specialists from the real economy and civil society, to identify hot topics and hot research areas.

The aim of the 2021 international conference on "Economic Scientific Research – Theoretical, Empirical and Practical Approaches" – ESPERA, organised by the "Costin C. Kirițescu" National Institute for Economic Research (NIER) was to present and evaluate the economic scientific research portfolio, to argue and substantiate the Romanian development strategies – including European and global best practices. The theme of the ESPERA 2021 edition was "The crisis after the crisis. When and how the New Normal will be". It expresses the desire to bring under a wider panoply topic highly debated and argued in literature. In this context, ESPERA 2021 has highlighted plenty of new opportunities and fresh ideas, challenges and solutions that will bring new approaches in understanding the new normal.

The scientific program of the ESPERA 2021 conference was addressed to a wide diversity of themes, bringing together researchers from all INCE institutes and centres, members of the Romanian Academy, Romanian academic researchers and also guests from other countries. Researchers were encouraged to present articles on

the economic scientific research that they have focused, as much as possible, on paradigm shifts for the world after the COVID-19 crisis, since some deep and long-lasting changes are expected building up a "New Normal".

Singular relevant aspects could be related to complete digitalization and digital sovereignty, people and workforce management, virtual training and reskilling, digital currency, de-carbonization in all production processes, supply chains traceability, cybersecurity, automation, artificial intelligence and machine learning, Internet of Things and blockchain technologies.

The ESPERA 2021 Conference was intended as a thought-provoking exercise for researchers, and it is organized in such a way as to provide an academic platform for debates, covering the broadest approaches, enabling an interactive exchange of ideas and the latest results and findings, including those emerged in economic science arising from both fundamental and empirical researches and promoting evidence-based policy forging a new vision under the circumstances of the recent crisis.

The Conference includes an additional section dedicated to PhD and post-PhD students, thus providing to beginner researchers an inspiring framework for scientific debate and for their further training. The contributions and views that are expressed, on a meritorious and wide-ranging level, are brought together, as in previous years, in a volume – Proceedings of the International Conference ESPERA 2021 – that will be submitted to EBSCO for evaluation purposes and inclusion in Conference Proceedings Citation Index by Clarivate, Web of Science.

The authors were invited to submit full-text papers that report original unpublished research, which are not under consideration for publication elsewhere. For Romanian contributors, the Romanian language version of the paper was also required. The official languages of the conference were English and Romanian. Also, some of the papers not selected for the Conference Proceedings were submitted for evaluation, with the agreement of the author, in order to be published in the scientific publications of the international conference partners: Working papers of the National Institute for Economic Research, *Romanian Journal of Economic Forecasting*, *Romanian Journal of Economics, Revista Calitatea vieții* (Quality of Life Magazine), *Revista Inovație socială* (Social Innovation Magazine), *Agricultural Economics and Rural Development*, *Global Economic Observer*, *Financial Studies*, all indexed in prestigious international databases.

The editors express their warm appreciations to the scientific committee members, coordinators and scientific reviewers of all the 15 workshops, who have made substantial effort for the success of this annual scientific test, and managed to deliver a rich scientific content.

The ESPERA 2021 Editors

Bucuresti, Romania — Luminita Chivu

Madrid, Spain — Ignacio De Los Ríos Carmenado

Ploiesti, Prahova, Romania — Jean Vasile Andrei

Contents

Chapter 1
Synthetic Composite Indicators for Monitoring Changes in Countries' Development Rankings – A Bibliometric Analysis

Luminița Chivu, George Georgescu, and Alina Zaharia

Abstract The paper focuses on bibliometric analysis of the key topic of composite indicators, having in view their growing importance in worldwide scientific researches and debates, mainly due to their potential in providing a relevant picture of multidimensional phenomenon and serving as a valuable tool for policy makers, including at the level of global or continental international organizations. The applications of composite indicators have been extended in wide-ranging fields, from public and economic governance, competitiveness, business management and performance, risk assessment, trade, agriculture to, more recently, sustainable development, international comparisons and country rankings, gentrification, environment and waste management, energy and alternative fuels, climate changes, COVID-19 and other diseases, security. A particular attention of our analysis has been paid to comparisons between countries, by their updating on a regular and standardized basis, monitoring changes in their rank, and benchmarking the mutual and relative progress in a variety of domains to capture a comprehensive image on the relative progress over time of countries. This way, it becomes easier to understand the main determinants of different countries, like EU ones, in terms of development and the advance of real convergence. Even if the bibliometric analysis was performed using the publishing information only from the Web of Science database between 1978 and August 2022, the paper findings highlighted many features valid for the entire international literature on this topic, among these: the publications have grown exponentially (out of the 3190 papers counted in the

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investigated period, 94% have been published after 2005 and more than 75% after 2010), the highest number of the publications were written by European-affiliated authors, and the top of funding organizations is led by the European Commission.

Keywords Composite indicator · Multidimensional index · Multicriteria analysis · Convergence index · Weighting system · International comparison · Country ranking

1.1 Introduction

In the last decades, the interest for the topic of composite indicators has had an exponential increase in the worldwide scientific and policy debates. This growing interest is mainly due to their potential in providing a multidimensional "big picture" of complex phenomenon that individual indicators cannot capture. At the same time, composite indicators became valuables tools for policy makers, including at the level of global or continental international organizations, representing an essential benchmark in decision making.

The applications of composite indicators have been extended in wide-ranging scopes and fields, including international comparisons and country rankings.

The approach of this topic in our paperwork is based on bibliometric analysis, intended to synthetize, emphasize, and systematically present, in a quantitative manner, the main key subtopics and their relationships in literature review, exposed through a network map with the help of the Vosviewer software. The bibliometric technique is performed using the publishing information from the Web of Science (WoS) database between 1978 and August 2022, aiming to group the most relevant key topics from WoS publications by clusters and by time and respectively, of most recent and most cited 1000 publications, also by clusters and by time.

The research questions to which the study is trying to find adequate answers are related to the pace of publications on the topic of composite indicators in the last forty years, the subtopics of increasing interest, the most prolific and cited authors and their research area focus, the top founding organizations.

Considering future researches concerning the assessment of catching-up process at the level of European Union (EU) Member States, a particular attention is paid to comparisons between countries and the construction of the most adequate composite indicator for monitoring changes in their rank to understand its main determinants in terms of development and to capture a comprehensive image on the relative progress over time in the advance of the real convergence.

1.2 Literature Review

In the last two decades, along with increasing availability of information, there has been a growing interest in composite indicators, considering they would yield a better overview on the multidimensional "big picture" of different interconnected realities, including the general topic of economic development and the related

country rankings, being used to an ever greater extent by global organizations, academics, media, also recognized as an useful tool for public communication and policy analysis, helping policy-makers to underpin the development of data-based narratives and to take the most adequate decisions [11, 24, 25, 29].

As basic concept of the paper focusing the EU Member States and considering the bibliometric analysis requirements, the definition of composite indicators, quasi-generally accepted in the literature on this topic, has been stated in the Note on composite indicators presented at the consultation meeting of the European Commission held on 14 March 2002. According to it, composite indicators are compiled based on sub-indicators that have no common meaningful unit of measurement and there is no obvious way of weighting these sub-indicators [24, 30].

A composite indicator is constructed by the aggregation of a set of individual indicators, that provide a synthetic measure for a multidimensional phenomenon not directly observable [32].

From the definition itself and the large debates around the topic results a certain degree of subjectivism and uncertainty, which in fact are part of the exercise in the composite indicators construction, mainly because of the choices regarding the sub-indicators, the weighting methods, and the aggregation system, often implying a compromise between scientific accuracy and the information available.

On the other side, when the interest in assessing a particular complex system or a multidimensional phenomenon focuses on indicators listed individually next to each other, the overall picture risks being distorted by paying too much attention on just one dimension to the detriment of others, which is absolutely to be avoided, especially if comparing a set of countries [21, 31].

Composite indicators have gained many applications in all areas of research, tackling issues in wide-ranging fields [20, 27, 30]. For example, in 2005, a number of 165 leading composite indicators covering national governance, competitiveness, environment or other aspects and, in 2011, more than 400 official composite indices that rank or assess national performances according to several economic, political, social, or environmental indicators had been identified [2, 3, 24].

The main steps in composite indicators construction could be synthetized as (i) defining the phenomenon to be measured; (ii) selecting a set of individual indicators; (iii) normalizing the individual indicators; (iv) aggregating the normalized indicators; (v) validating the composite indicator. According to the specific area of investigation and the objective of the research, other steps, as preliminary exploratory data analysis or imputation of missing data could be added [17, 24, 32]. As underlined by Mazziotta and Pareto [19], according to a precise work paradigm, the first criterion that a composite indicator construction should comply with is the principle of parsimony, which states that it must be as simple as possible to allow an easy interpretation of results both in space and time, and the data processing should be reduced to minimum necessary.

From the perspective of this topic approach and, subsequently, the bibliometric analysis, it is worth mentioning that a composite index could provide comparisons between countries and help effectively ranking them. Its updating on a regular and standardized basis captures a synthetic and comprehensive image on the relative

progress over time of considered countries (as the EU Member States). By monitoring changes in their rank and benchmarking the mutual and relative progress in a variety of domains, become easier to understand its main determinants in terms of economic development level and the advance of real convergence [22].

Analyzing the axiomatic system underlying the construction of composite indicators for ranking countries, Munda and Nardo [23] proposed an approach featuring an axiomatic system completely explicit and a minimum degree of imprecise assessment and technical uncertainty. Based on these features, they argue that the overall quality of any composite indicator depends on the information available, individual indicators and variable chosen, direction of each indicator, their relative importance, the choice of weights and the aggregation convention that could ensure the consistency between the assumption used and the ranking obtained, adding also conditions of transparency and interpretability to achieve the coherence of indicators. A successive optimization procedure could allow weights to be fitted complying with pre-specified values of importance, refining, and simplifying the aggregation [6].

The issue of catching-up the development gaps between the rich and the poor countries could also be approach in terms of convergence rate [4, 5, 10, 12, 16, 28]. But except for within group convergence or some particular countries (notably the East Asian Tigers) the "iron law of convergence" according to which countries are expected to eliminate gaps in real per capita GDP at a growth rate of around 2% per year does not hold at global level, even if it would result after many decades. The achievement of full convergence is decisively influenced by the initial conditions, factor endowments, large cross-country differences and particularities, the endogenous factors, and many other aspects beyond the economic variables.

A Catch-Up Index as a composite index, was launched in 2012 and developed by the European Policy Initiative of OSI Sofia, initially designed to capture the level of convergence or divergence of the 10 countries that join the EU in 2004 in matching the Western part of the EU [14]. Subsequently, the Catch-Up Index has been extended for 35 countries, including the EU candidate and potential candidate countries [15].

This composite index contains four categories (Economy, Quality of Life, Democracy and Governance) with equal weights, including 47 indicators and sub-indicators. The related raw data is rescaled from 0 to 100 (from lowest to highest) and converted into scores which are weighted based on the importance assign to them by an expert team, resulting a standardized score for each country, that allow their ranking from 1 to 35 (from highest to lowest). This is a relatively simple method, has many limitations, but could be relevant and helpful in international comparisons and rankings, including for monitoring the performances of countries at different timespans under the circumstances of adequate comparability degree and analytical data quality.

A similar method has been used by Albu et al. [1], constructing a composite index called Relative Gap Scoring (RGS) for comparative assessment of Romania's development level within European Union in 2007, the year of country's accession to the EU. A number of 5 economic indicators and 5 social indicators were selected, considered as significant for the prospective of the real convergence. The RGS index

is based on a scoring calculation depending on the quotient of each indicator level for a certain country and of the country ranked first (the country leader for the respectively indicator). By dividing a certain level of an indicator to the maximum recorded in the leading country, the statistical data are normalized and the option for geometric aggregation avoided the situation when, under the circumstances of a close development level between two countries, the one which holds ranks much different within the hierarchy of various indicators (some ahead, some in the back) would be favored compared to the other which has similar (more balanced) positions on most (or all) indicators. The final RGS score for 2007 ranked first Denmark, followed by Sweden and Luxembourg, Romania being placed just on the 26th position, only before Bulgaria, which was appreciated as consistent with the economic and social realities of that time.

Despite the growing interest on the construction of composite indicators, there are many limitations because of integrating a large amount of information and some methodological shortcuts, and the results have to be used with caution, especially in the policy analytic work. It is worth mentioning that, to mitigate these problems, the European Commission and OECD have undertaken joint efforts in developing quality guidelines covering all the phases of statistical production process [9]. However, the validity of composite indicators is intrinsically linked to their construction, and there is no element to be above criticism [11]. When a measurement model is defined, assuming a specific direction of causality between the measures, i.e., individual indicators and the latent variable, i.e., the phenomenon to be measured become of essential importance [18].

As pointed out by Terzi et al. [32], the main issues are far from being fully explored and/or solved, the existent literature gap on composite indicators being related to the development of different frameworks that should lead to an increased attention to connected issues such as data-driven weights, subjective approaches, dichotomous variables, association sensitivity and inequality.

1.3 Methodology

The bibliometric analysis is used to synthetize, emphasize, and systematically present the literature review in a quantitative manner [8, 26, 36]. This type of analysis focuses on emphasizing the evolution in time, space and of topics from the scientific publications on various themes searched within international databases, such as Web of Science, Scopus, Google Scholar, and others. However, this research focuses only on Web of Science due to its high impact on scientific world, as well as due to the high information which should have been presented when considered multiple databases. As well, this study highlights the most prolific and the most cited authors, the main research fields of these publications, the type of access, the type of papers, the funding organizations, and the language used for presenting the results. In addition, the main key topics and their relationships will be exposed through a network map with the help of the Vosviewer software [34].

These maps consist of circle labels and lines to illustrates the weight of a topic within the map and its relationships with other topics [33, 34: 14]. The higher the circle is, the higher the weight of a topic is [33]. The same applies to the relationship lines: the thicker the lines are the stronger the relationships are [33, 34: 14]. Also, the maps illustrate clusters which are represented through different colors, ranging from red, which indicates the highest density of a topic, to green, and to blue, which indicates the lowest density of a topic, by default [33, 34: 14–17].

The bibliometric technique was performed using the publishing information from the Web of Science (WoS) database between 1978 and August 2022, based on the following two search inquiries:

1. A general one: "convergence index" (Topic) AND "multidimensional index" (Topic) AND "country ranking" (Topic) AND "international comparison" (Topic) AND "weighting system" (Topic) AND "composite indicator method" (Topic) OR "multi-criteria analysis" (Topic).
2. A more in-depth one: "composite indicator" (Topic) AND "index" (Topic).

1.4 Results and Discussions

1.4.1 General Inquiry – Topics "Convergence Index" AND "Multidimensional Index" AND "Country Ranking" AND "International Comparison" AND "Weighting System" AND "Composite Indicator Method" OR "Multi-criteria Analysis"

Evolution of the Number of Publications During the Period 1978–2022

According to the Web of Science (WoS) (2022), out of the 3190 results, 93.92% publications appeared after 2005, although the first interest about the topic search through the general inquiries was shown in 1978, as it could be seen in Fig. 1.1.

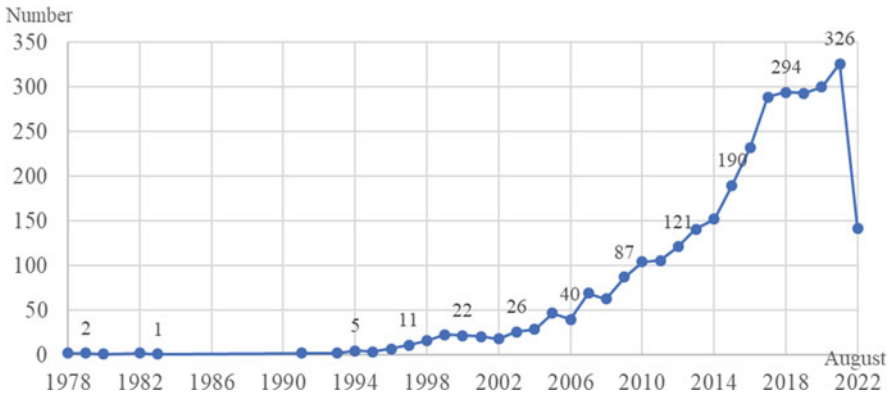

Fig. 1.1 The evolution of the number publications based on the "general inquiry" on Web of Science database overtime. (Source: Author's own research based on WOSviewer software)

The information during 1978–1999 represent only 2.45% of all analyzed data in the considered timeframe, and the biggest focus was on multi-criteria analysis performed on regional or business level in the field of location decisions, risk assessment, business management, trade, property investment, agriculture, and environmental issues. More recently, the papers talk about social, environmental, and economic issues, such as sustainable development-related topics, gentrification, COVID-19 and other diseases, security, and so on.

The highest number of papers were included in the following research fields: environmental sciences ecology, engineering, science technology, business economics, computer science, and energy fuels, with more than 10% of the papers for each category. It is important to mention that one paper could be placed in several research fields. Most publications were articles, 73.51%, followed by 26.21% proceeding papers, 2.88% reviews, 2.41% book chapters, and other types of papers. Only about 3% were available for free read. Surprisingly, most papers were written by European-affiliated authors. Also, the highest number of the publications were affiliated with Italy, Spain, England, USA, Poland, and France, each of them with more than 5% of the results. The top five funding organizations were: European Commission, National Natural Science Foundation of China, Conselho Nacional de Desenvolvimento Cientifico e Tecnologico, Coordenacao de Aperfeicoamento de Pessoal de Nivel Superior, and UK Research Innovation. In addition, approximately 97% of the papers were written in English, while Spanish with 0.82% and Portuguese with 0.31% represent the next languages used after the overwhelming majority.

Network Maps of 60% Most Relevant Key Topics Considering the Title, Keywords, and Abstracts

When considering the title, the keywords, and the abstract of the 3190 publications found based on the seven criteria used, the network map is created from 892 words of the 56,129 terms in total with a minimum of 20 occurrences each. This frequency is considered due to the high number of words from the analyzed publications, and because in this way it allows for a better observation of the 591 key topics.

The network map presented in Fig. 1.2 illustrates 535 terms with a frequency higher than 20 per word, which represent the 60% most relevant words within the analyzed publications between 1978 and August 2022, according to the WOSviewer software [34].

It can be observed that three clusters arise. First, the red one focuses on solutions for increasing sustainability in various fields, such as energy, business, waste management, buildings, through various methods, projects, and collaborations. Second, the blue one, which is small, it emphasizes the climate change mitigation and adaptation solutions in different fields, such as agriculture, biodiversity and natural resources management, forestry, and industry. Third, the green one focuses on space management and software applications. Further, the highest frequencies, illustrated through the bubbles' dimensions, is registered by the following words, with more than 400 occurrences per term: area, decision, factor, alternative, project, selection, solution, cost, region, technology, sustainability, map, option, risk, index, stakeholder, and design.

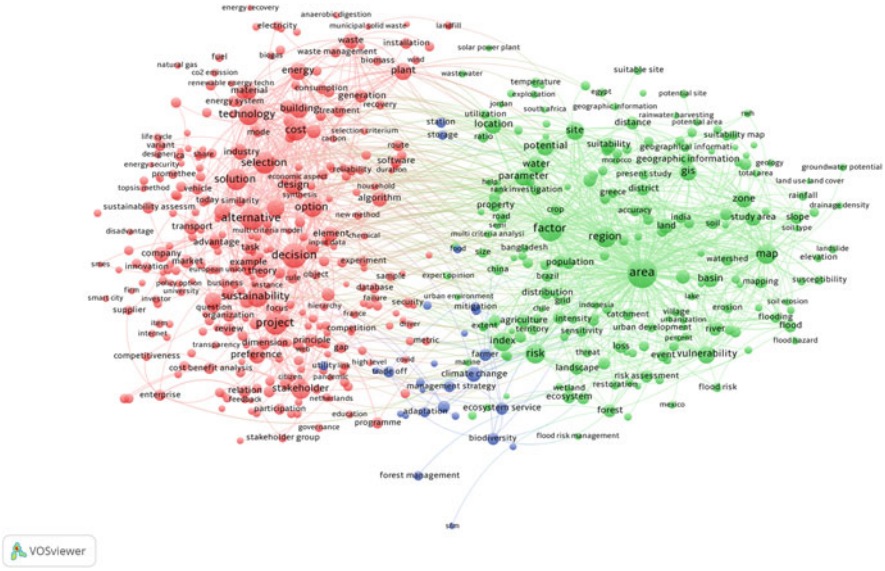

Fig. 1.2 Network map of the 60% most relevant key topics based on the "general inquiry" from the Web of Science publications, by clusters. (Source: Author's own research based on WOSviewer software)

The terms with more than 200 occurrences are: site, parameter, GIS, energy, location, plant, building, sector, water, potential, vulnerability, preference, concept, zone, basin, choice, waste, algorithm, example, study area, material, suitability, company, land, industry, element, transport, and climate change. Meanwhile, the highest relevance is considered for the following words: SMES, enterprise, groundwater potential zone, multi actor multi criteria analysis, competitiveness, drainage density, landslide, energy recovery, SDGS, susceptibility, flood hazard, elevation, MCDM method, land use, land cover, supplier, smart city, remote sensing, natural hazard, rainfall, flood, item, benchmarking, analytical network process, soil type, soil erosion, transport sector, slope, relation, Internet, natural gas, student, flooding, electric vehicle, firm, energy security, success, geology, mobility, and investor, with a relevance score equal or more than 2.00.

It is important to bear in mind that sometimes the topics mentioned in the title, the keywords and the abstract of the publications have sometime no in-depth discussion within the body of the scientific papers, making this one limitation of these types of network maps created with VOSviewer [37].

If we look at the evolution in time of the main topics, Fig. 1.3 emphasizes it during time, by considering the key topics with more than 20 frequency per word.

Furthermore, the most prolific five authors are Cathy Macharis with 50 papers, Dagnija Blumberga with 30 papers, Petr Moldrik and Dalia Streimikiene with 14 papers, and Manfred J. Lexer with 13 papers. However, the most cited authors

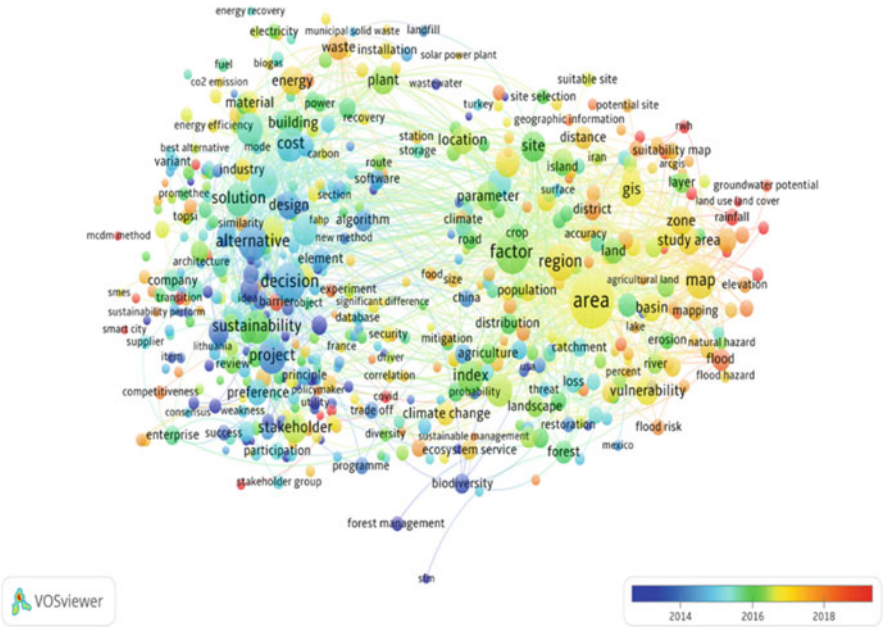

Fig. 1.3 Network map of the 60% most relevant key topics based on the "general inquiry" from the Web of Science publications, by time. (Source: Author's own research based on WOSviewer software)

are Deng, H.; Yeh, C. H. and Willis, R. J. with 583 citations, Munda, G. with 441 citations, Tzeng, G. H.; Lin, C. W. and Opricovic, S. with 399 citations, Kiddee, P.; Naidu, R. and Wong, M. H. with 382 citations, and Lahdelma, R.; Hokkanen, J. and Salminen, P. with 346 citations.

Yet, these are relatively old papers, between 1998 and 2013. Their research focus on business performance hierarchy, methodological approaches of social multi-criteria evaluation, comparison of alternative-fuel buses, overview of electronic waste management, and methodological approaches of stochastic multi-objective acceptability analysis.

Network Maps from Web of Science Most Cited and Most Recent Publications Additionally, the word association of the most cited 1000 publications are represented in Fig. 1.4, by considering the key topics with more than 20 frequency per word.

These most cited 1000 publications gathered 22,258 terms from which 304 key words had the frequency higher than 20. So, Fig. 1.4 illustrated 182 terms, which represent 60% most relevant words within the most cited 1000 analyzed publications, according to the WOSviewer software [34].

Thus, it can be observed that four clusters arise. First, the red one focuses on technology and performance aspects of sustainability in different sectors, such as energy and industry. Second, the blue one emphasizes methodological topics, such as problem, decision, review, stakeholder preference, technique, and AHP. Third, the yellow one focuses on climate change and other environmental issues related to

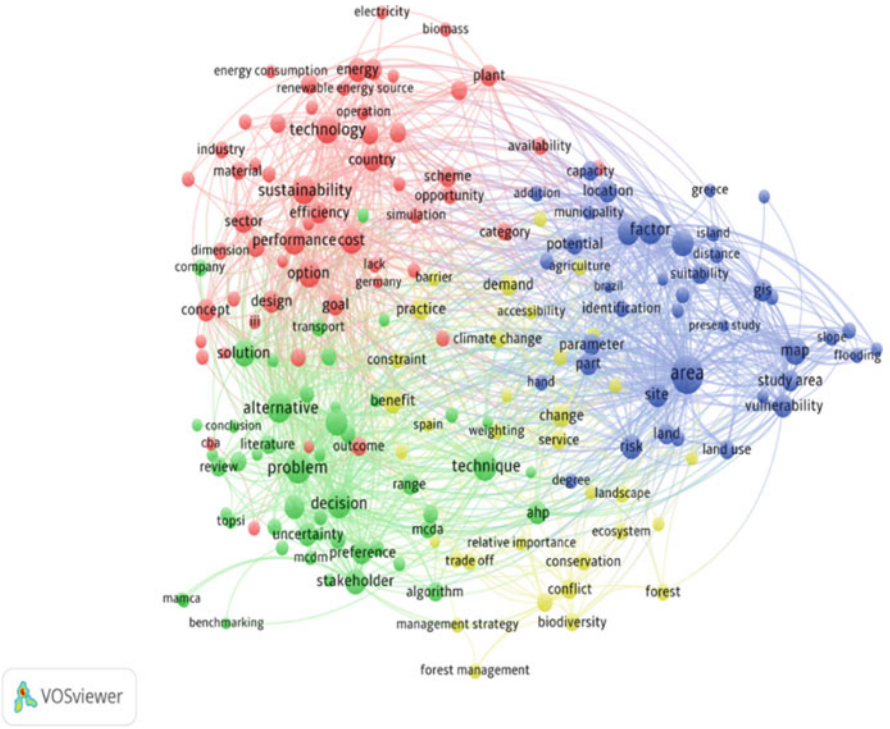

Fig. 1.4 Network map of the 60% most relevant key topics based on the "general inquiry" from the Web of Science 1000 most cited publications, by clusters. (Source: Author's own research based on WOSviewer software)

agriculture, demand, service sector, ecosystem management, and forest management. Fourth, the blue one has topics related to the space management and spatial software applications.

Further, the highest frequencies, illustrated through the bubbles' dimensions, is registered by the following words, with more than 200 occurrences per term: area, problem, alternative, decision, factor, technique, sustainability, technology, performance, map, option, selection, solution, cost, and region.

While, the terms with more than 100 occurrences per term are: index, stakeholder, risk, site, energy, decision making, benefit, preference, country, vulnerability, uncertainty, AHP, sector, design, part, GIS, concept, location, change, plant, practice, efficiency, waste, potential, goal, parameter, scheme, demand, study area, and land.

Meanwhile, the highest relevance is considered for the following words: sensitivity, review, similarity, management strategy, support, ecosystem service, stakeholder, strength, emission, environmental impact, environmental performance, greenhouse gas emissions, concept, adoption, and waste, with a relevance score more than 1.00.

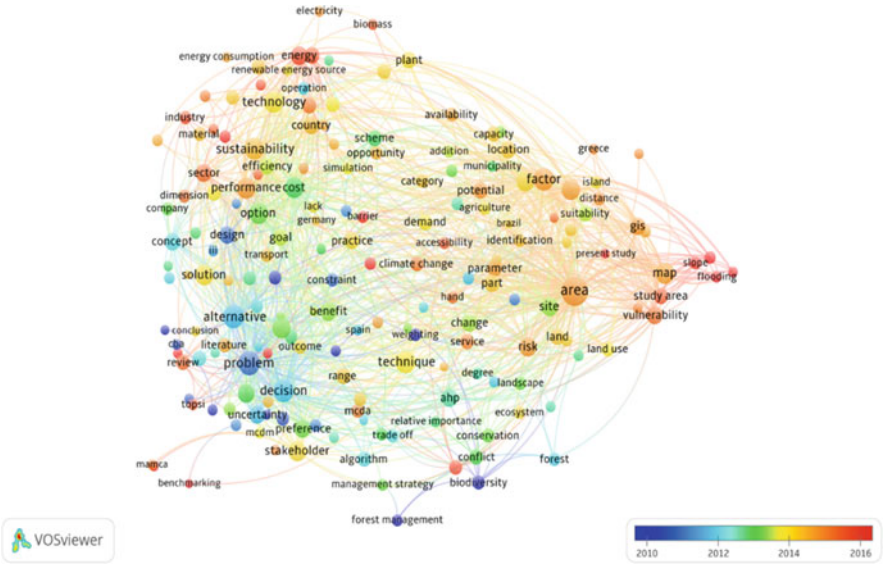

Fig. 1.5 Network map of the 60% most relevant key topics based on the "general inquiry" from the Web of Science 1000 most recent publications, by time. (Source: Author's own research based on WOSviewer software)

If we look at the evolution in time of the main topics from the most cited 1000 publications from WOS according to the search criteria, Fig. 1.5 emphasizes it during time, by considering the key topics with more than 20 frequency per word.

Next, when looking at the most recent 1000 publications from WoS according to the search criteria, 23,895 terms were found, from which 344 key words had the frequency higher than 20. So, Fig. 1.6 illustrated 206 terms with more than 20 frequency per word, which represent 60% most relevant words within the most recent 1000 analyzed publications, according to the WOSviewer software [34].

Thus, it can be observed that four clusters arise. First, the red one focuses on sustainability related issues and their assessment, application, and performance, as well as finding the best solutions for improving the status quo. Second, the green one emphasizes risk assessment in the context of increased extreme weather events and natural resource problems, as well as methodological topics related to AHP, MCDA, and GIS applications. Third, the blue one focuses on the assessment of different aspects through indices and ecosystem management. Fourth, the yellow one has as important topics the health issues related with the pandemic situation and the sustainable development goals.

Further, the highest frequencies, illustrated through the bubbles' dimensions, is registered by the following words, with more than 200 occurrences per term: area, paper, indicator, decision, factor, application, data, framework, performance, strategy, region, solution, alternative, map, risk, selection, cost, and sustainability.

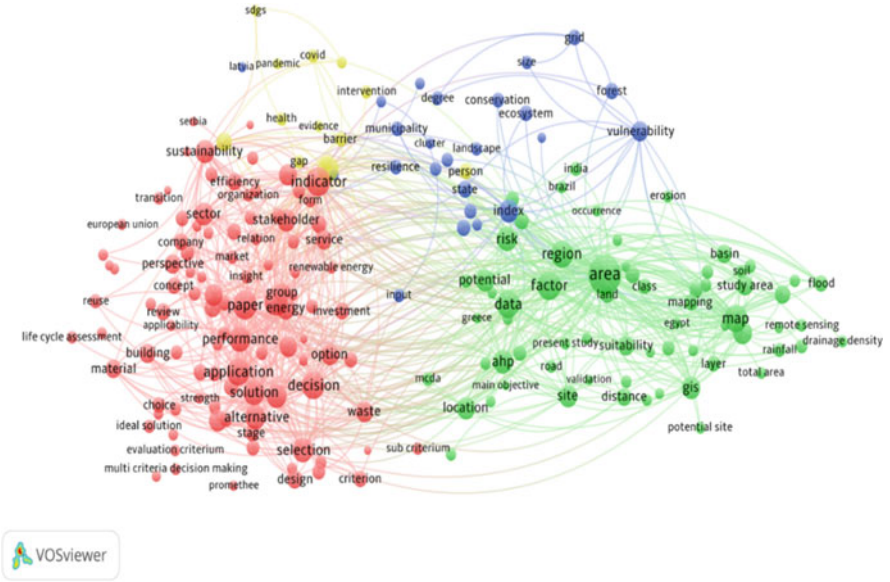

Fig. 1.6 Network map of the 60% most relevant key topics based on the "general inquiry" from the Web of Science 1000 most recent publications, by clusters. (Source: Author's own research based on WOSviewer software)

While, the terms with more than 100 occurrences per term are: AHP, sector, index, stakeholder, technology, energy, site, policy, location, project, term, potential, zone, GIS, option, waste, group, service, vulnerability, building, design, perspective, preference, basin, suitability, material, goal, and ranking.

Meanwhile, the highest relevance is considered for the following words: drainage density, remote sensing, elevation, slope, rainfall, grid, land cover, flood, landslide, flooding, SDGs, zone, study area, map, total area, forest, soil, layer, basin, vulnerability, MCDM method, energy consumption, and mapping, with a relevance score between 2.00 and 4.69.

Also, the following topics have a relevance score between 1.00 and 1.99: GIS, suitable area, spatial analysis, reuse, Czech Republic, sustainable development goals, energy efficiency, circular economy, sustainability assessment, material, pandemic, transition, Egypt, India, occurrence, variant, accuracy, ideal solution, evaluation criterium, multi criteria decision making, actor, building, company, competitiveness, European Union, degree, environmental impact, distance, COVID, choice, review, author, similarity, and suitability. Environmental performance, greenhouse gas emissions, concept, adoption, and waste.

If we look at the evolution in time of the main topics from the most cited 1000 publications from WoS according to the search criteria, Fig. 1.7 emphasizes it during time, by considering the key topics with more than 20 frequency per word.

So, looking at Figs. 1.4, 1.5, 1.6 and 1.7, it can be easily observed an increased interest about assessing health issues, especially in the context of the COVID-19

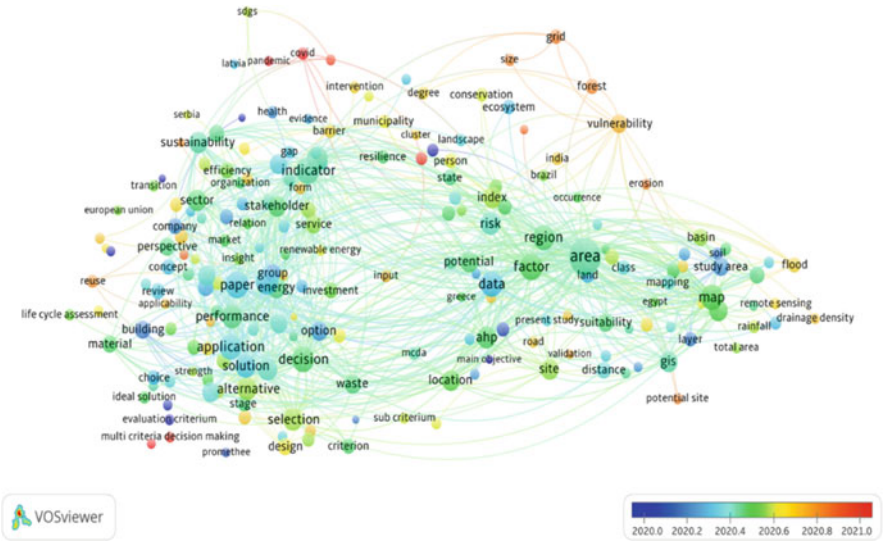

Fig. 1.7 Network map of the 60% most relevant key topics based on the "general inquiry" from the Web of Science 1000 most cited publications, by time. (Source: Author's own research based on WOSviewer software)

pandemic. Also, the topics have extended on all sectors of economy, demonstrating a higher interest from researchers on both intrasectorial collaborations and between sectors. The digital applications in tackling sustainability-related challenges have as well increased, which allows for adopting faster solutions.

1.4.2 In-Depth Inquiry: Topics "Composite Indicator" and "Index"

According to the Web of Science (WoS) (2022), out of the 850 results, 97.06% publications appeared after 2005, although the first interest about the topic search was shown in 1991, as it could be seen in Fig. 1.8.

The information during 1991–2012 represent only 12.24% of all analyzed data in the considered timeframe, while the peak was reached in 2020 with 15.77% of publications only for this year.

The highest number of papers were included in the following research fields: business economics, environmental sciences-ecology, social sciences-other topics, science technology-other topics, and sociology, with more than 10% of the papers for each category. It is important to mention that one paper could be placed in several research fields. Most publications were articles, namely 89.4%, followed by 9.4% proceeding papers, 2.8% reviews, 2.1% book chapters, and other types of papers. Only about 2.9% (25 papers) were available for free read. The top publishers were: Elsevier, Springer Nature, MDPI, Taylor & Francis, and Wiley, with over 4.5% of

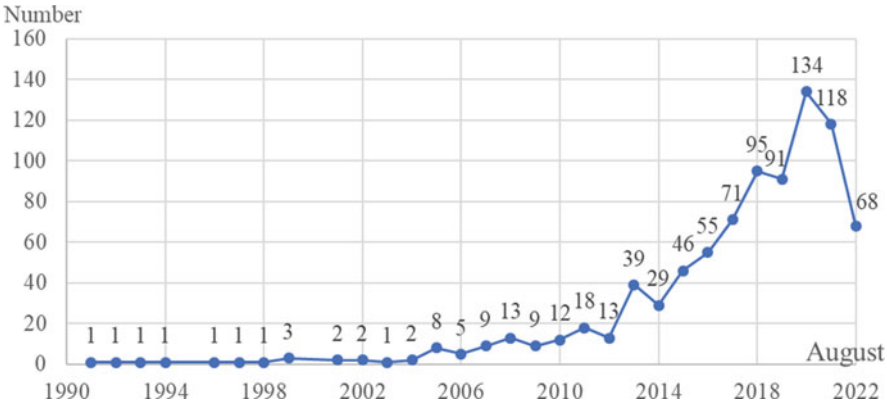

Fig. 1.8 The evolution of "composite indicator" and "index" publications on Web of Science database overtime. (Source: Author's own research based on WOSviewer software)

papers (39 publications) each. It is interesting that the first two publishers have 30.35% and 22.94% of publications on "composite indicator" and "index" compared to the other publishers on this topic. Further, the top five journals which publish on this topic are: Social Indicators Research (11.5%), Ecological Indicators (4.1%), Sustainability (4%), European Journal of Operational Research (2.4%), and Journal of Cleaner Production (2.1%). The top five funding organizations were: European Commission, National Natural Science Foundation of China, Spanish Government, UK Research Innovation, Conselho Nacional de Desenvolvimento Cientifico e Tecnologico. Also, the highest number of the publications were affiliated with Italy, Spain, USA, and China, each of them with more than 10% of the results. In addition, approximately 96.8% of the papers were written in English, while Russian with 1% and Spanish with 1% represent the next languages used after the overwhelming majority.

Furthermore, the most prolific five authors are Nicky Rogge with 14 papers, Zhou Peng with 12 papers, Elke Hermans with 11 papers, Siir Kilkis and Shen Yong Jun with 10 papers. However, the most cited authors and papers between 1991 and August 2022 are publications written by a high number of collaborators: Vos et al. [35] with 1474 citations, Bray et al. [7] with 1291 citations, Kassebaum et al. [13] with 1166 citations. All three talk about health issues at global level.

Additionally, when considering the title, the keywords, and the abstract of the 850 publications found based on the used inquiry, the network map is created from 258 words of the 16,741 terms in total with a minimum of 20 occurrences each. This frequency is considered due to the high number of words from the analyzed publications, and because in this way it allows for a better observation of the key topics.

The network map presented in Fig. 1.9 illustrates 155 terms with a frequency higher than 20 per word and which represent the 60% most relevant words within the analyzed publications between 1991 and August 2022, according to the WOSviewer software [34].

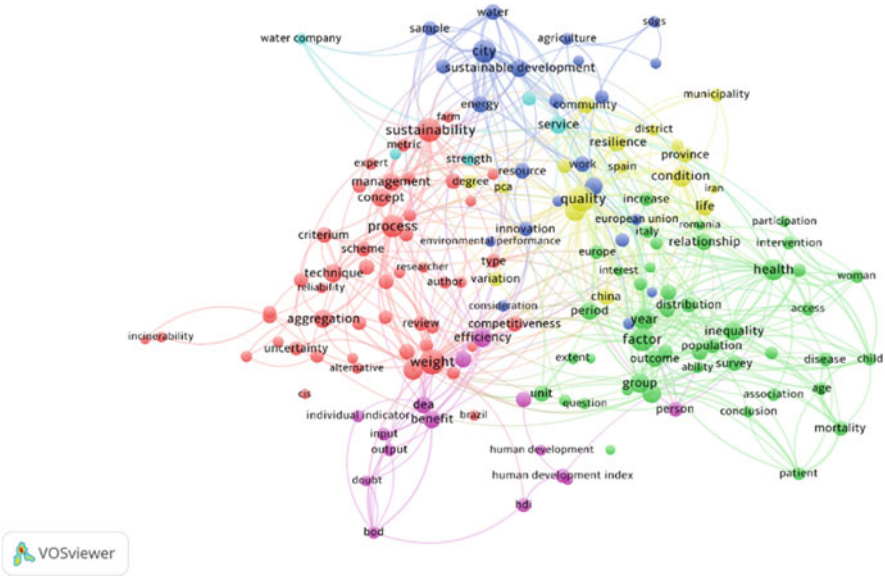

Fig. 1.9 Network map of the 60% most relevant key topics of the "composite indicator" and "index" publications from the Web of Science, by clusters. (Source: Author's own research based on WOSviewer software)

It can be observed that six clusters arise. First, the red one, which includes terms such as aggregation, process, case study, choice, indicators, criterium, expert, decision making, focuses on methodological approaches and stakeholders' involvement in the process of developing indices. Second, the green one, which includes terms such as ability, inequality, disease, education, health, Europe, intervention, disease, it emphasizes the social aspects considered in the development of composite indicators. Third, the blue one, which includes terms such as city, agriculture, climate change, comparative analysis, economic development and growth, energy, environmental performance, innovation, resource, SDG, scenario, it focuses on sectorial approaches of economy for achieving sustainable development. The last three, which are smaller, the yellow, the purple, and the light turquoise clusters, refer to quality of life, community involvement, and human development index.

Further, the highest frequencies, illustrated through the bubbles' dimensions, is registered by the following words, with more than 200 occurrences per term: weight, quality, and sustainability. The terms with more than 100 occurrences are: city, factor, process, year, health, vulnerability, condition, construction, group, risk, efficiency, resilience, concept, inequality, aggregation, technique, and service. Following, the terms with more than 90 occurrences are: sustainable development, progress, period, life, management, benefit, and relationship. Meanwhile, the highest relevance is considered for the following words: opportunity, participation, water company, inequality, sensitivity analysis, HDI, scenario, CIS, agriculture, sample, conclusion, individual indicator, aggregation method, input, energy poverty, city,

output, water, SDG, sustainable development, capita, resilience, DEA, uncertainty, association, selection, choice, ability, environmental performance, future, and background, with a relevance score between 1.00 and 1.83.

1.5 Conclusions

This article represents a synthesis of the results of the research carried out by the authors in a first stage of their approach aimed at building a composite indicator, able to capture a comprehensive image on the relative progress over time of the Member States of the European Union from the perspective of real convergence and which facilitate comparative analyses between Member States.

The conclusions from the scientific literature review were completed with a bibliometric analysis carried out with the help of Vosviewer software, based on publications from Web of Science, for the period 1978–2022. The bibliometric technique was performed based on two search inquiries: a general one with topics: "convergence index" AND "multidimensional index" AND "country ranking" AND "international comparison" AND "weighting system" AND "composite indicator method" OR "multi-criteria analysis" and a more in-depth one with topics: "composite indicator" AND "index." This is the first bibliometric analysis on this topic.

On the others, the analyses carried out allowed the analysis of the evolution of the number of publications during the period 1978–2022, the generation of network maps and the identification of resulting clusters for the 60% most relevant Key topics considering the title, keywords, and abstracts of the articles and from 1000 most cited and most recent publications.

Among the main conclusions resulting from the analyzes, which provide important inputs for the second stage of the research aimed at building a composite indicator, we note as important:

– The growing interest of researchers in this field, the number of articles in Web of Science database, with topics as: convergence index, multidimensional index, country ranking, weighting system, composite indicator method and multi-criteria analysis increasing from 2 in 1978 and 5 in 1998 to 294 in 2018, 326 in 2021 (93.92% of the articles being concentrated in the period 2005–2022). Convergence indicators, multicriteria analyses, etc. are predominantly in the attention of researchers concerned with the identification of solutions for increasing sustainability in various fields, climate change mitigation and adaptation solutions in different fields, as well as from space management and software applications. The publications with these topics by the most prolific and most cited authors are relatively older (between 1998 and 2013) and have as research focus: business performance hierarchy, methodological approaches of social multi-criteria evaluation, comparison of alternative-fuel buses, overview of electronic waste management, and methodological approaches of stochastic multi-objective acceptability analysis (results from general inquiry). The highest

number of the publications were written by European-affiliated authors, and the top of funding organizations is led by the European Commission.

- The increasing trend of interest of researchers publishing in Web of Science on topics as composite indicator and index: from one publication in 1990, to 2 in 2000, 12 in 2020, 134 in 2019 and 118 in 2020 (97.06% published after 2005). This indicate a significant increased interest in composite indicators lately, especially when the limitations of quantitative approaches are increasingly debated, especially when considering the social and environmental aspects of life, which mainly are qualitative factors and it is hard to attribute a number to compare them or to assess them. Five research fields concentrated more than a half of the number of research papers: business economics, environmental sciences-ecology, social sciences-other topics, science technology-other topics, and sociology, with more than 10% of the papers for each category. The first two clusters aroused, with the highest intensity (with a frequency higher than 20 per word and which represent the 60% most relevant words within the analyzed publications) includes terms such as aggregation, process, case study, choice, indicators, criterium, expert, decision making, focuses on methodological approaches and stakeholders' involvement in the process of developing indices (the red one) and terms such as ability, inequality, disease, education, health, Europe, intervention, disease, it emphasizes the social aspects considered in the development of composite indicators (the green one). It is relevant for this paper that also in this case the highest number of the publications were written by European-affiliated authors, and the top of funding organizations is led by the European Commission.
- From the point of view of the research limits, it is important to bear in mind that in some cases the topics mentioned in the title, the keywords and the abstract of the publications have sometimes no in-depth discussion within the body of the scientific papers, making this one limitation of these types of network maps created with Vosviewer [36, 37]. Future research could extend the inquired databases, as well as performing corpus-based analysis of full text publications on the topic.
- Also, this research is based only on publications from the international Web of Science database, future analyzes may include other recognized databases.

Starting from these conclusions, in the next stage, as mentioned in the content of the article, the authors must identify solutions that respond to the important challenges arising from: selecting the individual indicators based on which to build the composite one; normalizing the individual indicators; aggregating the normalized indicators and validating the composite indicator.

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Chapter 2
Motivation 'After Work': The Right to Retire Versus the Right 'Not to Retire'

Valeriu Ioan-Franc and Andrei Marius Diamescu

Abstract The debate on the management of public pension systems seems to be stimulated rather by the cyclical 'dysfunctions' in the budget implementation and less by the true intention of offering solidity and predictability to a public system that is crucial to the balance and health of the nation. For a more solid credibility offered by the detailed knowledge of the system, we are taking the liberty of illustrating the essential aspects with details on the pensions and pensioners in Romania, without leaving aside the European community or global approaches. It has been said repeatedly in the recent years that the pension system is in a deep crisis or even on the verge of collapse! Some 'specialists' have strongly argued that the entire theory at the basis of the current pension system is an outdated, anachronistic in relation to the current economic and demographic evolutions. Our intervention brings to the fore aspects on the economy of longevity, of human rights to ensure motivation after work, a form of minimum comfort that society must provide for its members at the age when choice is increasingly difficult.

Keywords Pension system · Retirement · Motivation for work

2.1 Introduction

We have been witnessing for too many years already, in our opinion, a wide debate between the factors responsible for the sustainability of the public pension system in Romania and not only.

Sometimes included in concerns present in the wider, European space, or nationally, at other times, the debate on the management of public pension systems seems to be stimulated rather by the cyclical 'dysfunctions' in the budget implementation and less by the true intention of offering solidity and predictability to a public system that is crucial to the balance and health of the nation. For a more solid credibility

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offered by the detailed knowledge of the system, we are taking the liberty of illustrating the essential aspects with details on the pensions and pensioners in Romania, without leaving aside the European community or global approaches.

The 'scarcity' of such approaches is finally revealed by the identified solutions, most frequently of an 'accounting' nature, targeting only the reduction of budgetary spendings on pensions and rarely system, complex ones, targeting the ensuring of a decent living for the people who reached the age of retirement.

Moreover, through certain measures circulated in the political and, to the same extent and even more, public debate, some of these even applied at certain times, the free labour market has been significantly distorted, affecting the right to work of certain categories of persons. This in an extremely hard to understand aspect, giving that, like many other EU countries, Romania also faces a lack of labour force, inclusively in areas that are essential to the future of the nation, a situation that is overwhelmingly the responsibility of the state to resolve. And education is overwhelmingly responsible, too.

Lastly, the 'ease' with which the pension system has been intervened in the last 20 years, sometimes brutally, inclusively by changing the fundamental principles during the 'game' – see the way of using principles such as social insurance contributions, social importance of the activity/work carried out, compensation for the restriction of certain rights and citizenship liberties following the exercised profession, etc. – have left, practically, the pensioners 'at the hand of fate', being deprived of any possibility of projecting, even on a short term, their incomes.

The most serious consequence of the way the Romanian pension system was managed is, however, the damage to the prestige that the retired population should enjoy in a healthy society. The frequent, perhaps 'too frequent' presentation of pensioners as simple and 'merely' resource consumers lead to their social marginalisation and even antagonisation versus other population categories who are unhappy with the 'burden' they have to bear to pay the pensioners. In other words, the undermining of the fundamental principle on the basis of which the current pension system was built – solidarity between generations – was a counter performance successfully achieved.

2.2 Literature Review

Our preoccupations, be they within the frame of the research programmes of the 'Constantin C. Kiritescu' National Institute for Economic Research, or individual, as participants in our own name in national or international scientific reunions, materialised in numerous primary and secondary scientific publications, devoted to the topic we address. Making the most of a significant volume of papers facilitated the substantiation of ideas and conclusions. The Romanian national literature after 1990 (the beginning of transition from the command economy to the market economy) has its important milestones: research on the dimension of poverty in Romania [16]; macroeconomic, demographic evolutions and pension reform [6];

human capital and economic performance [9]; challenges for social protection, derived from demographic ageing and labour market evolutions [12]; motivation at work [15]; reform and meta-reform in Romanian society [3]; evolutions of work remuneration and work motivation [4]; globalisation and position of Romania in the European and global socioeconomic space [13]; the behaviour of society with special focus on the psychology of those who have long passed the third age [10].

To the same extent, the referential, not only fundamental but dedicated to the area, works in the research field are significant and allowed the formalisation of rational points of view, thus we cite, among them, the process of people reformation [11], the principles of economy in a postcrisis world [8], the comparative analyses of the pension systems in Switzerland, Belarus, Finland, Mexico, Spain, Portugal to highlight a possible future of the active systems of capitalising labour force in the third age [5].

Some of the suggestions we formulated were debated in scientific reunions dedicated to humanistic economy at the Barcelona Economic Network [7].

From all these resources/ research sources we drew those foundations dedicated to the wellbeing of the people in the advanced age of entering the third millennium of human civilisation.

2.3 Methodology

Our intervention at the International Conference ESPERA 2021 (Theoretical, Empirical and Practical Approaches) of 'Costin Kiritescu'[1] National Institute of Economic Research – Romanian Academy is built cumulatively on the author's research experience in the field on the one hand and on significant research of the literature in the field on the other hand.

Also, although the text does not make direct references to the great volume of data and factual information sought, national statistical data (made available by the National Institute for Statistics) as well as international data (mainly OECD studies) on the field have been considered. In fact, for the veracity of the references to factual sources, some data initially included in the oral intervention of December 2021 have been reconfirmed by the releases made public by the time of the publication of our study. This made the analyses possible and, beyond desk research, over the years we had the opportunity to bring ideas and lines of reflections to the attention of the academic scientific community. We are even convinced that, through this way of working we brought to the fore or at least kept the field in the attention as well as the importance of finding solutions in a period of rearranging of the global economic order about which we theorised and hoped to go through peacefully, without

[1] Costin C. Kiritescu National Institute for Economic Research is the repository of the OECD research series having access to lines of documentation through the Romania-OECD Centre for Studies and Documentation organized in the Institute.

convulsions and complexes. The crisis of the recent years, starting with 2008, then the pandemic one culminating with the Russian – Ukrainian war – and, from there, the worsening of the energy crisis, the green economy, etc. – show that this new order will take place and consolidate in the least desired fashion or unforeseen at the beginning of the millennium. That is, when, through the objectives of the UN, the guidelines of sustainable development – economic, social, environmental and cultural-civilisational were transmitted to the entire civilised world.

The theories developed by academician T. Postolache, referring to the trigenerational society [14] in which successive (ages) but coexisting generations need to find the harmony of a coexistence ensuring self and social respect also through support economic systems were of real help and stay in our attention. An essay that went in the depths of the academician Postolache's theory is that of Ilie Badescu, a corresponding member of the Romanian Academy, in which he also analyses the civilisational crisis, universal consensus, the trigenerational individual and the new fundamental intellectual structure of the world [1].

2.4 The Obsession of Retirement Versus the Economics of Longevity

The syntagm obsession of retirement is not used only to pique our reader's interest. The moment of retirement, of the man's withdrawal from his work became obsessive both for the individual who is abruptly taken out of work on the day of his reaching the retirement age (when, in Romania, with few exceptions, individual employment contracts are automatically terminated under two organic laws – the Labour Code and the Pension Law). This thought/moment is obsessive because, in the last decades, the pension systems have no longer been able to adequately cover the needs and living standards of the ones who, until that moment – had a certain degree of existential security due to their salary – the motivation for work. It is obvious, not only in Romania, but in other countries too, that the income from contributory pension is significantly reduced while the cost of living is steadily increasing the degree of vulnerability of elderly pensioners.

Employers also have an obsession on the moment of retirement as, under the laws in force, they have to replace their experienced, responsible and committed employee with two or even three other positions to cover – at the same level of quality – the requirements of the job vacated through retirement. The labour market does not always and everywhere according to the terms of the theories with which they try to train young people for all the jobs and tasks necessary for the functioning of society. It is, also, the obsession of Romanian employees who see themselves forced to look for the labour force that the country is missing while more than four million people are working abroad. And there are millions of people at the age of fully active working power (30–40 years) and from attractive jobs for the countries of their choice.

As for the economics of longevity, a concept discussed at length in the past years and strongly promoted by the Barcelona School of Humanist Economics, centred around the Royal Academy of Economic and Financial Sciences – RACEF of the Institute of Spain, we try to explain, in what follows, the inequities accumulated over time, the foundations and requirements that have become increasingly obvious.

Affirmations have been made in the last years that the current pension system would be in a deep crisis or even on the verge of collapse! Some 'specialists' have strongly argued that the entire theory at the basis of the current pension system is an outdated, anachronistic in relation to the current economic and demographic evolutions. Our intervention brings to the fore aspects on the economics of longevity, of human rights to ensure motivation after work, a form of minimum comfort that society must provide for its members at the age when choice is increasingly difficult.

We proved the inconsistency of such statements in the study of two years ago 'Les personnes âgées entre le droit aux loisirs et marginalisation sociale' [7]. Continuing the argumentation in this study and taking as reference a gross salary of 4000 RON (corresponding to a net salary of approximately 2100 RON) it is easily noticeable that at a working age of 40 years an employee would accumulate a personal contribution to the social security budget of approximately 480,000 RON ($1000 \times 12 \times 40$). This amount would cover the payment of a pension equal to the salary for 19 years!

To the ones rushing to remind us that social security does not cover only the pensions of the ones with complete contribution period we are reminding that, in Romania, the pension generally does not exceed 65% of the net salary and, more importantly, the average life expectancy (at birth) is of only 74.2 years (78.4 for women and 70.5 for men) [18], which matches an average life expectancy at retirement of approximately 16.4 years for women and only of 5.5 years for men! Considering the data presented, it is easily noticeable, that, during his or her lifetime, a Romanian citizen with full period contribution is reimbursed 50% at the most of his or her contribution to the social security system, the difference remaining at the disposal of the state to cover the other needs in this area.

'Regardless of the way in which the purchase power of the pension is calculated, i.e. by relating the evolution of the nominal pension to the consumer price index or by relating the pension to the retail prices of goods and services, the data show that, currently, the pensioner is buying way less goods and services than in the past'. Perfectly contemporary, we may say, but, unfortunately, this conclusion was taken out from a study elaborated by the Institute for National Economy [6], published more than 12 years ago, when 'Romania was facing a deep economic crisis: output was in the third consecutive year of decline, unemployment was rising and [...] actual incomes of the population were reducing, payment balance and current account were in unprecedented imbalance, foreign debt service was pressing heavily on the rather modest foreign currency reserves, prices increase and the deterioration of the exchange rate of the leu were tending to get out of control'.

In the over 12 years since the elaboration of the mentioned study, multiple interventions have been enforced on the legal frame regulating the public pension system in our country, including the passing of two 'new' laws on the unitary public pension system [21], in their turn significantly amended.

However, ‘solutions’ such as the over taxation of special pensions, the progressive taxation of pensions, the changing, in some cases, to the principles of pension calculation, etc. are currently just as much presented and debated/disputed.

It is obvious, in our opinion, to any person of good-faith, that, in its current form, the pension system in our country had reached its limits. The mentioned measures are not but small accounting ‘artifices’ and, many times maybe, political ones, which do nothing but postpone the collapse and, worse still, redistribute poverty motivating it as ‘taking from the rich to give to the poor’.

‘The imperative of welfare reform has been on the national agenda for decades, but general interests have blocked any substantial change. Currently, the main barrier could be the negative inertia of the ideas received. . .’ [11]. These statements, which seem perfectly adjusted to current Romania, referred to the Chilean social protection system from the end of the seventh decade of the last century and were pronounced in 1978 by Jose Pinera, a doctor in economics from Harvard University, who would become the author of the reform of the Chilean social protection system and a leading figure in the modernisation process of his country.

Although published 22 years ago by Expert Publishing House of ‘Costin C. Kirițescu’ National Institute for Economic Research, Jose Pinera’s book did not seem to be of much interest to our country’s social protection decision-makers and, for this reason, we quote from its pages: ‘The inexistence of a relationship between contributions and benefits (not only between financial contributions and benefits – a.n.) and the attribute of political power to define who benefits and how much, configured a discretionary source of power which opened the way to demagogy and injustice. What government or political forces, with an eye on the next elections, could have resisted the discriminating solicitations of the high-pressure groups? And we very well know that it is not the poor who have the organization, financing, and power to exert pressure on the authorities. Nor is it the oppressed who know the secrets of bureaucracy and pension legislation that are impenetrable to the ordinary citizen. If one studies the profile of the pension system’s benefits, one notices that it strictly corresponds to the degree of power of the various groups of workers (professional – a.n.)’.

And if this quote is not enough either to attract the decision-makers’ attention, without seeking to review the paper of the Chilean economist, excellent, from our point of view, not for the criticism, but especially for the solutions proposed to reform the public pension system, we continue to draw attention to it: ‘Chilian history is the history of the governments who looked at the passing of their quarter of an hour with the indolence pertaining to naive virgins. They undertook the task of leading the country without a long-term vision. Once in power, the mistook urgency for importance and got tangled in the every day. When they understood, it was too late. For all their good intentions, despite the hustle and bustle of many feverish working days in which they dreamed of a better country, eventually things remained unchanged’.

Our return to the conception of Jose Pinera referring to the pension system should not be understood as a plea for it (although, according to some voices, the Romanian second Pillar of pensions was inspired precisely by this approach). We are certain

that the Chilean solutions are also perfectible or, how it was observed during the COVID-19 pandemic, are sensitive to shocks generated by early withdrawals, but what is really important to remember is the imperative of a reform 'from the ground up' of the current pension systems in our country and not only!

It is true that one of the main arguments in favour of such a reform is **the sustainability of the current public pension system**, but to stop at this motivation has the potential to induce the possibility of postponing such an approach as long as today (the data of our intervention's printing, a.n.), according to the National Institute of Statistics, the ratio between the average number of state social security pensioners and the average number of employees is 8–10 [20].

That which makes the reform of the current system an urgency is its incapacity to ensure pensioners a dignified and, moreover, a predictable life, a life that, unfortunately, at this moment we cannot talk about because of the gap between the average spendings of the population, calculated for 2021 at 1925 lei per person and the average state social security pension which, even in the Q1/2022 will not exceed, according to our calculations, 1772 lei [19].

Adding to this the fact that, in Romania, the value of the minimum consumption basket for a decent living for a single adult person, calculated for November, 2021, so prior to this year's wave of prices increase, was of 2708 lei per month. In other words, we can say that a large proportion of the pensioners in our country are in a dramatic situations, as their incomes covers only approximately 65% of the minimum necessary!

Symptomatically, maybe, for the attention that pensioners enjoy from the state is also the fact that, for almost two years, the National Institute for Statistics has been unable to calculate the value of the minimum consumption basket for a decent living, because of a material error existent in the legislation, the data we used being based on an analysis of the Friedrich Ebert Romania Foundation and Syndex Romania from November 2021, broadcasted by Mediafax news agency.

The constant reduction of real incomes obtained from pensions in Romania, and implicitly, the depreciation of pensioners' life quality is today an incontestable reality. However, it is completely wrong, in our opinion, to attribute this deterioration solely to demographic evolutions.

'Regardless of how we would analyse the demographic evolutions, they can't be avoided when or disregarded when considering the evolution and strategic planning of economic production structures. Population constitutes the first point of reference of any thinking and planning of the future of an economy, be it national, regional or global', warned, in the early 2000s, the renowned economist Constantin Ciutacu, while also sounding a serious alarm: 'If we don't do it for Romania, others will for sure include us in the equations of some scenarios, no matter how irrelevant we may think we are today' [3].

Looking at the today's state of a great part of the population of the country and, especially, at the percent of the pensioners whose incomes are way lower than the level of the spendings necessary for a decent living, Ciutacu's warning seems to have been, unfortunately, a 'prophetic' one.

The inclusion in the Constitution of Romania of the state's obligation to take 'measures for economic development and social protection so as to ensure citizens a decent standard of living' [17] proved insufficient to capacitate the ones who were at the helm of the country over the years to find the ways to achieve this constitutional goal.

It is not our task and we have not set out to identify those responsible for this unwanted state of the over-age population. But, from the multitude of causes that generated this situation, we can state, without fear of being mistaken, that defining factor for the 'underperformance' obtained was the erroneous foundation of the so-called 'pension system reform'.

In fact, almost all the reforms of the Romanian public pension system after 1990 had as a main goal the correlation of state revenues with pensions and social security expenses and not the assurance of a decent living for people in retirement!

Hence, it has not been understood that, just as 'in relation to the population, the economic structures can't be designed solely in terms of demand-supply-price-profit ratios, offered scholastically as solutions by the orthodox theory of the market economy' [3], so the balance of the revenues-expenditures in the national public budget is not enough for a real reform of the pension system which will meet the constitutional imperative of ensuring a decent living!

This is why we believe that any approach, in the pension area, which will not sit the human being and his or her satisfaction at its core will not represent by far a real reform aimed to grant sustainability and predictability to a public system, but another new 'correction' in the case of an already chronic disease which, inevitably, will do nothing but prolong the agony of the patient, without bringing any improvement.

Another serious consequence of the downplaying/disregard of the importance of the individual's degree of satisfaction in relation with the pension received is the actual distortion of the entire labour market by affecting motivation for, during and after employment.

2.5 Several Conclusions

In our vision, supported by the Barcelona School of Humanistic Economics and presented last year in the Barcelona Economic Network [7], the motivation component and, implicitly, the degree of satisfaction of the individual, play a crucial role both in selecting the options for a future work place and during the employment and, of course, after the termination of the employment.

From this point of view, school/education is in most cases supported motivationally by the desire to take up a particular job, the salary/remuneration is nothing else but the reward but, at the same time, the motivation for work, while the pension can easily be considered motivation for the 'after work' period.

This 'periodisation' should not, however, be regarded exclusively, the motivations in relation to work being basically present throughout the entire life: we cannot take out the possibility to opt for a certain job that facilitates an early retirement

(mining, for example) where the ‘after work’ motivation is present from the schooling stage. Similarly, we cannot, or, better said, we should not be able to exclude the motivation for work after retirement age.

Unfortunately, today, in the public pension system, in most cases, reaching the legal age for retirement is synonymous with ceasing to work, regardless of the individual’s option and potential. For this reason, we attempted, through our scientifical approaches, to promote what we called ‘the right not to retire’, being convinced of the relevance of this ‘right’ on a truly free labour market.

At the same time, in the situations that allow the continuation of the activity, the choice of the individual to continue working does not or should not cancel the right to pension which is granted by reaching the standard age conferring this right. In other words: the right to pension cancels the right to work!

‘[. . .] result of globalization, the capitals gain a liberty of movement that populations or labour force in large territories – sometimes entire continents – don’t have; thus, human rights are substituted by capital rights, national public law becomes a private right; labour force no longer fits except theoretically and propagandistically the old classical scheme of market equilibria by resorting to the three well-known parameters of demand, supply and price’ [4], warned, since 2000, the researchers of the Romanian Academy ‘Constantin C. Kiritescu’ National Institute for Economic Research.

Unfortunately, what more than 22 years ago were considered ‘possible evolutions’ are currently realities demanding major, urgent solutions, in the absence of which ‘populations as a whole or socio-professional categories which not so long before had a sense of their own existence (our note) are pushed into the sphere of useless, futile actions, joining the ranks of the dependent or the maintained’ [2].

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Chapter 3
Assessment Models of the Digital Economy and Knowledge-Based Societies in Europe

Marius Constantin, Simona Roxana Pătărlăgeanu, Alexandra Diana Chirescu, and Jean Vasile Andrei

Abstract Economies and societies around the world are affected by the rapid progress in the field of digitisation, specific to knowledge-based societies. It is one of the aims of the European Commission to empower businesses and people towards a more equitable, sustainable and digitised future. In this regard, the EU has a set of key performance indicators that are designed to monitor progress – by 2030, at least 80% of the EU citizens should acquire basic digital skills and use digital ID, while 75% of the EU businesses are expected to use cloud computing services and AI. Since it is essential to measure the progress of the digital economy to ensure that the targets are met, the objective of this research was that of designing assessment models meant to: (1) indicate the progress made in the field of the digital economy in EU-27 in the case of each country, (2) signal risks with respect to countries not reaching the targets set by the European Commission by 2030, (3) explore the need of digital cohesion member states.This paper fills a literature gap by providing a progress assessment framework based on a unique set of key performance indicators. Results highlight great progress tracked on Internet accessibility and cloud space usage in the European Union.

Keywords Digital performance · Economics of digitisation · Assessment · Model design · Knowledge society

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3.1 Introduction

Over the last decade, technological advancements have led to a more digitised society in which devices are essential for conducting day to day activities. European Member States aim to create modern and sustainable infrastructures, to transition businesses and public services to the online environment and to have digitally skilled citizens [19]. According to a survey carried out by the Directorate-General for Communication of the European Union on the European citizens' knowledge and attitudes towards science and technology, it has been found that 86% of the respondents think that modern technology has a positive impact on peoples' lives and they expect an increase of the general welfare of the population [20]. When it comes to the digital infrastructure, Member States aim to assure performant and secure connectivity that will increase the competitiveness of the EU-27's economy. For this desired objective to be reached, both the private and public sectors should embrace the digital transformation and innovative processes [15, 16]. Although digital technology would introduce more eco-friendly processes in all the economic sectors, it is necessary to develop the existing technology to become more sustainable [18]. To smoothen the transition to the Digital Decade and improve digital performance, the European Commission developed the Digital Europe Programme that funds project related to the digitalisation of EU-27's economy. Moreover, Member States should follow the trajectories and the 'national strategic roadmaps' included in the governance framework on the development of the digital economy and knowledge-based societies. This research focuses on evaluating EU-27's advancements with respect to digital economy both from the perspective of individuals and enterprises. The objective of this study was met by the fact that there were highlighted the performance discrepancies between the European states and it was created a ranking referring to the digital improvements (2018 vs. 2015) and a ranking for the year 2018, that brings into light the most digitised states. To analyse the development level of the EU-27 states, it is necessary to perform a constant monitoring and evaluation process of the key performance indicators established for this purpose. Although the existing literature addresses assessment models of the digital development discrepancies between European states, there is no study in which it is presented an evaluation model based on performance rankings [39, 52]. The paper is organised in four sections. The first section corresponds to the Literature Review, in which a brief abstract of the authors' studies on digital economy and knowledge-based societies was presented. Within the Research methodology section, the selection of indicators used to realise the assessment models of the digital economy and knowledge-based societies was explained. The following section presents the Results and discussions based on the assessment models. Finally, the last section was dedicated to conclusions.

3.2 Literature Review

Digital economy, also defined as 'the engine of economic growth', consists of all the technological developments and the way in which information is being used, that has led both to social and economic advancements [34]. According to other authors, digital economy could represent 'an economic activity that is realised every day due to billions of online connections among people, companies, data and devices' [1, 23]. Over the last decades, technological innovation has changed the way people live, work and interact with each other [27]. At the same time, this change has modified the structure of the work flows both at the microeconomic and macroeconomic level. Thus, the meaning of performance, productivity and the way in which these economic indicators are being seen, has changed [41]. In this context, digital economy could be approached from at least two points of view: 'digital industrialisation' and 'industrial digitalisation'. As the first term is already comprehensible and utterly explicit, the last mentioned term refers to increasing the productivity and the volume of production for the secondary and tertiary sectors [22]. With the aid of digital economy, 'no place is remote or inaccessible anymore', as more and more people gained access to information that was not available before, when it was diffused paper-based (K. [34]). Within this frame of reference, online information could be characterised as available at every moment, coherent and homogenous, easily maintainable and accessible. At the same time, the development and usage of modern technology came up with a faster decision making process and contributed to the evolution of both the public and private sector [9]. From the economic perspective, the Information and Communication Technologies (ICT) sector can be the source of many advantages including the increase of profitability at business level, strengthening the value of the business models and decrease the costs in disseminating information [38]. To benefit from the advantages conferred by the digital progress, people should be aware of the fact that digital, computer, media, communication and technology literacy play an important role in the ICT sector. This being said, digital literacy could be described as 'the basic skills set' necessary for navigating on the Internet in a safe and efficient manner, while also having a complex cognitive and psychological approach [14]. While computer literacy represents the capacity to utilise both 'digital software and hardware', technology literacy mentions the competence of choosing the most appropriate technology for solving an issue. In other words, the capability to interact with online media defines the media literacy and the communication literacy highlights the exchange of information that takes place online. All of this skills that are relevant for the transition to the digital society, represent employment opportunities, as ICT is an important part of our daily activities [14]. Nonetheless, when it comes to the digital transformation of the society, it has to be acknowledged the fact that not only the IT sector has to improve, but also other related sectors, such as the agriculture, manufacturing, service or retail. This improvements contributes to creating innovative business models and more sustainable processes [51]. To put it another way, digitalisation brings its contribution for the society welfare and for implementing the

Sustainable development goals required by the United Nations' 2030 Agenda for Sustainable Development [50]. Contemporarily, a knowledge-based economy represents also a digital economy. While digital economy refers to the transition from the paper-based data and processes to digital operations, the knowledge-based economy means that people can actually learn from that data and help improving work-flow processes, both at microeconomic and macroeconomic level [11]. According to Rockett [44], the key aspects of the knowledge-based economy are knowledge transfer and innovation. Besides those components of the knowledge-based society, there are also other components, such as: creation, distribution and manipulation of the information and value [44, 47]. As many authors have previously demonstrated, the knowledge-based economy contributes to obtaining a competitve advantage both at microeconomic and macroeconomic level [25, 45]. By interconnecting major key aspects of the modern world at many levels – including social, economic and environmental levels, digitalisation provides facile alternatives to store and manage information [36]. According to the same authors, digital economy creates added value and optimises the processes within businesses [5], claim that digital economy is 'the economy of new speeds', which does not involve the movement of goods, but the information exchange. Through digital economy, the level of observability and traceability of the operations has expanded and the overall activity performance increased [40]. Studies have shown that the degree of interest for the digital economy expanded because technology and knowledge have an enormous impact on the economic development of countries [6, 41]. To create a more complex view, digital economy and knowledge-based society could contribute to developing smart cities, in which it is invested in human capital, modern infrastructure and sustainable resource management to boost economic growth and people welfare [42]. Through these advancements, it is considered that cities could become more resilient, inclusive and could help reducing the poverty rate, the dropout rate and the unemployment rate [48]. Although the process of digitalisation differs from one country to another, it is important to measure the changes that occur and also the level of development for every state [32]. On this basis, according to Katić et al. [30] one of the most important indicator for measuring a state's digital performance is the computer and mobile Internet connection and the use of cloud services. The same authors consider that this variable can provide a realistic, objective and well framed picture of the access and use of technology by different social categories. On the other hand, another author considers that e-services, e-marketing, e-commerce and digital lifestyle represent a wellfounded set of indicators suitable for assessing the progress and performance of the digital economy in the EU-27 Member States. Moroz [38] considers that digital lifestyle could be the most important indicator, as it creates a clear image of the access of the population to smart devices [38]. Sagiyeva et al. [45] believe that the structure of the GDP and the service sector, together with the population age and urban population positively impact the adoption of ICT. Along the same lines, Volkova et al. [51] consider that GDP and Digital Economy and Society Index (DESI) could offer an essential perception on the digitalisation of a country. Another set of essential indicators, analysed and debated by researchers would be the ICT infrastructure

and access, the Internet use by individuals, the mobile Internet access by individuals, the use of cloud services by individuals and the use of cloud services by individuals [37]. From the same perspective, Borovkov et al. [7], bring into discussion the number of connected IoT devices, social media, big data, e-commerce, the individual use of ICT and others. Borowiecki et al. [8] analysed DESI, envisioned by the European Comission, to measure the digital competitiveness at the level of the Member States. The study brought into light the fact that Internet usage, both for the public services and at the household level, was important for 'strengthening the competitiveness' of the countries. From other researchers' point of view, the IT investments, the number of students enrolled at the IT oriented faculties and the e-banking, e-payment and e-commerce variables offer a more complex picture of peoples' attitude when it comes to the importance of technology in the day-to-day life [16]. In other words, individuals' access to digital technology could be measured by analysing the number of computers per 1000 people [3]. Other studies refer to the innovative activity of organisations or the ratio of costs for technological innovations for analysing the progress of the digital economy [21, 24]. In addition, other papers analyse the Internet advertising of enterprises, the value of e-commerce sales of enterprises, the mobile Internet connections used by the employees in enterprises, the enterprises that have a website and the enterprises that employ ICT specialists [13, 46]. This businessoriented approach intend to highlight the investments realised by economic agents for innovation and digital development. Nonetheless, it is important to analyse the digital economy also at the macroeconomic level. In this context, Barefoot et al. (2018) and the U.S. Bureau of Economic Analysis [49] brought into discussion the digital economy and industry share of total employment and the digital economy real value added. After reviewing a part of the scientific literature on the digital economy and based societies in Europe, a unique set of key performance indicators– specific to monitoring the transition to a more digitised economy in the EU was created. Thus, this paper fills a literature gap by providing a progress assessment framework based on the following variables: the level of Internet access for households, the cloud computing services used by businesses, the digital inclusion for individuals, promoting e-commerce for businesses and e-public services used by individuals. A part of these indicators have also been considered by other authors. Johnson et al. [29] analysed the search across e-commerce sites and the level of Internet access for households. Within this framework, they claim that individuals 'visit only 1.8 travel sites monthly'. When it comes about the cloud computing services, Khan and Salah [31] mentioned that such services represent a cost-effective alternative that also ease the processes. In addition, Chang [12] brought into discussion the increasing performance of businesses are achieved when cloud services are being used. Inga and Huaranga [26] highlighted that also SMEs need to realise that the transition to digitalisation is essential for their activity, as it speeds up all the processes, the information can be easily accessed from anywhere and it has a beneficial impact on their profitability and sustainability. On the digital inclusion, Carmi and Yates [10] claimed that it is essential that everybody has access to ICT and have the basic digital skills, also reffered to as 'digital literacy'. In this context, actions need to be taken both

strategically and policy-wise. Another important indicator in analysing the digital economy would be e-commerce, that had a tremendous increase in the last decade, considering the difference between the development levels of countries [2]. H. Li et al. [33] mentioned in their paper that e-commerce is relevant also when speaking about logistics, as it smoothes all the processes and it increases transparency. Nonetheless, Mensah [35] and Reddick and Roy [43] consider that e-government enhanced the connection between citizens and the public sector, conffered transparency and improved trust in the municipalities. Although governments invest in high technology equipment to facilitate the access to e-public serivices, it is of great importance that citizens accept and embrace these advancements. Alzahrani et al. [4] investigated the most popular theories on e-government acceptance by citizens to come up with answers that could speed up the transition to the digital economy. This being said, in the following chapters, assessment models were designed and meant to: (1) indicate the progress made in the field of the digital economy in Europe in the case of each Member State, (2) signal risks with respect to countries not reaching the targets set by the European Commission by 2030, (3) explore the need of digital cohesion between EU-27 Member States.

3.3 Methodology

Table 3.1 presents relevant information about the indicators analysed for assessing the level of digitalisation for the EU Member States. The data used in this study refers to the years 2015 and 2018, as these are statistically compatible with all the indicators mentioned in Table 3.1.

To build the assessment models on EU 27's performance on the knowledge-based societies and the digital economy, this paper was grounded on a quantitative research method, similar to the one approached in the paper of Andrei et al. [28]. Data used in this research was taken from Eurostat database in November 2021 and it includes five relevant indicators for the analysed domain: (1) the level of Internet access for households, (2) cloud computing services, (3) the digital inclusion for individuals, (4) digital single market – promoting e-commerce for businesses, (5) e-public services used by individuals. The first indicator measures the percentage of households that have Internet access and it represents one of the most important and approachable variables that measures countries' digital performance. The second indicator quantifies the percentage of enterprises that bought cloud computing services used over the Internet. By using cloud computing services, business costs related to storage will diminish and the overall performance would increase. It is also an important variable, as it highlights the investments for the digital economy. The third indicator assesses the percentage of individuals that have Internet access and use it once a week including every day. By digital inclusion one should understand that everybody needs to have access to the Internet and have the proper training to benefit from the ICT. The fourth indicator evaluates the percentage of enterprises with e-commerce sales of at least 1% turnover. Ecommerce represents an indicator

Table 3.1 List of indicators used in the research

Item no.	Eurostat assigned codes	Indicator name	Measurement unit	Proxy
1	ISOC_CI_IN_H	The level of Internet access for households	The percentage of households that have Internet access	Connection to the Internet for households/ICT usage in households (as seen in references 1, 3, 13, 20, 25, 27, 28, 36). The indicator represents one of the most important and approachable variables that measures countries' digital performance
2	ISOC_CICCE_USE	Cloud computing services	The percentage of enterprises that bought cloud computing services over the Internet	Enterprises that bought cloud computing services (as seen in references 12, 19, 22, 27, 28, 38). Cloud computing services constitute a 'business transforming model' that 'reduces storage costs' and 'contributes to the rapid growth of digitalization', so it is an essential indicator that highlights the investments for the digital economy
3	ISOC_BDEK_DI	The digital inclusion for individuals	The percentage of individuals that have Internet access and use it once a week including everyday	Digital inclusion/Internet access from the perspective of the individual (as seen in references 3, 7, 10, 27, 36). Digital inclusion is a complex variable that refers to 'equal access, opportunities and skills' that people need to have to benefit from the ICT
4	ISOC_BDEK_SME	Digital single market promoting e-commerce for businesses	The percentage of enterprises with e-commerce sales of at least 1% turnover	E-commerce utilisation from the perspective of the enterprises (as seen in references 2, 12, 15, 17, 24, 25, 38). E-commerce represents a dynamic and competitive approach which 'enables both consumers and producers to gather, share information about products or services and ease transactions', therefore it is an elaborate indicator that offers a clear image on business digitalisation.
5	ISOC_BDEK_PS	E-public services used by individuals	The percentage of individuals that used the Internet for interacting with the public authorities in the last 12 months	Internet utilisation in e-government services from the perspective of the individual (as seen in references 4, 26, 28, 30, 36, 37.) E-public services or e-government is a key variable that should be considered when referring to digitalisation, as it 'strengths the confidence and transparency of the processes' and 'facilitates the relationship and cooperation between the public sector and the citizens'

that sets a clear image on business digitalisation, as it constitutes the online connection between customers and producers. The fifth indicator considers the percentage of individuals that used the Internet for interacting with public authorities in the last 12 months. It is considered that this indicator and e-government itself would ease all the processes and will strengthen citizens' trust in the public authorities.

3.4 Analysis/Results Interpretation

Table 3.2 presents EU-27 Member States performance on cloud computing services in the year 2015 and 2018 (the most recent years in which data were available). The improvement was measured as an absolute difference between the values registered

Table 3.2 The progress assessment on cloud computing services

Country	Year 2015	Year 2018	2018 reported to 2015 improvement (absolute)	Improvement ranking	Year 2018 ranking	Performance discrepancies
Belgium	25	40	15	2	4	2
Bulgaria	5	8	3	9	16	7
Czechia	N/A	26	N/A	N/A	N/A	N/A
Denmark	37	56	19	1	2	1
Germany	N/A	22	N/A	N/A	N/A	N/A
Estonia	N/A	34	N/A	N/A	N/A	N/A
Ireland	35	45	10	5	3	−2
Greece	9	13	4	8	13	5
Spain	15	22	7	7	10	3
France	N/A	19	N/A	N/A	N/A	N/A
Croatia	22	31	9	6	6	0
Italy	N/A	23	N/A	N/A	N/A	N/A
Cyprus	13	27	14	3	7	4
Latvia	8	15	7	7	12	5
Lithuania	16	23	7	7	9	2
Luxembourg	N/A	25	N/A	N/A	N/A	N/A
Hungary	11	18	7	7	11	4
Malta	25	37	12	4	5	1
Netherlands	N/A	48	N/A	N/A	N/A	N/A
Austria	N/A	23	N/A	N/A	N/A	N/A
Poland	7	11	4	8	14	6
Portugal	N/A	25	N/A	N/A	N/A	N/A
Romania	8	10	2	10	15	5
Slovenia	17	26	9	6	8	2
Slovakia	20	21	1	11	11	0
Finland	53	65	12	4	1	−3
Sweden	N/A	57	N/A	N/A	N/A	N/A

in 2018 and the ones tracked in 2015. The improvement ranking was calculated based on the absolute difference mentioned above. In this context, the state which recorded the greatest difference is ranked number 1, etc. The ranking for the year 2018 is calculated by considering the values for the year 2018. The performance discrepancies were calculated as an absolute difference between the 2018 ranking and the improvement ranking.

The high positive values indicate that there is a gap between the analysed state and the leaders on cloud computing services and the high negative values highlight the opposite situation. The analysis indicate that Denmark, Belgium and Cyprus recorded the greatest improvement on cloud computing services in the EU-27.

Moreover, Denmark registered the highest improvement in 2018 reported to 2015: 19% of enterprises bought cloud computing services used over the Internet (increase of 51,35%, 2018 reported to 2015). Slovakia, Romania and Bulgaria were the least performant countries when it comes to the cloud computing services. However, Romania was ranked on the tenth and 15th places and Bulgaria on the ninth and 16th places in the EU-27, based on the percentage of enterprises that bought cloud computing services used over the Internet in 2018: 10% and 8%. Based on the improvement ranking and the ranking for the year 2018, Slovakia was ranked 11/11. The performance of the EU-27 Member States on digital inclusion for individuals is presented in Table 3.3.

The most considerable development were registered in Romania (increase of 16% of the individuals that had Internet access and use it once a week including every day, from 52% in 2015 to 68% in 2018), Cyprus (increase of 14% of the individuals that had Internet access and use it once a week including every day) and Poland (increase of 10% of the individuals that had Internet access and use it once a week including every day). On the other hand, Luxembourg registered a regress of 5% on this indicator, in 2018 reported to 2015. In this context, Luxembourg was ranked 13/13, however it was ranked 4/20 in the year 2018. At the bottom of this ranking was Estonia (1% improvement in 2018 reported to 2015), Sweden, Ireland and Denmark. The evolution of e-commerce for businesses for the EU-27 Member States was analysed in Table 3.4.

The greatest achievements were registered in the case of Denmark (an increase of 6% in the enterprises that had e-commerce sales of at least 1% turnover in 2018 reported to 2015), Greece, Luxembourg, Malta and Finland (with an improvement of 5% with respect to the enterprises having e-commerce sales of at least 1% turnover). At the bottom of the ranking were Germany (with a decrease of 5%, from 25% in 2015 to 20% in 2018), Croatia (with a decrease of 2% of the enterprises having e-commerce sales of at least 1% turnover), Ireland and Austria (both registering a decrease of 1% of the enterprises having e-commerce sales of at least 1% turnover. Table 3.5 was designed to highlight the performance of the level of Internet access for households.

The most impressive advancements were observed for Cyprus (increase of 15% of the households that had Internet access, from 71% in 2015 to 86% in 2018), Bulgaria and Romania (both countries recording an increase of 13% of the households that had Internet access. At the bottom of the ranking were Estonia (ranked

Table 3.3 The progress assessment on digital inclusion

Country	Year 2015	Year 2018	2018 reported to 2015 improvement (absolute)	Improvement ranking	Year 2018 ranking	Performance discrepancies
Belgium	83	87	4	9	7	−2
Bulgaria	55	64	9	4	20	16
Czechia	77	84	7	6	9	3
Denmark	93	95	2	11	1	−10
Germany	84	90	6	7	6	−1
Estonia	86	87	1	12	7	−5
Ireland	78	80	2	11	11	0
Greece	63	70	7	6	18	12
Spain	75	83	8	5	10	5
France	81	85	4	9	8	−1
Croatia	66	73	7	6	15	9
Italy	63	72	9	4	16	12
Cyprus	70	84	14	2	9	7
Latvia	75	81	6	7	10	3
Lithuania	69	78	9	4	13	9
Luxembourg	97	92	−5	13	4	−9
Hungary	72	75	3	10	14	4
Malta	75	80	5	8	11	3
Netherlands	91	94	3	10	2	−8
Austria	81	85	4	9	8	−1
Poland	65	75	10	3	14	11
Portugal	65	71	6	7	17	10
Romania	52	68	16	1	19	18
Slovenia	71	79	8	5	12	7
Slovakia	74	78	4	9	13	4
Finland	90	93	3	10	3	−7
Sweden	89	91	2	11	5	−6

11/13), Netherlands (11/13), Slovakia (11/13), Sweden (11/13) and Denmark (12/13). Luxemburg registered a regress of 4%, being ranked 13/13 and 3/15 in 2018. The progress with respect to the e-public services used by individuals was analysed in Table 3.6.

The most favourable situation was observed in the case of Czechia (increase of 21% of individuals that used the Internet for interacting with public authorities in the last 12 months, from 32% in 2015 to 53% in 2018), Latvia and Hungary. The states which registered regress were Luxembourg, Romania, Estonia and Portugal. Table 3.7 concatenates the analysed indicators in digital economy and the ranking perspective to outline the European leaders.

By analysing the results presented in the table above, it can be observed that the EU-27 states which registered the most significant improvement with respect to the

Table 3.4 The progress assessment on e-commerce for businesses

Country	Year 2015	Year 2018	2018 reported to 2015 improvement (absolute)	Improvement ranking	Year 2018 ranking	Performance discrepancies
Belgium	25	29	4	3	4	1
Bulgaria	6	6	0	7	18	11
Czechia	24	24	0	7	5	−2
Denmark	26	32	6	1	1	0
Germany	25	20	−5	10	8	−2
Estonia	13	16	3	4	12	8
Ireland	32	31	−1	8	2	−6
Greece	6	11	5	2	16	14
Spain	17	19	2	5	9	4
France	16	16	0	7	12	5
Croatia	20	18	−2	9	10	1
Italy	7	10	3	4	10	−4
Cyprus	11	12	1	6	15	9
Latvia	9	11	2	5	16	11
Lithuania	18	22	4	3	6	3
Luxembourg	7	12	5	2	15	13
Hungary	11	13	2	5	14	9
Malta	16	21	5	2	7	5
Netherlands	17	17	0	7	11	4
Austria	15	14	−1	8	13	5
Poland	10	13	3	4	14	10
Portugal	19	9	0	7	9	2
Romania	8	9	1	6	17	11
Slovenia	16	18	2	5	10	5
Slovakia	13	13	0	7	14	7
Finland	16	21	5	2	7	5
Sweden	26	30	4	3	3	0

digital economy indicators and recorded the highest values in the year 2018, are the following: (1) Denmark, (2) Finland, (3) Sweden, (4) Netherlands, (5) Cyprus, (6) Romania, (7) Ireland and (8) Luxembourg.

3.5 Conclusions

Over the last decades, technological innovation has changed the way people live, work and interract with each other. In the context of the knowledge-based society, digitalisation plays an important role, as it interconnects all the key aspects of the modern world, which include the social, economic and environmental dimension,

Table 3.5 The progress assessment of households Internet access level

Country	Year 2015	Year 2018	2018 reported to 2015 improvement (absolute)	Improvement ranking	Year 2018 ranking	Performance discrepancies
Belgium	82	87	5	8	6	−2
Bulgaria	59	72	13	2	15	13
Czechia	79	86	7	6	7	1
Denmark	92	93	1	12	3	−9
Germany	90	94	4	9	2	−7
Estonia	88	90	2	11	4	−7
Ireland	85	89	4	9	5	−4
Greece	68	76	8	5	14	9
Spain	79	86	7	6	7	1
France	83	89	6	7	5	−2
Croatia	77	82	5	8	10	2
Italy	75	84	9	4	8	4
Cyprus	71	86	15	1	7	6
Latvia	76	82	6	7	10	3
Lithuania	68	78	10	3	13	10
Luxembourg	97	93	−4	13	3	−10
Hungary	76	83	−7	6	9	3
Malta	81	84	3	10	8	−2
Netherlands	96	98	2	11	1	−10
Austria	82	89	7	6	5	−1
Poland	76	84	8	5	8	3
Portugal	70	79	9	4	12	8
Romania	68	81	13	2	11	9
Slovenia	78	87	9	4	6	2
Slovakia	79	81	2	11	11	0
Finland	90	94	4	9	2	−7
Sweden	91	93	2	11	3	−8

and it offers an easy and secure alternative to store and use information. This research focused on evaluating EU-27's advancements on digital economy both from the perspective of individuals and enterprises. The objective of this study was met by the fact that there were highlighted the performance discrepancies between the European states and it was created a ranking reffering to the digital improvements (2018 vs. 2015) and a ranking for the year 2018, that brings into light the most digitised states. Results highlight great progress tracked with respect to Internet accessibility in the EU and cloud space usage. The countries that registered the most significant improvement on digital economy were Denmark, Finland, Sweden, Netherlands, Cyprus, Romania, Ireland and Luxembourg. A limitation of this study would be the fact that we have used data that was available on Eurostat, while maybe other important variables could have contributed to the classification of the EU-27 by considering their digital performance. Henceforth, the research could

Table 3.6 The progress assessment on e-public services used by individuals

Country	Year 2015	Year 2018	2018 reported to 2015 improvement (absolute)	Improvement ranking	Year 2018 ranking	Performance discrepancies
Belgium	52	56	4	9	9	0
Bulgaria	18	22	4	9	19	10
Czechia	32	53	21	1	11	10
Denmark	88	92	4	9	1	−8
Germany	53	57	4	9	8	−1
Estonia	81	79	−2	13	4	−9
Ireland	50	54	4	9	10	1
Greece	46	50	4	9	13	4
Spain	49	57	8	6	8	2
France	63	71	8	6	5	−1
Croatia	35	36	1	10	16	6
Italy	24	24	0	11	18	7
Cyprus	34	42	8	6	15	9
Latvia	52	66	14	2	6	4
Lithuania	44	51	7	7	12	5
Luxembourg	70	63	−7	14	7	−7
Hungary	42	53	11	3	11	8
Malta	42	47	5	8	14	6
Netherlands	75	82	7	7	3	−4
Austria	57	66	9	5	6	1
Poland	27	35	8	6	17	11
Portugal	43	42	−1	12	15	3
Romania	11	9	−2	13	19	6
Slovenia	45	54	9	5	10	5
Slovakia	51	51	0	11	12	1
Finland	79	83	4	9	2	−7
Sweden	73	83	10	4	2	−2

be extended to other states than EU. This statistical analysis would specifically be interesting to countries that struggle to join EU. Researchers could use data from the article to compare results from other states to those of EU-27, and to put forward suggestions and digital opportunities, at macroeconomic and microeconomic level. The outcome of this research brings its contribution for the future analysis with regard to the progress of the digital economy and knowledge-based societies by providing a methodological framework that is effortlessly replicable for any data set. The suggested method for evaluating the level of digitalisation, contributes to obtaining results that could be interpreted by the decision-makers to develop better strategies and action plans.

Table 3.7 The progress assessment on e-public services used by individuals

	Cloud computing services		The level of Internet access for households		Digital inclusion for individuals		Digital single market promoting e-commerce for businesses		E-public services used by individuals	
Country	IR*	RML*	IR*	RML*	IR*	RML*	IR*	RML*	IR*	RML*
Belgium	2	4	8	6	9	7	3	4	9	9
Bulgaria	9	16	2	15	4	20	7	18	9	19
Czechia	N/A	N/A	6	7	6	9	7	5	1	11
Denmark	1	2	12	3	11	1	1	1	9	1
Germany	N/A	N/A	9	2	7	6	10	8	9	8
Estonia	N/A	N/A	11	4	12	7	4	12	13	4
Ireland	5	3	9	5	11	11	8	2	9	10
Greece	8	13	5	14	6	18	2	16	9	13
Spain	7	10	6	7	5	10	5	9	6	8
France	N/A	N/A	7	5	9	8	7	12	6	5
Croatia	6	6	8	10	6	15	9	10	10	16
Italy	N/A	N/A	4	8	4	16	4	10	11	18
Cyprus	3	7	1	7	2	9	6	15	6	15
Latvia	7	12	7	10	7	10	5	16	2	6
Lithuania	7	9	3	13	4	13	3	6	7	12
Luxembourg	N/A	N/A	13	3	13	4	2	15	14	7
Hungary	7	11	6	9	10	14	5	14	3	11
Malta	4	5	10	8	8	11	2	7	8	14
Netherlands	N/A	N/A	11	1	10	2	7	11	7	3
Austria	N/A	N/A	6	5	9	8	8	13	5	8
Poland	8	14	5	8	3	14	4	14	6	17
Portugal	N/A	N/A	4	12	7	17	7	9	12	15
Romania	10	15	2	11	1	19	6	17	13	19
Slovenia	6	8	4	6	5	12	5	10	5	10
Slovakia	11	11	11	11	9	13	7	14	11	12
Finland	4	1	9	2	10	3	2	7	9	2
Sweden	N/A	N/A	11	3	11	5	3	3	4	2

*IR** Improvement ranking, *RML** Ranking at Multinational (EU-27)

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Chapter 4
Economic Growth Through Financial Development: Empirical Evidences from New Member States and Western Balkan Countries

Eglantina Hysa and Naqeeb Ur Rehman

Abstract This study provides some other pieces of evidence on the relation and the contribution of financial development to economic growth for two specific regions, such as the group of new members (NMS) of the EU and the Western Balkan countries (WBC). This study applies panel data using relevant proxies for the model. According to the study results and based on threshold regression, a non-linear association is confirmed between financial and economic growth. More specifically, the interaction effect of remittances and financial development complement the economic growth of NMS. In addition, the findings show that both, financial development and remittances, are pushing the reduction the economic growth in WBC. Although the NMS can be well-integrated with the rest of the EU countries, there is still room for improvement in governance and enterprise restructuring. To gain sustainable growth across developing countries, policymakers should target the following: (1) increasing the saving ratio to increase the productive investment; (2) narrowing interest rate margins to encourage domestic credit to the private sector.

Keywords Financial Development · Remittances · Economic Growth · New Member States · Western Balkans

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4.1 Introduction

Numerous endogenous growth models refer to financial development as the key driver of economic growth worldwide. Studies indicated that proxies of financial development such as saving and lending could accelerate investment and productivity and thus economic growth [19]. Studies suggested that financial (by reducing the lending obstacles) and the interest rate liberalization trigger the economy's growth [50]. Still, we can say that financial liberalization and its advantages are low in developing countries than in the rich world. For example, the lack of financial structure poorly developed insurance and the equity markets, and the lack of skills may result in low economic output.

The main objective of this work is to explore the tangible influence of two crucial factors, remittances, and financial development, concerning the economic prosperity in two regions of Europe. First, the non-EU members (WBC) which includes Albania, Bosnia, Macedonia, Montenegro, Kosovo, and Serbia. And WBC are looking for a membership in the common market (EU). Even though WBC are defined as polarized countries (with different ethnicities and religions within their countries), they show similarities in economic progress [33]. After the collapse of the communist system in these countries, the transition period is relatively slow in terms of transformation from a centralized economy to a more open one, basically a market-based economy. Concurrently, WBC is facing many economic challenges such as high inequality, high consumption with low saving, credit constraint, non-recovery of loans, high volatility of exchange rates, high current account deficits, high rate of unemployment, and high level of corruption thus low economic output [7, 13, 23, 32, 34, 46–48].

On the other hand, the new member states (NMS) are those countries who joined the EU from 2004 under the EU enlargement program. These countries are Bulgaria, Croatia, Czech Republic, Hungary, Poland, Latvia, Lithuania, Slovenia, Slovak and Romania. Compared to WBC, these post-communist countries have improved their banking system significantly, de-regularize the state-owned enterprises, and increased the saving and cross-border lending due to being well integrated into the EU markets [6, 41]. To date, limited quantitative papers [39, 40, 52] that used some data and specific econometric models could examine the correlation and the dimension of the influence of financial development and remittances on the economy. However, past studies ignored some comparisons among NMS and WBC about the correlation mentioned above. This study has used panel data from 2000 to 2017 and deployed threshold regression and system GMM analysis. In addition, this study considers a variety of proxies, i.e., broad money stock, remittances, saving, formal credit specific to the business sector, the interest spread, and so forth. We tested the two main research questions in this study. First, we tested the threshold effect of financial evolution on the economy, and second, the interactive effect of financial evolution along with remittances on the economy.

Our paper provides the theoretical background and then reviews the previous papers using quantitative approaches in relation to the impact of financial development associated with remittances on economic progress. The following section proceeds with the source of data, empirical strategy, graphical analysis, and then we provide the regression analysis of the hypotheses. Lastly, section five concludes with policy implications and some critical insights.

4.2 Literature Review

4.2.1 Economic Growth Through Financial Development

First, we review the literature, focusing on the empirical one, regarding the above-mentioned relation and then we review the impact of financial development and remittances on the economy in the following sub-section. Numerous studies [18, 28, 49, 57] investigated the association between financial deepening and economic development. The literature related to empirical studies stated that financial deepening promotes economic development and growth, called the "supply leading hypothesis" and the "demand leading hypothesis" suggested that economic growth promotes financial development [29]. Both hypotheses argued that there exists a positive relation among the financial and economic development/ growth. For example, the longitudinal paper of Apergis et al. [3] related to 65 countries was one of the papers confirming the positive correlation. While Colombage and Halabi [18] research work was focused on emerging economies, and they found a reverse causality of broad money stock, equity, bonds market outstanding with economic progress.

Other studies, for example, Koivu [42] on 25 transition economies as a proxy for financial deepening used domestic credit to the private sector and failed to find the impact on economic development. In addition, Antoshin et al. [2] paper on 55 economies examined that bank financing to the business sector enhances the economic development using SYS-GMM. The study of Hassan et al. [31] used time-series and implied that income economies benefit from financial development more than developing countries. Likewise, Calderon and Liu [9] and Ruiz [55] also supported the findings of Hassan et al. [31]. Using cointegration analysis, Christopoulos and Tsionas [16] study found cointegration of deposits/nominal GDP and economic growth for the case of developing economies. Results across transition economies in EU, Caporale et al. [10] panel study (1994–2007) in 10 CEE economies identified that market capitalization (a proxy for financial development) has a significant and positive impact. By deploying SYS-GMM estimation, Petkovski and Kjosevski [52] asserted that the development of financial institutions (banks and non-bank) is significant to hasten the economic development in CEE and SEE countries. A study on transition economies (CEE) by Cojocaru et al. [17] from 1990 to 2008 showed that domestic credit to businesses accelerated economic growth.

On non-linear relationships, Creel et al. [19] postulated that excessive financial development negatively affects economic growth. For instance, a deeper financial system with extensive bank lending and competition may pose an adverse selection problem and low economic growth. Similarly, Samargandi et al. [56] identified that financial development and economic growth have inverted -shaped association in 52 middle-income countries from 1980–2008. Using threshold panel regression estimation, Law and Singh [43] claimed that a high degree of financial deepening may negatively influence economic progress if financial development exceeds a certain threshold in terms of financing to the private sector in 87 developed and developing economies. Strictly speaking, if the level of financing (domestic credit) passed the threshold of 80% (of GDP) then it would harm the economic progress (see, Arcand et al. [4]). While Deidda and Fattouh [20] used threshold (based on per capita) and argued that the above-mentioned relationship is relatively weak in developing countries than in rich countries. This study investigates the threshold effect between financial deepening and economic progress.

4.2.2 Link Between Remittances and Financial Development

In recent decades, expatriate workers' remittances have increased dramatically over US$ 600 billion (in 2018). Migrant transfers are the potential source of government financing, spurring investment in the private sector through external financing using banking channels. Strictly speaking, remittances in developing countries reduce poverty due to increased disposable income. On remittances and growth link, a panel study conducted by Fayissa and Nsiah [22] using SYS-GMM from 1980 to 2004 related to 36 African countries, explored that remittances had a significant and a positive influence on the economy. In another study, Jawaid and Raza [36] asserted that remittances positively impact growth in the case of study of South Asian countries, while it is negative for Pakistan. In addition, the volatility of these remittances is extremely important and negatively impacts economic development. In fact, two outcomes are listed with regard to the effect of remittances on economic development: The first group argued about the positive effect [11, 21, 37], while the second group of researchers ([15] showed the negative and insignificant impact.

Based on the conceptual framework of Acosta et al. [1], three aspects were discussed. First, "remittances are considered exogenous in economic development and at the same time they are countercyclical, and source of capital to the economy." Based on these three conditions, Acosta et al. [1] argued that remittances in developing countries generally contribute to high consumption and leisure. In comparison, other studies [27] argued that a large volume of remittances contributes to uncertainty in output growth. For example, in the case of Egypt, Jordan, and Morocco, the large flow of remittances reduces the growth of these economies due to non-productive investment (see Glytsos [27]).

In contrast, several studies [12, 58] discussed the interactive link of both remittances and financial deepening on the economy. The empirical literature discussed the two sides of the role of financial deepening on economic progress. First, the domestic financial enhancement strengthens (positive) the effect of remittances on host countries' economic progress, while the second argument favors the negative effect on economic growth. A quantitative study by Sobiech [58] on 61 emerging and developing countries from 1970–2010 Sobiech [58] postulated that remittances decrease poverty. However, it benefits the country's financial development in the long run.

Moreover, Giuliano and Ruiz-Arranz [26] discussed that "remittances substitute financial deepening when credit constraints exist." This is the case of the countries having an underdeveloped financial system. Accordingly, the money coming from remittances enhances capital and significant economic growth.

In sum, the influence of remittances on economic progress is related to the degree of financial deepening in the host economy. For example, if a country has a developed financial sector, the financing constraints are removed and such migrant transfers increase bank deposits, which can be used for productive projects. In comparison, such transfer may lead to adverse effects on the economy. Remittances could reduce the labor supply or mainly used in consumption (low saving) and such transfers are not invested in the financial markets [14]. To conclude, we estimate the substitution and/or complementary effect of remittances and financial development on growth.

In this section, the author must provide the necessary background literature for explaining the state-of-the-art in the domain of the present research. The author should consider all significant references and make a synthesis of the different viewpoints expressed by different authors. Also, the author should provide the working definitions of the basic concepts used in the paper, and the main ideas, models or theories found in the literature related to the present research. The literature review should reveal the gap between the extant literature and the new perspective or model presented in the paper.

4.3 Methodology

4.3.1 Source of Data

We obtained macro-level data from 2000–2017 related to NMS and WBC which examines the effect of financial deepening and remittances on the economy. According to the International Monetary Fund (IMF), there are 11 countries that have joined the EU since 2004 under the EU enlargement and we name as NMS. On the other hand, Western Balkan countries are non-EU members. Concerning the accession of WBC in EU, on 18 October 2019, the countries of EU discussed the membership of Albania, and Northern Macedonia held a meeting in the EU. However, other nations, including France and Netherland, emphasized more reforms before entering the EU. While on 25 March 2020, the EU gave positive signal for discussion on Albania and North Macedonia related to their membership.

Table 4.1 Definitions of the variables and the summary statistics

Proxies and variables	N	Interpretation	$\overline{X}$	∂
GDP per capita	306	GDP per capita (log)	8.870	6.784
Broad money stock	306	[log(Broadmoney/GDP)]	−0.550	0.47
Remittances	306	Personal remit. Received	−4.186	2.214
Domestic credit	258	Domestic credit to the private sector (log)	23.438	1.805
Saving	306	[log (gross domestic saving/GDP)]	−7.487	2.085
Interest margin	260	Interest on loan – Interest rate on deposit	4.997	5.0173
Inflation	290	Inflation rate (annual)	4.756	8.492
Gross fixed capital	306	Gross capital formation (log)	−1.462	0.633
Dependency ratio	306	Total population – Labor force divided by total population	0.507	0.132
Crisis	306	Dummy coded 1 if crisis==2007/08 otherwise 0	0.555	0.497

Source: Authors' own research

For estimation, we collected variables such as (1) real GDP/capita, (2) quasi-money (M2/GDP), (3) saving ratio (saving/GDP), (4) domestic loans to the business sector, (5) remittances, (6) interest spread, (7) inflation rate, (8) gross fixed capital formation, and (9) dependency ratio. The proxy for the financial development is the broad money stock ratio, the domestic credit, and the third one, the interest rate margin. At the same time, the dependency ratio variable measures the size of a family and its effect on financial performance. In sum, we presumed that the dependency ratio negatively impacts economic growth.

We converted all financial information (variables in US dollar) into Euro currency due to proximity of these countries (WBC and NMS) to the single currency area. To adjust with inflation, we deflated all variables using annual GDP deflator. Further, to capture the economic crisis of 2008 (see [24]), we used a dummy variable coded 1 when an economy faced crisis in 2007–08, otherwise 0. This dummy variable is used to investigate the impact of economic crisis across NMS and WBC. Table 4.1 shows the specification of each variable and the features of the summary statistics.

4.3.2 Empirical Strategies

We deployed the following empirical strategies to assess the influence of (1) financial development and (2) remittances on the economy. The graphical analysis compares the various financial indicators, including remittances across NMS and WBC. Then we proceed with the stationary check using panel unit root test. We used threshold regression analysis to investigate the threshold effects as well. Lastly, we used SYS-GMM analysis to estimate the combined effect of (1) financial development and (2) remittances on economy for the group of New Member States and Western Balkan Countries.

4.3.3 Graphical Analysis Across NMS and WBC

Figure 4.1 provides information related to the cumulative frequency distribution of broad money stock across NMS and WBC. By looking into the curves, we observed that relatively NMS have high volume of broad money stock compared to WBC. This indicates that NMS has a deeper financial system than WBC due to its financial integration with the EU. Figure 4.2 presents a visual analysis of broad money stock and GDP per capita (economic growth). WBC has lagged regions compared to NMS on financial development and economic growth link. This shows that WBC have a shallow financial system compared to NMS. Specifically, weak non-bank financial institutions, non-performing loans, and high-interest margins reduce WBC financial development. In addition, Figs. 4.2 and 4.4 show the plot between saving ratio and

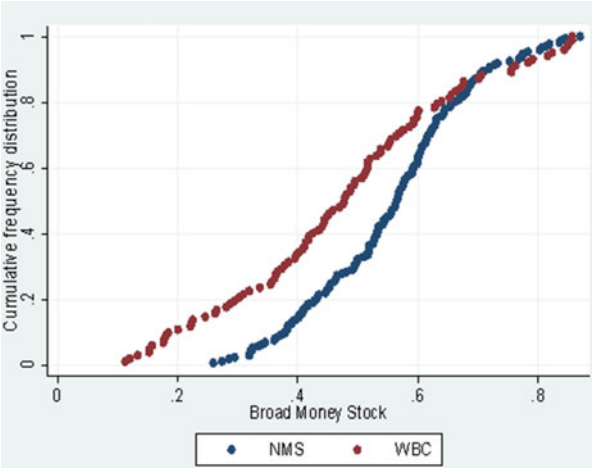

Fig. 4.1 Broad money stock–NMS versus WBC. (Source: Authors own elaborations)

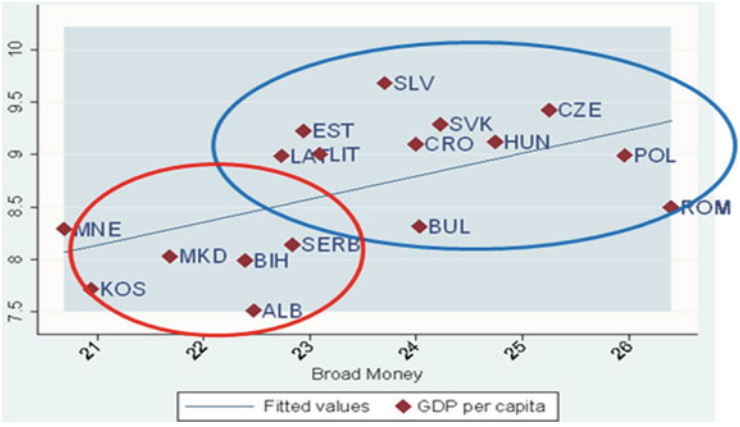

Fig. 4.2 Broad money stock and GDP per capita (logged). (Source: Authors own elaborations)

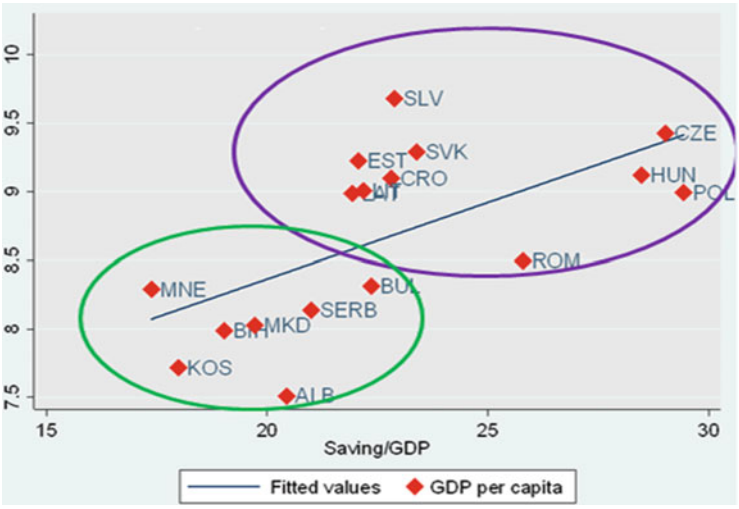

Fig. 4.3 Saving ratio and GDP per capita. (Source: Authors own elaborations)

economic growth, domestic credit to private sector and growth. Balkan countries experienced low saving ratio and low domestic credit to the private sector caused sluggish growth than for NMS.

Figure 4.5 presents the comparison of remittances and economic growth. In the first quadrant, mostly NMS with a high volume of remittances boosts high growth than WBC. While WBC has a high volume of remittances (on average) for Albania, Bosnia, Serbia, Kosovo, and Bulgaria (an exceptional), they experienced low economic growth. This outcome shows that in Balkan countries, the remittances are mainly used for consumption and less channelized through the financial system and resulting in low productive investment (Fig. 4.3).

4.3.4 Panel Unit Root Test

For testing the stationarity of the variables, we used Fisher's test [25], which is based on Maddala and Wu [45] method. This test uses a non-parametric method and it has certain advantages over Im et al. [35], the one of unit root test. For example, this test can be used for unbalanced panel-data (in our case), the test is conducted for any unit test and it is also possible to use multiple lag lengths in the Augmented Dickey-Fuller analysis. However, this test like other panel root tests such as Levin et al. [44] assumed that the individual time series have independent cross-sectional distribution. While in our dataset, it is assumed that several variables may have co-movements in the datasets, for example, broad money stock and GDP per capita or fixed capital formation and GDP per capita. To reduce the cross-sectional dependence, we used the de-mean unit root test, which subtracts the averages of

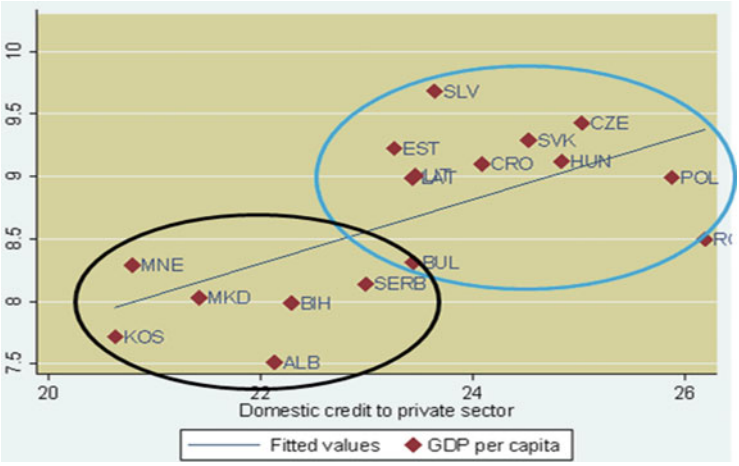

Fig. 4.4 Domestic credit to private sector and GDP per capita (logged). (Source: Authors own elaborations)

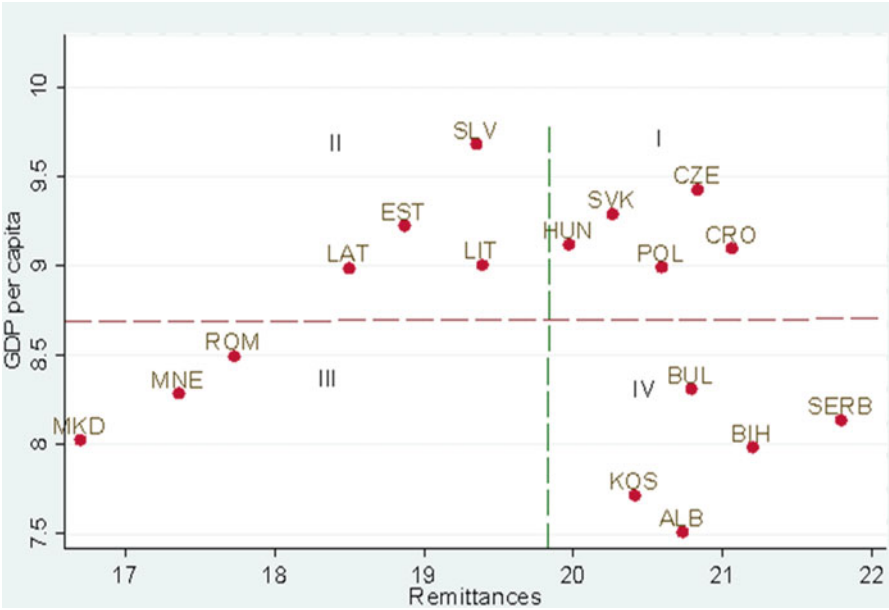

Fig. 4.5 GDP per capita and remittances. (Source: Authors own elaborations)

cross-sectional apart of the series. Furthermore, the Fisher test is a good choice when errors in cross-sectional units have cross-correlation because Monte Carlo evidence proposed that this issues of cross-correlation in errors is low observed with the Fisher test.

Table 4.2 Stationarity test (Fisher test)

Variables	p-values
GDP per capita	0.00*
Broad money stock	0.00*
Saving ratio	0.00*
Domestic credit	0.00*
Remittances	0.00*
Interest rate margin	0.00*
Gross fixed capital formation	0.00*
Inflation rate	0.00*
Dependency ratio	0.00*

Source: Authors' own research
*p<0.01

The use of Fisher test with drift model as follows:

$$\text{Drift model} : \Delta y_{i,t-1} = \rho_i y_{i,t-1} + \sum\nolimits_{j=1}^{\rho} \gamma_{i,j} \Delta y_{i,t-j} + \text{error} \tag{4.1}$$

$$H_0 : \rho_i = 0 \quad H_a : \rho_i < 0.$$

Equation 4.1 shows the list of variables for the stationarity test. Our hypothesis indicates the non-stationary of all series or contain panel unit root. In the meantime, the opposite hypothesis suggests the stationary of the series or at least one panel is stationary. Based on Fisher test and the probability value, we rejected the null hypothesis at 1% significance level and concluded that our variables are stationary (see Table 4.2).

4.4 Results and Discussions

4.4.1 Panel Threshold Regression

On second hypothesis, we analyzed the threshold effect of financial development on economic growth. Initially, Hansen [30] proposed a fixed effect threshold panel model and we expect that there is a threshold in financial development and then regress on economic growth[1].

The test findings in Table 4.3 show that two (double) thresholds include a lower threshold at −1.4910 and a higher threshold at the level of −0.1402.

[1]Countries with high financial deepening and advancement tend to have high economic development and progress than shallow financial development and vice versa. We used broad money stock (M2/GDP) as a threshold variable and using GDP per capita as regime dependent variable.

Table 4.3 Threshold Estimator (Level = 95)

Model	Threshold	Lower	Upper
TH-1	−0.1402	−0.1740	−0.0071
TH-2	−0.1402	−0.1721	−0.0071
TH-22	−1.4910	−5.2825	−0.4033

Source: Authors' own research

Table 4.4 Threshold effect test (Bootstrap = 200)

Threshold	RSS	MSE	F-stat	P-value	Crit10	Crit5	Crit1
Single	9.968	0.0346	279.44	0.000	40.37	44.37	69.60
Double	5.530	0.0192	231.12	0.000	31.29	33.37	38.64

Source: Authors' own research

Further in Table 4.4, the F-test results provide the significance in double threshold at p-value equals to 0.00.

Equation (4.2) shows the threshold model as follows:

$$y_{it} = u + X_{it}(q_{it} > \gamma)\beta_1 + X_{it}(q_{it} \leq \gamma)\beta_2 + u_i + e_{it} \tag{4.2}$$

$$H_0 : \beta_1 = \beta_2 \; H_a : \beta_1 \neq \beta_2$$

The q_{it} threshold variable γ is the parameter indication the threshold value that make possible the absorption of two equations with two separate coefficients β_1 and β_2. The slope u_i is the individual effect and e_{it} is the error-term, where under null hypothesis, there is no threshold for the panel data of the financial development. Based on the findings of threshold values, we split our dataset into two groups.

$$X_i \in \begin{cases} \text{Group 1, if } q_{it} \leq -1.4910 \\ \text{Group 2, if } q_{it} > -0.1402 \end{cases}$$

Table 4.5 reports the results of the fixed-effect regression for two groups 1 and 2. In the first group, if the threshold value is less than or equal to −1.4910, the results are reported in column 2 and if it is greater than −0.1402, the findings are presented in the column 3 which is a group 2. In the group 1 column, the parameter of financial development (ß = −1401 at 5% significance level) showed negative association to economic growth, while this relationship becomes positive and significant (ß =0.2063 at 1% significance level) for the second group. The analysis result in a non-linear relationship among financial and economic advancement. The threshold value above from −1.4910 (Table 4.3), the financial deepening complements the economic development, otherwise it substitutes the economic development.

In the case of group 1, the elasticity of saving ratio shows that high saving would likely to reduce the economic growth. This finding indicates that countries with a high saving ratio will not sustain economic growth due to low financial development. In group 2, the elasticity of remittances (β = 0.0484 significant at 1% level)

Table 4.5 Group-wise fixed-effect panel data model

Economic growth [(log (GDPpercapita)]	Group 1 $q_{it} \leq \gamma$	Group 2 $q_{it} > \gamma$
Financial development (threshold)	−0.1401** (0.0680)	0.2063*** (0.0618)
Saving ratio	−0.0340** (0.0169)	−0.0063 (0.0114)
Remittances	−0.0153 (0.0235)	0.0484*** (0.0139)
Domestic credit	0.1022*** (0.0252)	0.0487*** (0.0150)
Net interest margin	−0.0059** (0.0046)	−0.0092*** (0.0032)
Gross fixed capital formation	−0.0252 (0.0759)	0.2046*** (0.0519)
Dependency ratio	−2.6504** (1.0568)	−1.4259** (0.0720)
Inflation rate	−0.0069 (0.0083)	−0.0001 (0.0027)
Crisis [dummy coded 1 if crisis, otherwise 0]	−0.1406** (0.0611)	−0.0329 (0.0429)
R-sq. (overall)	0.3928	0.4028
F-stat	27.27***	18.46***
Rho	0.9589	0.9756
Observations	218	198
Groups	17	11

Source: Authors' own research
***p < 0.01; **p < 0.05. Standard errors are in parentheses ( )

positively linked with economic growth. This result suggests that the external flow of capital through remittances triggers economic progress. In addition, the impact of domestic credit to the private sector is positive in both groups. This outcome is similar with the findings of Hassan et al. [31]; Antoshin et al. [2]. Increasing the lending by 1% to the private sector raises the economic growth by 4.8%. In short, formal credit increases investment and thus high economic growth.

On the efficiency of the financial sector, the net interest margin showed a negative association to economic growth across both samples. Countries with less interest spread would result in high financial sector efficiency and lead to high economic growth. In other words, the low is the interest rate margin the high is the economic growth. In group 2, gross fixed capital formation reported a positive association with economic progress. This finding shows that investment in fixed assets increases the country's wealth and accelerates economic growth. Countries with high dependency ratio (number of dependents in the family) tend to experience low economic growth across both groups. The coefficient of economic crisis showed negative association with growth for group 1. This outcome suggests that global economic crisis of 2008 reduce the economic growth across our sample size.

4.4.2 System GMM Estimation

As a support for the empirical model, we used generalized method of moments (GMM) analysis [5]. The econometric model we used suffers from endogeneity issue (i.e., correlation of explanatory variables with the error term) and it is appropriate to use system GMM estimation compared to 2SLS (Two-Stage Least Squares) because 2SLS may provide weak or non-availability of instruments in the datasets (see [26]). Second, country fixed effects (e.g., geography and demographics) may correlate with independent variables. In other words, system GMM eliminates unobserved heterogeneity and endogeneity by using the first difference of the equation by using the lagged variables as instruments. In addition, we introduced the lagged of key financial variables in one period, such as the product of financial development (M2/GDP) and remittances, domestic credit/the private sector, and the saving ratio.[2] Previously, numerous researchers [10, 38, 40, 52] used the SYS-GMM for investigating the impact of both financial deepening and remittances on economy. Our econometric model as follows:

$$\begin{aligned}\Delta y_{it} = {} & \gamma_1 \Delta y_{i,t-1} + \beta_1 \Delta \text{Remitt}_{i,t-1} + \beta_2 \Delta FD * \text{Remitt}_{i,t-1} + \beta_3 \Delta DC_{i,t-1} \\ & + \beta_4 \Delta \text{Saving}_{i,t-1} + \beta_5 \Delta x_{it} + \Delta u_{it}\end{aligned} \tag{4.3}$$

$$\Delta u_{i,t} = \Delta v_i + \Delta e_{i,t} \tag{4.4}$$

$\Delta y_{i,\ t\ -\ 1}$, reports the first differenced lagged dependent variable and it is instrumented with its past period. The two parameters β1 and β2 are related to remittances (ΔRemittances) and the interaction term of financial development and remittances (ß2ΔFD $*$ $\text{Remitt}_{i,\ t\ -\ 1}$), while, ΔDC represents the domestic credit/the private sector, Δsaving indicates the saving ratio the control variables (Δx). We also estimated the Eq. (4.4) using Arellano and Bond test for checking the serial autocorrelation. Based on z-test value ($z = 0.26$) for second-order (AR2), which is failed to reject the hypothesis (at 5% level) of no autocorrelation. To conclude, the model is failed to identify the serial autocorrelation or endogeneity problems. Table 4.6 reports the system GMM estimation results. We decomposed the sample data into two regions, i.e., NMS and WBC. This strategy allows us to compare the results across two NMS and WBC. In the first column, the list of all variables is reported, and the remaining columns present the coefficient values across three sample sizes. In one period, the lagged economic growth showed a positive association to the dependent variable. This finding suggests that growth in the past tend to boost

[2] Our results are much better by using the first lagged level of endogenous variables (remittances, broad money stock, domestic credit/the private sector) as compared to the findings of Buch et al. [8], and Reed [53]. Using the first level lagged variables of remittances, financial development (M2/GDP, domestic credit, saving ratio) provide non-rejection of the Sargan-Hansen test value. Our model does not suffer from overidentification, i.e., due to the first lagged of these variables. The lagged variables would allow us to interpret the past year's effect. In addition, using lags of these variables to some extend minimize the causality problem in our model.

Table 4.6 System GMM estimation-across two regions

	All countries	NMS	WBC
GDP per capita-dependent	Coefficients	Coefficients	Coefficients
GDP per capita (t-1)	0.9568*** (0.0359)	0.7119*** (0.0398)	0.9606*** (0.0201)
Remittances (t-1)	0.0128 (0.0136)	0.0078 (0.0117)	−0.0067 (0.0090)
FD* remittances (t-1)	0.0136*** (0.0025)	0.0127*** (0.0049)	−0.0379*** (0.0096)
Domestic credit (t-1)	0.0248*** (0.0101)	0.0193** (0.0077)	0.0464** (0.0218)
Net interest margin	−0.0072*** (0.0023)	−0.0049*** (0.0017)	−0.0031 (0.0029)
Saving ratio (t-1)	0.0021 (0.0067)	0.0322 (0.0539)	−0.0001 (0.0025)
Gross fixed capital	0.0279 (0.0299)	0.1666*** (0.0547)	0.0719 (0.0547)
Crisis (dummy)	−0.0604*** (0.0143)	−0.0852*** (0.0195)	−0.0752*** (0.0266)
Dependency ratio	0.5379 (0.9648)	−0.1063 (0.7379)	−2.7989*** (1.0775)
Inflation	−0.0023 (0.0025)	−0.0057*** (0.0019)	−0.0003 (0.0007)
Intercept	1.4383*** (0.4509)	2.9154*** (0.8399)	1.7185** (0.9488)
AR1 test AR2 test	0.06 0.26	0.15 0.18	0.10 0.09
Sargan test	$x^2 = 59.10$ p-value = 0.104	$x^2 = 61.910$p-value = 0.092	$x^2 = 41.13$ p-value = 0.357
Observations Groups	170 17	100 10	77 6

Source: Authors' own research
***p < 0.01; **p < 0.05. Standard errors are in parentheses ( )

economic growth in the current period and it is consistent across NMS and WBC regressions. However, the elasticity (ß =0.9606) is found strong for WBC compared to NMS.

The parameters of remittances showed no association at all to economic growth across all three groups. The combined impact of financial development and remittances showed that, 1% increase in financial development and remittances in the past year, the current economic growth is a rise by 3.6% across all countries. In the case of NMS, the interactive variable shows a 1% increase in financial development and remittances, and the economic growth is increased by 1.2% across NMS. This outcome suggests that the impact of past financial advancement as well as remittances increases the current economic development of NMS. Alternatively, we proposed that a deeper financial system in NMS accelerates economic growth due to their effective financial integration with the European markets. In addition, the

transition process of NMS in terms of privatization, trade and the globalization has effectively transformed these economies from low financial development to high financial development (see appendix A1).

In comparison, the coefficient of the interactive variable of financial deepening and remittances negatively affects economy for the case of Western Balkan Countries. This finding implies that the effect of past financial deepening and remittances decreases the current economic development for the case of Western Balkan Countries, which is consistent with the findings of Rehman and Hysa [54]. Similarly, the study of Giuliano and Ruiz-Arranz [26], this finding suggests that while comparing WBC with NMS, the financial system is relatively fragile. In addition, the findings appear that the effects of both financial development and remittances substitute the economic development in the WBC. In short, we confirmed the findings of Osbild and Barlett [51], which states that countries with a weak financial system due to low saving ratios, high-interest margins, and high non-performing loans adversely affect economic growth. Moreover, the transition process across WBC is underdeveloped and slow, and it shows that a poor governance system with weak enterprise restructuring and the lack of competition policy results in shallow financial development (see appendix A1). Even if these countries increase the level of broad money and receive the high remittances would result in the loss of output due to weak institutional development.

The elasticities of domestic credit/the private sector show that past domestic credit enhances the current year's economic growth across NMS and WBC. This outcome is similar to some previous studies' results (e.g., [2, 31]). To capture the effect of financial efficiency, the net interest margin coefficient showed that with a 1% rise in interest spread the economic development is reduced by 0.49% and is significant at 1% level. This outcome suggests that narrow interest margin increases economic growth. Nevertheless, this relationship showed no association for WBC. The elasticity of gross fixed capital presented that 1% increase in investment in fixed assets would increase the economic growth by 16.66%. The strength of this relationship apparently implies that gross fixed capital investment boosts the economic growth of NMS. The global financial crisis of 2008 has a negative impact on economy for both regions. This outcome suggests that the economic crisis of 2008 reduced economic growth. The dependency ratio is found negative only for WBC. This finding may suggest that high number of dependents in the family reduces the economic growth across WBC. Lastly, inflation has negative impact on the economic growth across NMS.

4.5 Conclusion

This research work explored the effect of both, financial deepening and remittances on economic advancement using panel data across new member states (NMS) and Western Balkan countries (WBC). The visual analysis showed that overall WBC have low financial deepening in terms of the broad money stock, domestic credit/the private sector, and the use of remittances. The panel threshold regression findings

suggest that countries with a high level of financial development have a complementary effect on the economy, while economies with a low level of financial deepening substitute economic progress. According to the results from the GMM system estimation, the study finds that financial development and remittances complement the economic growth across NMS. On the other hand, contrary to NMS, these two factors, substitute the economic growth for the case of WBC. Overall, by splitting the data into two regions, we identified the non-linear relationship of financial deepening and remittances to the economy.

There are important policy implications of this study. In the case of NMS, financial development plays a pivotal role in their economic advancement. To strengthen the effect of financial deepening and remittances on the economy, using an effective real interest rate policy (narrow interest margin) could accelerate the economic growth of NMS. Although, the transition process of NMS is relatively fast and well-integrated with the EU markets. But there is still room for improving governance and enterprise restructuring to boost NMS's economic growth.

In comparison, the WBC has relatively shallow financial development and it negatively affects economic growth. Any further inflow of capital in remittances will not trigger economic growth until the backing of an effective financial system is not provided. There are key policy suggestions about WBC, first, the remittances and domestic savings should be appropriately channelized through the financial system using a narrow interest margin. Currently, WBC has a low saving ratio due to high-interest margin and that factor results in low deposits and less lending to the private sector. The central banks (CBs) of WBC must ensure a smooth credit line to the productive sectors of the economies. Concerning their transitional challenges, policies must improve the governance system, enterprise restructuring, and create a more competitive environment in WBC.

As a limitation of this study we mention the relationship investigation using large panel data. Additionally, another lack would be the usage of another proxy of financial development such as market capitalization.

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Chapter 5
Capital Markets Union and International Risk-Sharing

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Abstract A currency union limits the ability of the member states to stabilise output shocks through exchange rate adjustments or resort to monetary policy interventions. Therefore, it is important to mitigate adverse output shocks which could affect consumption patterns through private or public risk-sharing channels. We study in this paper the difference between the core and periphery eurozone member countries regarding the reaction to GDP fluctuations, especially during downturns. Implementing a Capital Markets Union could play an important role in ensuring protection against output shocks through enhancing cross-border financial flows. We intend to show that since the launch of the euro, the degree of private risk-sharing has substantially increased within the euro area. Also, further capital markets integration could help reduce the effect of idiosyncratic shocks on output. Our results show that a functional Capital Markets Integration is a prerequisite for greater risk-sharing in European Monetary Union.

Keywords Risk-sharing · Consumption smoothing · Capital Markets Union

5.1 Introduction

Risk-sharing channels could contribute to smoothing consumption during downturns as an effect of the drop in GDP experienced during financial crisis. Functional risk-sharing mechanisms could thus increase economic resilience during shocks, foster growth and convergence, especially between members of a currency union.

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Risk-sharing channels represent thus one of the benefits of belonging to a monetary union, contributing to ensuring the capacity to react during economic crisis.

In this paper, we refer to risk-sharing through capital markets, through cross-border financial flows. A high degree of financial integration is likely to result in better risk-sharing, while insufficient financial development in the eurozone could not have entailed a better mutualisation of economic shocks, causing the split between core and periphery eurozone (EZ) countries during the last financial crisis [11].

Financial markets could play an important role in diversifying risk-sharing allocation and mitigate shocks to output during crisis. The efficiency and channels of risk-sharing mechanisms have been studied in the literature especially with a focus on how risk-sharing functions in fully operational monetary unions, such as the US or eurozone.

At the same time, enhancing the amount of risk-sharing shared through financial markets will contribute to a better functioning of the Economic and Monetary Union by smoothing the effects of economic cycles [10].

Literature usually identifies public and private risk-sharing mechanisms through the fiscal channel, the capital markets channel and the credit market channel. All these mechanisms function to smooth adverse shocks on GDP from being transferred into consumption.

We intend to refer in this article to consumption and income smoothing through capital market channel, which is the most underdeveloped in the eurozone. The capital market channel works through cross-border portfolio investments, while the credit channel refers to smoothing of shocks through savings or borrowings. The fiscal channel smooths risk through intergovernmental transfers.

There is an extensive literature referring to the functioning of risk-sharing channels, comparing these mechanisms in the US and in the eurozone. These studies usually document a lower amount of risk-sharing in EU, compared with US states, and point to the importance of developing risk-sharing channels to alleviate the impact of adverse output shocks.

The proposal towards implementing the Capital Markets Union, together with the Banking Union, to complete the architecture of the Monetary Union, would serve towards achieving a higher degree of cross-border risk-sharing through financial channels. The development of the capital markets union would contribute thus to greater financial integration and higher capacity to respond to asymmetric or symmetric shocks to GDP in the euro area.

Home bias in the equity market represents one of the reasons for reduced cross-border risk-sharing through financial channels in the eurozone member states. The home bias is responsible also for the low degree of financial integration among euro area countries and for a low degree of implementing the Capital Markets Union.

Euro area investors prefer to invest in domestic equity, the share of domestic equity held by euro area states being much larger compared with foreign equity. This reduced cross-border investment portfolio is responsible for achieving such a low degree of risk-sharing through the capital market.

A diversified portfolio of equities would help to smoothen asymmetric shocks to GDP by allowing a diverse investment range, a shock to the domestic economy

being absorbed because residents hold foreign equities, helping to spread the amount of shock internationally.

Thus, the potential for developing the Capital Markets Union represents a priority for European Union member states, especially considering the pandemic crisis, which will produce significant asymmetric shocks for European economies.

Therefore, our focus in this article is on the role of capital markets as a shock-absorber in case of asymmetric or symmetric shocks to output. The capital markets should function as an effective risk-sharing mechanism, by ensuring the inflow and outflow of capital during crisis.

We propose in this paper to test whether the asymmetric or symmetric shocks to output during the last decades in eurozone countries have resulted in a decrease of consumption patterns. In this way, we can compare public and private risk-sharing mechanisms and find if private risk-sharing functioned as a shock absorber during the crisis.

We intend to assess the response of consumption to fluctuations in the gross domestic product through capital market channels. Consequently, we intend to estimate impulse-response functions with a view to account for non-linearities in the effect of macroeconomic shocks on consumption.

Our paper intends to make several contributions to the literature, focusing on the capital market risk-sharing channel, emphasising the importance of the capital markets union to allow for a diversified portfolio of cross-border equity holdings.

Our findings confirm the importance of greater financial integration between euro area countries and for countries outside the EZ. As a common currency can result in a reduction of information and trade costs, it should also result in bigger cross-country financial flows [4].

International income flows can help residents of a country diversify risk due to different output dynamics. Thus, the greater the amount of financial development achieved at the level of eurozone countries, the capacity to respond to asymmetric shocks increases consequently. Our results confirm thus the importance of financial integration and the fact that belonging to a monetary union can help countries achieve a better reaction in case of output shocks.

5.2 Literature Review

The main channels of risk-sharing in euro area countries have been presented, with a view to take into consideration which channels were resilient to the output shocks during the Global Financial Crisis and the eurozone crisis. The actual pandemic will pose a significant challenge for the economies of the member states, which will test again the functioning of risk-sharing mechanisms.

The literature of risk-sharing was based on the seminal model of Asdrubali et al. [2], which proposed a framework with three main channels for consumption smoothing: capital market channel (smoothing through cross-border income flows), credit

channel (smoothing through counter-cyclical savings) and fiscal transfers. The authors compare the degree of shock absorption through risk-sharing mechanisms both in case of US federal states and in case of eurozone member states and find that while in the US the capital market channel functions to smooth all shocks to GDP, in case of euro area, the capital channel is undeveloped.

According to empirical literature, the public risk-sharing in the euro area is very low, while risk-sharing through private channels, capital and equity markets is also insignificant.

An analysis of the effect of private and public channels for risk-sharing for EMU countries during 1999–2015 considers the role of financial integration and financial assistance. A time-varying test is used to estimate the extent of risk-sharing absorbed, showing that 40% of country-specific consumption shocks have been smoothed before the global financial crisis, while after the crisis, 65% of shocks were absorbed. The most effective private channels of risk-sharing are cross-border holdings of equity and debt [4].

Financial income is considered an important risk-sharing channel, according to a study on the components of factor income, to assess the effect of financial integration and international portfolio diversification on consumption smoothing. The paper uses panel data for EU countries, showing the contribution of equity and bond markets to reducing consumption-growth differentials between countries [4].

The capital market and credit market channels benefit from financial integration and from the competition among financial institutions [6]. According to other studies, risk-sharing through the channel of capital markets has become more developed after the introduction of the common currency [9].

Other studies find that the degree of risk-sharing is higher in the US federation because there is a higher degree of financial market integration. At the time, public institutions have an important role in ensuring the risk-sharing capacity of EZ countries, compared with US states [7].

In case of sub-groups of EU countries, while there has been some convergence trend before euro accession, during the early period of EMU there were divergent patterns in risk-sharing. The discrepancies were more obvious between core and periphery European countries. Despite efforts to restore convergence between countries, the pattern of divergence continues between EU countries [5].

It is usually considered in the literature that federations have a higher capacity to alleviate the impact of GDP shocks, considering the mechanisms for spatial risk-sharing (income-smoothing) or intertemporal risk-sharing (consumption smoothing) [1].

Other studies analyse income smoothing associated with international portfolio diversification by decomposing the net factor income channel into interests, dividends and retained earnings, in case of OECD and EU countries. The results of the study confirm that interest receipts and equity dividend payments have an important contribution to absorb domestic income shocks [3].

The proper functioning of the capital market channel depends mostly on the degree of integration of financial markets and also the competition between financial institutions. Therefore, the importance of establishing proper regulations for

financial intermediation, the creation of an efficient financial infrastructure and also ensuring the stability of the financial systems [8].

5.3 Methodology

The lack of risk-sharing mechanisms will make recovery from crisis more difficult, while the implementation of these mechanisms will increase resilience to idiosyncratic economic shocks and improve consumption smoothing.

The classical measure for risk-sharing supposes that domestic consumption should be unaffected by output shocks, being based on a measure of the reaction of consumption to GDP shocks. An ideal case would suppose that no GDP shocks is being transmitted into consumption.

$$\Delta \log(C) = \propto_0 + \propto_1 \Delta \log(\text{GDP}) + \varepsilon_0 \tag{5.1}$$

The amount of risk-shared through the capital market channel can be identified with the national accounts Net Factor Income, including compensations for employees working in a foreign country and income from property or investments. The capital market channel includes financial flows from foreign direct investment and bond and equity holdings.

The degree of development of the capital market can be identified with a measure for financial integration, showing thus the interrelation between financial markets of eurozone member states, and how consumption and income shocks are being smoothed through different channels.

The diversification of foreign portfolio can serve as a mean to assess which is the extent of risk-sharing which members of a currency union can achieve. According to some authors, most risk-sharing through the capital market comes from investment income, which includes income received from FDI, portfolio investment income and other investment income [9].

We use in this paper a vector autoregressive model to study the reaction of consumption in case of shocks produced to output. Our model uses impulse-response functions to assess the behaviour of the variables in case of exogenous shocks. One of the advantages of using a VAR model is that it allows to incorporate non-linearity in the data and is also more robust to misspecification.

Data used for eurozone core and periphery countries are extracted from Eurostat database, comprising the following variables influencing the extent of risk-sharing through capital markets:

- gross domestic product,
- consumption,
- an indicator for financial development to assess the degree of capital market integration.

The impulse-response function will provide information on the response of one variable to a shock produced to the other variables. The method allows to estimate and obtain different coefficients for each forecast horizon included in the analysis.

We estimate a VAR model of the following form:

$$Y_t = A_0 + A_1 y_{t-1} + \ldots + A_p\, y_{t-p} + \varepsilon_t \tag{5.2}$$

where y_t represents the vector of endogenous variables, A_t is the matrix of autoregressive parameters and A_0 represents a vector of constant terms.

Therefore, our model is specified as follows:

$$\begin{bmatrix} \text{gdp}_t \\ \text{consump}_t \\ \text{fin\_dev}_t \end{bmatrix} = \alpha_0 + \alpha_1 \begin{bmatrix} \text{gdp}_{t-1} \\ \text{consump}_{t-1} \\ \text{fin\_dev}_{t-1} \end{bmatrix} + \ldots + \alpha_n \begin{bmatrix} \text{gdp}_{t-n} \\ \text{consump}_{t-n} \\ \text{fin\_dev}_{t-n} \end{bmatrix} + \begin{bmatrix} \varepsilon_{1,t} \\ \varepsilon_{2,t} \\ \varepsilon_{3,t} \end{bmatrix} \tag{5.3}$$

5.4 Results Interpretation

There is an interlinked relation between financial crisis and the lack of efficient risk-sharing mechanisms. Financial fragmentation is the result of inadequate response from governments to shocks and subsequently capital flows reduction. The lack of diversification in capital flows was seen as a major cause for the disruptions caused by economic crisis [12].

The results of our model confirm that in case of euro area countries, the response of consumption in case of a shock to gross domestic product is significant. These findings confirm that it is important to mitigate adverse output shocks through capital market channel. Thus, capital market integration proves to be a very important channel to prevent the accumulation of macroeconomic imbalances and also help cushion asymmetric or symmetric shocks to GDP.

In the first row of impulse-response functions for the relation between consumption, output gap and financial development, we have the response of one-percent deviation impulse to consumption. Thus, the modification of consumption has no effect at any horizon on financial development, while it produces a decrease of gross domestic product growth rate, followed by an increase, along the interval analysed, proving the interdependence between fluctuations in consumption and fluctuations in output gap.

In the second row we have the response of consumption in case of financial development impulse, the results showing it will cause after a long period, of approximately 10 years, a decrease of consumption. At the same time, the effect of an impulse of financial development on output gap will consist in an increase of the output gap, followed by a decrease at a long scale, of approximately 10 years.

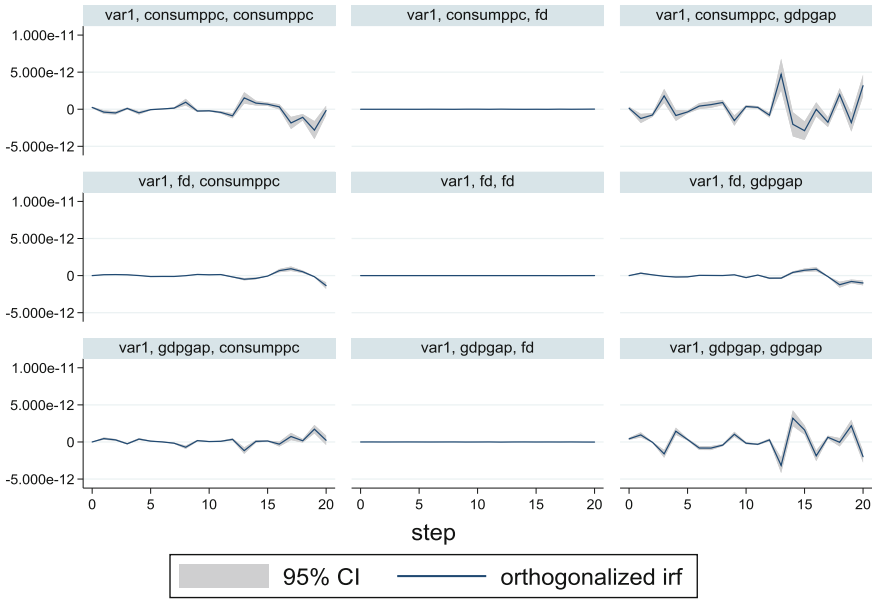

Fig. 5.1 Impulse-response functions for euro area countries. (Source: Authors calculus using STATA)

The response of consumption in case of an output gap shock will consist in fluctuations of consumption during the whole period analysed, while a shock on output gap will produce no effect on financial development (Fig. 5.1).

5.5 Conclusions

Risk-sharing mechanisms could represent a potential solution for the drop in consumption caused by the actual COVID-19 pandemic, as well as other financial crisis, by allowing risk to be fully distributed among members of a currency union, helping states to alleviate the impact of asymmetric or symmetric shocks on output.

The role of international risk-sharing is to mitigate adverse output shocks and to stabilise consumption in case of recessions. Risk-sharing mechanisms can function to protect consumption volatility due to shocks to domestic GDP. Thus, implementation of effective cross-border risk-sharing can help to cushion the effects of asymmetric shocks on output to translate into consumption decreases.

We have analysed in this paper the topic of risk-sharing mechanisms in the European Union, starting from the premise that a recently-established monetary union, such as the eurozone, also needs efficient banking and capital markets

union. The functioning of risk-sharing channels – the fiscal, capital markets and banking channel during the global financial crisis and the sovereign debt crisis can show the extent to which eurozone can protect itself against idiosyncratic shocks to GDP.

Considering the experience of another currency union, the USA, where shocks to output are being smoothed through a large extent through risk-sharing mechanisms, eurozone countries could adopt a similar stance to ensure an improved resilience to economic crisis.

Also, the amount of risk smoothed through cross-border investments is very low in the euro area, compared for instance with US states, where the capital market channel plays a very important role in mitigating GDP shocks.

The results of impulse-response functions used in this paper confirm that gross domestic product growth rate volatility can also affect the dynamics of consumption, the two variables showing a significant correlation. Thus, in case of output gap shocks, the response of consumption consists in an important decrease, proving the necessity to prevent such fluctuations through risk-sharing channels. Thus, financial development is used as a proxy for capital market integration, confirming that a higher degree of capital market development can help EU states in attenuating output shocks.

Thus, the implementation of the capital market union can represent also a potential solution for the drop in consumption and in gross domestic product growth rate during the pandemic crisis, helping countries to mitigate output shocks.

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Chapter 6
FESBAL-UPM Food Bank Chair and the Service-Learning Projects from the 'Working With People' Perspective

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Abstract In industrialised countries and developed societies, there is a paradox regarding food surpluses and the presence of poverty and social exclusion. In such societies, although there are signs of solidarity being implemented, it is necessary to spread human and cultural values to be aware of the social, environmental, and economic consequences of food consumption. Universities have a great potential to set relationships both with civil society and the economic sector through projects that generate 'services' to contribute to tackle the problems of society and that can bring values leading to an improvement of people's lives.

Since the creation of the Food Bank Chair (known in Spanish as CBA)-UPM in 2013, the Spanish Food Bank Federation (FESBAL) and the Technical University of Madrid (UPM), together with the investigation group GESPLAN has conducted a wide array of Service-Learning Projects (SLP) that contribute to rational food consumption.

Such projects are framed within the Working With People (WWP) model that integrates Service-Learning Projects and personal competences for Project Management. This paper shows this model and the results from a three-level perspective: training-awareness, dissemination-knowledge transfer, and investigation.

Keywords University-company relationships · Sustainable food · Service-Learning Projects · Chairs-companies · Competences

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6.1 Introduction

Long before the coronavirus (COVID-19) epidemic, there was a long way to go to eradicate all types of hunger and malnutrition in the world for the year 2030. Now, the pandemic has hindered this objective.

In 2022, around 700 million people experienced extreme poverty, and more than 690 are at risk of hunger. According to FAO's last report, there is a total of 2.370 billion people facing moderate or severe insecurity [17]. Almost one out of three people of the global population had a lack of appropriate food in 2020, which represents an increase of 320 million people in a single year, with an average food insecurity rate of 30% [17].

Moreover, it is important to point out that around 931 million tones of food are wasted per year, 17% of the total food produced. Such amount would be enough to stop the problem of food insecurity at a global scale [3, 5].

In Spain, 1.363 billion kg of food was estimated to be wasted in 2021, equivalent to 31 kg per person; enough food to feed more than 1 million households in Spain. Other studies estimate that nearly 1 million households (975,249) are facing food insecurity and more than 2 million people have had to reduce their food intake due to lack of resources in 2021 [24].

Awareness campaigns and education provided to society are considered necessary to tackle this challenge [23]. Having a critical and rational thinking on consumption which must start at the family-level and continue throughout every people's life [9]. Schools, universities, and other educational institutions have the duty to raise awareness by fostering a rational, civic, and solidary aptitudes to prevent food waste [12].

This paper presents a new way to contribute to the university-business-society relationship through the implementation of joint projects that can create services, raise awareness and acting towards an improved rational and sustainable consumption. This latter does not only focus on environmental aspects, but the social and cultural dimension present in people's daily lives, as well as health and sociocultural diversity are of paramount importance [29]. According to FAO, a sustainable food system can offer food security and nutrition to everyone, without compromising the economic, social, and environmental bases to allow food and nutritional security for future generations [18].

In this sense, the Food Bank Chair (hereinafter CBA-UPM) was created in 2013 with the aim of contributing to raise awareness on rational and sustainable food consumption. The innovative idea emerged from the Spanish Food Banks Federation (FESBAL), which looked for the Technical University of Madrid's Investigation Group GESPLAN, which already had action plans in human development and sustainability.

FESBAL's activities are integrated in the FEBA federation (Fédération des Banques Alimentaires Européenne), grouping 257 banks from 22 European countries. FEBA was founded in 1986 to fight hunger and food waste. There are more than 13,000 volunteers collaborating in the daily operations, distributing 402,000

tons of food through their 31,000 charities, meaning 804 million dinners served to 5.7 million people in Europe [18].

The role of Food Banks is becoming increasingly relevant, as recognised by various research studies [25, 30], especially in societies, such as Spain, where the capacity of public institutions to meet the needs of civil society has decreased in recent years [21, 22, 24].

Furthermore, the role of these civil society institutions falls within the framework of social responsibility and of private entities to act together with public institutions in raising awareness and solidarity [13, 15, 30].

6.1.1 Service-Learning Projects (SLP)

Service-learning is based on systematised learning developed through a quality service given to the community [27]. This methodology aims to include at academic level projects where curricular learning is linked to a real need of a social entity [28]. This approach provides benefits to the community and connects education with the real world [26, 31, 32]. In this sense, it represents a complex proposal for experiential education in which the aim is to establish a balance between learning and service, without the need of being a volunteer or to carry out a curricular internship [20].

The illustration bellow shows the 'SLP-Working With People' model from which CBA projects are developed to respond to the needs of society:

6.1.2 Methodology: WWP-SLP

SLP projects promoted by the CBA-UPM are a 25-year-long process of refining Project Based Learning [11, 13], at undergraduate and postgraduate level, and in the international master's degree in Rural Development Project Planning and Sustainable Management. The model developed, coined as 'Work With People (WWP)' [8], jointly promotes educational innovation and research, encouraging University-Business Chairs to formulate SLP projects based on the needs of society. The WWP model therefore requires the development of strategic alliances (with universities, companies, civil society entities) combined with synergies between Research Groups and Educational Innovation Groups (EIG), that formulate SLP projects based on the three pillars of research universities: teaching, research and linking with society [8].

The SLP-WWP model requires the relationship of two fundamental aspects (Fig. 6.1). On the one hand, the University, with teaching and research staff, educational programmes, methodologies, and teaching activities. On the other hand, the entities (public and private) of society, with needs, problems, and opportunities. The linking element between both realities are the projects (PBL) generating

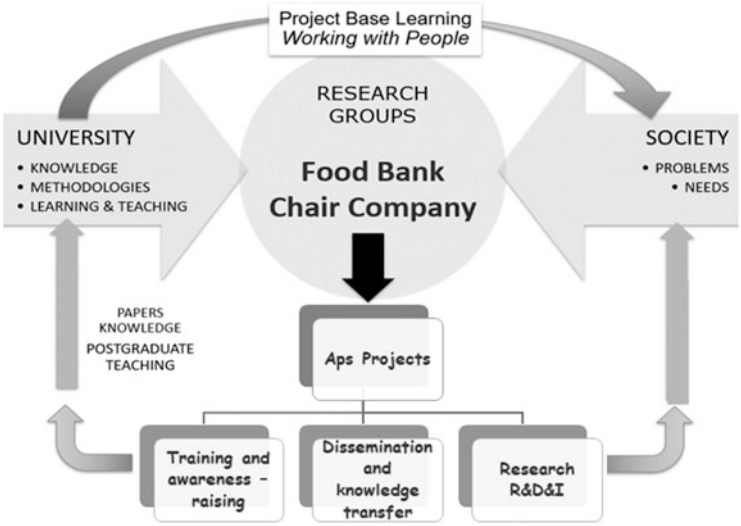

Fig. 6.1 Relationship of SLP-WWP with the FB-UPM Chair

'services' that respond to real needs of society and learning opportunities. This methodology allows to integrate a learning experience within the service provided to society. The SLP-WWP model therefore implies joint work, cooperation and close collaboration between the agents involved in the projects, which in the case of the CBA are included in three lines of action:

training and awareness-raising, research and dissemination, and knowledge transfer.

This SLP-WWP model requires the following basic elements:

(A) *Steady collaboration*: The CBA is a collaboration between the UPM and FESBAL that integrates its 54 Food Banks as entities to which services are provided from the lines agreed in framework agreement.
(B) *Projects*: From the CBA, projects that generate a 'Service' are materialised, they include the participation of students, and they support learning processes as well. These are MPDRGS postgraduate students, who are offered the possibility of linking their master's final thesis with specific projects or actions coordinated by the CBA staff. They are provided with a work environment, resources to carry out research in a specific context and needs. The projects are real scenarios that promote skills development through problem solving.
(C) *Time-based planning of activities*: The CBA and SLP requires an annual planning of activities, organisation of tasks and teamwork. This period allows coordination with the agents involved and setting up priorities.
(D) *Infrastructure and resources*: The CBA also require adequate infrastructure to carry out the activities in the UPM- assigned offices located in the School of Agronomy, Food and Biosystems Engineering (ETSIAAB). In addition, FESBAL and Food Banks provide their facilities to participating students and researchers.

(E) *Joint cooperation and commitment*: From the CBA, the SLP is based on the cooperation between GESPLAN research group teaching staff, the UPM student teams, the members of FESBAL and the Food Banks, these latter being the main recipients of the activities. Food Banks and their staff's knowledge of the context enables a close view of reality affecting real people. Social commitment is key in the SLP model, including other collaborating entities in the projects, which work with dedication, resources, and efforts to change reality.

(F) *Project Management Skills*: 'Project-based work' is promoted from the knowledge and development of skills under the international standards of the International Project Management Association (IPMA) under three dimensions: technical-practical, behavioural, and contextual skills.

The three components of the SLP-WWP model, with synergies across them and the actors involved (public-private and civil society), are presented below (Fig. 6.2).

(A) *Ethical-social component*: This component covers the ethical-social dimension for sustainable consumption, including people's behaviours, attitudes and values who interact to promote, participate, operate, and benefit from SLP projects. This component is identified with the key objective of promoting social responsibility from a human dimension. By including moral behaviours, this component is fundamental to all SLP projects from the CBA and lays the foundations for people – from different public and private spheres – to work together, with commitment, trust, and respect for individual freedom. These types of projects do not have a 'neutral' character, but they are based on an ideal of 'service' that is value driven. Thus, the aim is to improve people's skills and behaviour, considering the principles on which the Food Banks' activities are based: awakening the spirit of solidarity and spreading human values.

Fig. 6.2 SLP-Working With People model applied to the CBA

(B) *Technical-entrepreneurial component*: CBA's actions are guided by the 'project-based work' of SLP to improve the effectiveness and efficiency of services. These SLP projects are the 'technical' linking instruments, which generate 'services' to society, aligned with strategic objectives, meeting specific requirements and quality standards. In addition, continuous innovation is promoted through new SLP projects that incorporate young university volunteers mentored by the CBA, FESBAL collaborators and Food Banks. Moreover, the GESPLAN group promotes the development of competencies under the international standards of the International Project Management Association (IPMA).

(C) *Political-contextual component*: The aim is to provide the CBA with strategic elements to improve its relationship with FESBAL and food banks based on latest trends and policies. This area covers GESPLAN, FESBAL and its Food Banks' capacity to interact with public administrations at various levels (international, national, regional and local) and other actors from civil society. The CBA is therefore an internal organisation that supports FESBAL's participation in new projects of social interest. The CBA has an instrumental role of service to Food Banks. Therefore, its actions are constantly changing according to the learning process, new needs, and the generated information.

The following is a summary of the results of the SLP projects conducted during the past years, grouped into the 3 main action fields:

6.2 Results

Since the creation of the CBA in 2013, a total of 121 projects have been developed within the framework of the agreement established between FESBAL-UPM. The results of the SLP projects are grouped into the three main action fields as shown in the following Table 6.1. From the 121 SLP projects implemented, 64,457 people have taken part and numerous public and private entities and households have participated. Table 6.2 shows the participation rate of private and public entities together with civil society for the three action fields.

Table 6.1 Projects results and participant entities

Action fields	N° of projects	% Projects	N° entities	N° beneficiaries and participants
Dissemination and knowledge transfer	39	32.2	152	**289**
Training and awareness-raising	66	54.5	2248	**63,083**
Research	16	13.3	50	**1085**
Total	**121**	**100**	**2450**	**64,457**

Source: Author's elaboration from the CBA annual reports

Table 6.2 Participation rate of actors involved per action field

Action field	% Public E.	% Civil society	% Private E.
Dissemination and knowledge transfer	42.11	21.71	36.18
Training and awareness-raising	54.45	14.81	30.74
Research	32.00	48.00	20.00
TOTAL	53.22	15.92	30.86

Source: Author's elaboration from the CBA annual reports

6.2.1 Training and Educational Cooperation Activities

The first block includes projects in the area of training and awareness-raising on responsible and sustainable consumption. Since the creation of the CBA in 2013, FESBAL prioritised the implementation of actions in this area, accounting for 54% of all projects, and which have reached 63,083 people.

The Coral programme on responsible food consumption was one of the first CBA's actions. It started in 2014 with a group of university volunteers, coordinated by teachers and researchers together with FESBAL and Food Banks. The project consisted in volunteers providing schools with didactic resources and workshops to raise awareness on the 'zero waste' concept.

After seven editions of the drawings contest, the results have proven to be incredibly positive, reaching 21,720 students (from fifth and sixth grade and last year of secondary education) of 461 schools together with the participation of 27 Food Banks from different Spanish cities, which contributed to raise awareness on the reduction of food waste.

There are several dynamics with different activities (talks, games, workshops, and awareness videos) developed by Food Bank volunteers and applied in different schools. After, some schools keep participating in the drawings contest, holding a first phase at a regional level and a second one at a national level. For secondary school students, the CBA has also developed a Project-Based Learning methodology that simulates a real business scenario to foster teamwork and to develop skills such as culture and values developments, communication, negotiation, planning and leadership.

Numbers show that it is a truly consolidated 'contest' project that keeps progressing in terms of innovation and in the number of new schools participating. In each edition, the awarded drawings are exposed at the Food Banks headquarters, where the awards ceremony is organised at a national level known as the 'Espiga de Oro' award in which the role of the main collaborating companies is also recognised.

SLP-Based Final Degree Projects and Master Theses

The CBA also conducts other activities such as the coordination of different **final degree projects and master theses** (known as TFG and TFM in Spanish). They provide students with learning experiences while they offer services to improves most vulnerable sectors in society. This is achieved by ensuring a feedback system between both sides.

These works are coordinated by teachers and research staff collaborating with the CBA and they connect with the society and other entities such as the FAO. Moreover, they contribute to the development of personal skills and solidarity values among students and other people participating. Since its creation, the Chair has coordinated a total of 20 projects (both graduate and undergraduate level) which contribute to promote Food Banks' activities and to disseminate the concept of rational food consumption.

Various TFM have been carried out by the CBA by students of the International Master's Degree in Rural Development Project Planning and Sustainable Management, with methodological and scientific rigour, providing with innovative analyses emphasising the work and effects of Food Banks in Spain and in other countries.

In addition, other training and educational cooperation activities have been developed as SLP, such as curricular internships in companies and Food Banks and educational contests in different modalities. The curricular internships from the Project -Based Learning methodology [10], have benefited several sectors of society, ensuring a greater link between the CBA and real needs and problems.

6.2.2 Activities to Promote Research, Development and Innovation

In this area, research studies have been developed as SLP from the CBA, which address issues suggested by FESBAL. In total, 16 research papers have been carried out, with an overall participation of 22 students. They have collaborated with the GESPLAN research group through internships framed in the master's degree in Rural Development Project Planning and Sustainable Management. In addition, the papers included the participation of 1085 beneficiaries and entities from the public, private and civil society sectors.

It is worth highlighting the participation of FESBAL and some of its Food Banks, as well as the presence of external, national, and international entities. The methodology of the WWP model has allowed the research to transcend technical-business matters and incorporate elements of an ethical-social or contextual nature that are highly relevant to the activity of Food Banks.

The WWP model has allowed to connect with entities from civil society and from the public and private spheres, thus fostering a learning model that includes all sectors of society. Furthermore, many of these SLP have gone beyond the national level and are allowing FESBAL's activity to be internationally acknowledged as a case of success [1, 2]. These relations are framed within the international Agris-Mundus Alliance from the master's degree in Rural Development Projects and Sustainable Management and from the FAO-GESPLAN agreement for the integration of the Principles for Responsible Investment in Agriculture and Food Systems [6–8].

Another international alliance, promoted by the CBA together with FESBAL, is the one with European community EELISA 'Food Bank Chair: Rational Food Consumption' with the aim of raising awareness about rational food consumption. The UPM, together with eight other prestigious universities from Germany, France, Hungary, Italy, Romania, and Turkey make up the EELISA consortium and together with other communities, it seeks to transform university education in Europe through a stronger link with society, creating thematic hubs framed in working groups named 'communities' [14]. This new alliance allows collaboration with other universities and the sharing of experiences from the actions of Food Banks in other countries. The aim is also to design an 'EELISA credential' that certifies students for their competences (social commitment and capacity to respond to social challenges and contribute to sustainable solutions).

6.2.3 Dissemination and Knowledge Transfer Activities

The last major block of action consists of the dissemination and transfer of knowledge generated from the CBA and other content related to sustainable consumption and of interest to FESBAL. The contents are published through different media platforms (social networks, blog, and electronic newsletter) to reach a broader spectrum of society: both at the public level, as well as the institutional and specialised researchers to contribute to the creation of scientific web of knowledge. To contribute to the dissemination on social networks, the CBA logo was designed and used on Twitter, Instagram, and Facebook, with more than 800 followers and a rating of 4.5 stars.

The number of visits has increased progressively, reaching **2836** visits in 2021, being the drawing competition section the most visited one. In addition, a CBA Blog has been launched (https://blogs.upm.es/cba/) where information related to projects initiated by the CBA related to food sustainability, is posted on a regular basis. An electronic newsletter 'Alimentando Soluciones' (Feeding Solutions) has been created, designed for member companies, with relevant and up-to-date information on the progress made in the fields of development and the culture of rational consumption.

Overall, publications have successfully generated more than 4300 views per year, both from general news (news on social networks, electronic newsletter, CBA-UPM Blog, general articles) and in scientific research formats (scientific articles, congress and seminar publications, international book chapters).

Through these disseminations and knowledge transfer activities, the WWP model of the CBA allowed the networking opportunities among different entities (public, civil society and private), as shown in Table 6.3. All these activities are proving to be particularly useful and of great interest to the organisations involved, opening possibilities for new relationships and making culture and scientific knowledge accessible to the public and to non-specialist audiences. They are of great social importance, as they are a fundamental step in encouraging education, raising

Table 6.3 Drawings contest results (Coral Programme)

	2014/15	*2015/16*	2016/17	2017/18	2018/19	2019/20	2020/21	
Editions	1°	2°	3ª	4ª	5ª	6ª	7ª	Total
N° of schools	24	54	80	83	123	33	64	**461**
N° of students	1580	2704	3809	4000	5124	758	3725	**21,700**
N° of food banks	12	9	10	13	16	6	9	**27**

Source: Author's elaboration

Table 6.4 Dissemination and knowledge-transfer from the CBA, 2022

Type of activity	N° public entities	N° civil society entities	N° private entities	Total N° of entities
Articles	5	3	2	**10**
CBA blog	2	4	3	**9**
Newsletters	4	4	3	**11**
Congress and seminars	41	22	46	**109**
Books	4	0	1	**5**
Social platforms	8	0	0	**8**
Total	**64**	**33**	**55**	**152**

Source: Author's elaboration

awareness, and promoting the sensitisation of society in favour of responsible and sustainable food consumption (Table 6.4).

6.3 Conclusions

After these years, the success of the SLP-WWP model of the CBA goes beyond the merely 'tangible' aspects of the results obtained through the volunteering projects, as it achieves intangible benefits such as the expansion of values to society from the academic world.

After almost 10 years of joint activities, the UPM-Food Banks Chair contributes to the fact that it is not only charity institutions such as the Food Banks that provide a response to a global need in society, but that it also involves other actors in society.

The WWP model has built new relationships that aim to overcome the current 'culture of waste' and replace it with a solidarity-based and respectful mentality towards a more equitable and humanitarian society. The balance between university-society actions based on the three components of the SLP-WWP model (ethical-social, technical-business, and political-contextual) is confirmed as a necessity to progress in unity towards one of the most serious challenges facing humanity: hunger and malnutrition.

The educational and social impact of CBA, both in public and private sectors, is contributing to meet the objectives of the EU and Member States to reduce food waste and food loss in production and supply chains by 2030 [16].

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Chapter 7
Economic Aspects of the Innovative Alternatives Use in Agriculture

Jonel Subić and Marko Jeločnik

Abstract Agriculture is a sector of economy of crucial importance for global population, as it is a basic source of food and inputs used in other industry sectors. Also, agriculture is a sector primarily based on use of various inputs, while initiating usually harmful effects to local and global environment. In time of tightened economic, social and environmental expectations, burdened with frequent economic and energy shocks, or constant increase in population growth, contemporary agriculture is forced to seek for innovations, i.e. production alternatives that are environmentally friendly, economically justified and socially eligible. The main goal of the paper is to present the few successfully tested alternatives in the last few years that could be used in agriculture, before discussing their economic side. All alternatives are generally turned to renewable energy use at the farm level, mostly in irrigation, while they encourage wider involvement of automatisation and digitalisation in national agriculture.

Keywords Agriculture · Farm · Innovations · Alternatives · Automatisation · Digitalisation · Serbia

7.1 Introduction

The paper will be opened with the old question – What does agriculture include? It is not just a human activity that simply provides food for the global population, or raw materials for various industries [58]. It has a much wider context, because it changes the rural landscape [36], brings incomes both to the farmers (their families), [38] and certain administrative units, mainly through exports [1] and taxation [54] affecting their economic growth [59], proffer the employment [65] and silent escape from sore poverty [12], or attracts and connects the global population around the specific gastronomic taste and activities [23], etc.

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Agriculture generally represents close and permanent cycle of available natural or previously produced (synthetised) inputs spending to produce valuable agro-food products, oftentimes further irreplaceable industrial inputs. Status of inputs in agriculture usually has mineral fertilisers and agrochemicals, energy, labour, water, seed and seedlings, etc., while it generates several animal or plant products such as milk, meat, skin, feathers, fat and oils, grains, fruits, etc. [11, 28, 39].

Besides its important role, primarily to feed the rapidly increasing population worldwide, it is fully dependent on energy, land and fresh water, usually associating this sector of economy with many limitations and global issues.

Although it could be used in energy generation (biomass), agriculture is considered as net consumer of energy. Energy is commonly precondition for agriculture production organisation. Used energy mostly originated from fossil fuels and in much lesser content to renewables [40, 46]. Farms are consuming energy directly or indirectly. First way considers consumption of petroleum-based fuels, as well as consumption of natural gas, or electricity from public power grid (for running the machinery or equipment, heating or cooling, lighting, feeding or aeration, etc.). Second way mostly considers the application of synthetic agrochemicals based on petroleum [49]. There is some estimation that the entire agro-food sector consumes around 30% of the globally available energy, while over 70% is consumed by the farms [63]. For example, on the overall energy consumption in the EU, agriculture shares around 3.3%, while it is highest in the Netherlands at around 9%. Meanwhile, there is a negative trend in energy consumption in the EU agriculture at around 8% in the last ten years. Consumption of fossil fuels dominates, with around 55% of the overall energy consumed in agriculture [25]. Simultaneously, in the USA, agriculture consumes almost 2% of overall energy consumption, first in the form of diesel (up to 45%) and electricity (up to 25%). Contrary to the EU, energy consumption in the USA agro-complex shows upward trend [60]. Besides, together with agrochemicals energy used in agriculture, primarily fossil fuels, they generate harmful effects to environmental cleanness and human health [15, 30], as well as inciting the climate change [5]. As in most sectors of economy, continuity of agricultural production and further agro-food supply and food prices are highly sensitive to occurred energetic shocks, both to shortage of energy or increase in energy prices [41].

It could already be seen that the future is turned to the use of renewable energy sources, as inexhaustible energy sources are existing in nature which are completely or partly renewable in a certain period. By utilising them, we could produce electricity, thermal or mechanical energy, while they are characterised by environmental friendliness, or highly reduced emission of GHGs (primarily CO_2) during the process of energy production. Commonly, solar, water, or wind energy, hydro potential, tidal and geothermal energy or energy derived from biomass combustion have been used [3, 42, 51, 56]. Although the utilisation of renewable energy sources covers only 6% of overall energy production, their share is almost triple in the last decade [35].

For almost all living beings, life without water is unimaginable, so there is no mistake if water is considered as the matrix of life [7]. As a kind of bio-production, stability and development of production in agriculture has been based on permanent availability of sufficient amounts of fresh and bio-chemically clean water [43]. In recent time, partly by unreasonable water use in agriculture (primarily irrigation), agro sector significantly contributes the water shortages, i.e. exhaustion and depletion of accessible water resources [8]. In addition, conventional agriculture, through the agrochemicals, animal growing, unsecured waste, etc., or agro-industry, through the applied system of processing, way of input use, or missing waste management, usually affects the pollution of the watercourses and groundwater resources [14]. Generally, although small areas of agricultural land are irrigated worldwide (around 280 million ha is under irrigation systems, where almost 70% of surfaces is located in Asia, around 17% in America, or slightly under 10% in Europe), agriculture together with food-industry represents huge consumer of fresh water [53]. It should be mentioned that currently around 18% of the globally cultivated areas is under irrigation, while on these surfaces is produced more than 40% of available food [50]. In line with the intensification of the pressure to municipal water supply, the depletion of water resources for agricultural purposes also leads to constant increase in the price of used water [47]. Therefore, water is considered as strategic resource in the near future, or it could be already labelled as priority nowadays, requiring the approach with due care. Its availability imposes the need for water pricing policy development and introduction of water management practice in agriculture [2].

Available land areas suitable for agriculture widely differs related to soil fertility, mineral content, structure, depth and some other soil features. So, each soil is not suitable for all crops and agricultural activities. On the other hand, irresponsible treatment of agriculture, or lines of agro-food sector and other sectors of economy, towards the use and cultivation of fertile land (lack or poor land management practices) could lead to its abandonment, erosion or degradation [10, 24].

Principally, conventional agriculture that we know today has a significant impact on jeopardising the life ecology. Agriculture contributes to the escalation of climate change, calling into question the balance between the necessity of its practice and its intensity as a threat to people's future lives. So, besides climate and ecological aspects, as one of important challenges to agriculture is how to meet the increasing demand for food until 2050, as related to population growth (over the 9.7 billion in 2050), it is estimated that human and animal food, and biofuel production have to increase by 50% in four decades [26].

From its early steps, in the core of agriculture is innovation. From ancient times and the rise of primitive agriculture (such as grain farming in the Near East and Mesoamerica, or vegetable production in Amazonia or Asia), i.e. mastering the methods to domesticate plant or animal, and produce specific food required for population feeding, the practice of agriculture is based on innovation [27]. Up to today, throughout the realisation of four agricultural revolutions, agriculture comes to position to reject the simple run for higher yields, in exchange to entire digitalisation of production cycles in agriculture [45].

In other words, agriculture, like other sectors of the economy, has been based on knowledge and practical science for several decades while this approach has already been formalised through many (inter)national agricultural development policies and legislation [44].

Currently, in the century of digitalisation agriculture is willing to apply progressive technology. Thus, with so far accumulated knowledge in this sector, primarily related to IT and biotechnology, it is rapidly approaching other hi-tech sectors of economy [13]. With the primary goal of digitalisation or automatisation in agriculture, producers try to achieve much more quantity of high-quality food per the unit of invested assets. So according to the last CAP programme of the EU, agriculture is expected to be more knowledge-intensive, thus there is a need in growth of practice-oriented knowledge [61]. This will allow further progress of agriculture without environmental and economic consequences. For example, the power of knowledge-based approach to certain sector could be reconsidered in estimation that agro sector in Germany will grow up to 15% during the period 2015–2025 in line with more advanced use of available natural resources and contemporary management models, deriving the GVA of up to 3 billion EUR [33].

The rapid development of digitisation of the living environment and evolution of mass media have been initiated better availability of more complete and up-to-date information linked to agro-food and agro-input markets. Along with the greater practical influence of scientific achievements, there comes to the rise in level of awareness related to environmental issues, as well as issues linked to food quality and human health. So, both on supply and demand side expectations related to the food safety agenda have been grown. Due to the aforementioned, within the agro-food chain, both customers and farmers are constantly changing their beliefs and behaviour, while adapting their needs to the requirements of modern life and business [62].

From previously observed elements important to agro-food sector derives the main goal of the paper. It is contained in presentation of couple agro-technical solutions designed and implemented towards the current level of scientific progress. All solutions are turned to the use of renewables in agro-production at the farm level, mainly in the process of irrigation. Considering the economic aspects of realised innovations, the paper tries to encourage farmers to fully implement such a solution, as well as scientific community to strain harder in further development of knowledge-based solutions applicable in agriculture.

7.2 Methodology

The paper represents the brief presentation of three, at the micro level (mainly at family farms oriented to crop, basically vegetable production), practically tested innovative solutions that relies on the use of renewable energy sources in agriculture. Basically, paper will involve short explanation of technical and economic aspects of previously realised projects, with the focus on economic impact to farm

sustainability derived from the use of such solutions. Finalisation of all presented projects is realised within the last five years (2017–2021), and mainly was funded from national and international scientific funds. Development and realisation of all described innovative alternatives involve the common appearance of the Institute of Agricultural Economics (IAE) and Centre for Robotics of the Institute 'Mihajlo Pupin' (IMP) from Belgrade, Serbia.

The paper development implies the use of descriptive method, deduction, and formal logic, as well as basic economic methods generally used for assessment of investments or presentation of economic performances of performed business activities. Presentation leans on primary data derived from period of testing, implementation or regular use of implemented technical innovations at selected farms in Serbia. To achieve better comparison of gained results, all economic values are shown in EUR, while systems visibility is achieved by showing selected pictures. Each innovative technical solution is presented separately, as individual case study.

7.3 Results

According to the last Farm Structure Survey (FSS), in Serbia, there are almost 565,000 farms. They are dominantly family farms (over 99%), while in farm structure prevails farms with the size of up to 10 ha (up to 88% of the total number of farms) [55].

Confrontation of old, traditional way of production in agriculture and new, hi-technology oriented production imposes the basic question: Are the Serbian farmers generally ready for fully automatised and digitalised production? As small, economically weak farms prevail in Serbia [4], their sustainability could be highly questionable. Thus, there is an estimation that small farms (up to 10 ha) could be fully sustainable and market oriented if they are involved in hi-intensity production lines in agriculture, such as vegetable or fruit production in crops farming. Besides, they could be economically successful if they dispose the basic mechanisation, the most of labour, apply the GAP principles and possess the willingness to implement the innovations in their core business.

There are several goals that is expected to be fulfilled with the application of digitalisation and automatisation in agro-food production, such as: Building and development of agricultural production as economic and environmentally friendly sector of economy; Achievement of double-cropping and full market orientation of farmers; Production in line with food safety and healthy food requirements; optimisation, or above all rational use of available natural resources; Enabling the renewal, or in some aspects survival of rural areas, with eliminating or decreasing the migration processes and negative demographic trends; Strengthening the engagement of national knowledge developers, such as scientific institutions, or IT and bio-technology sectors; Initiation of investment; Enabling the time and labour savings at the micro level; Enabling the easier production management and food production traceability; Deeper participation in shaping the rural communities; etc. [6, 29, 48, 52, 64].

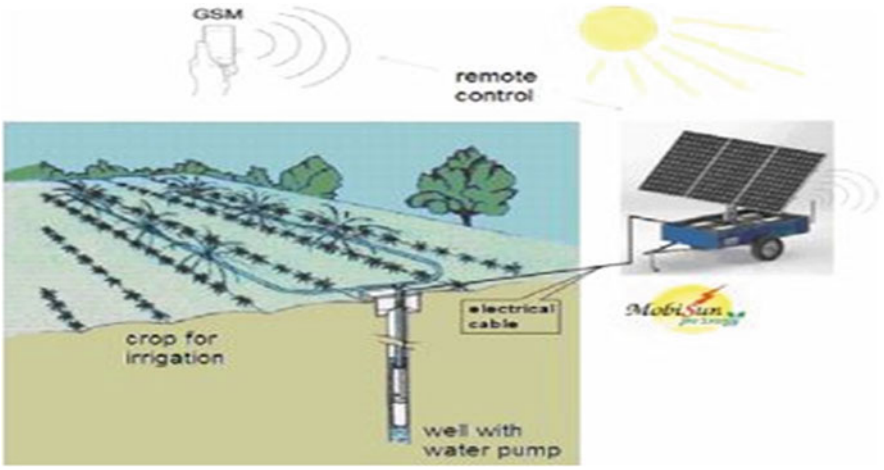
Implementation of each novelty in agricultural production (in this case those oriented to digitalisation or automatisation of production activities, or just shifting to renewables) brings both, economic and ecological contribution that will improve farm performances. Among economic contributions, the following could be singled out: input (costs) savings, such as energy, water, fertilisers and pesticides, feed, labour, etc.; growth in yielding (earnings), production stabilisation, increase in food safety and food quality; decrease in production risks and damages; facilitating of farm managing and more free time for farmers; etc. On the other side, among ecological contributions, the following could be emphasised: optimal (rational) use of available natural resources (local or global), such as water, soil, energy, biomass, etc.; drastic decrease or elimination in the application of agro-chemicals; greening of production lines transferring from fossil fuels to renewables; decrease in GHGs emission; etc.

The following case studies describe involvement of certain innovative alternatives in the production routine of small family farms, mainly oriented to vegetable production, both at the open field or in protected areas.

Case Study I – Use of the Mobile Robotised Solar Electro-Generator

Until the 2015, IMP from Belgrade developed the prototype (Picture 7.1) of the mobile robotised solar electro-generator that was later tested throughout the multiyear projects funded by the national Ministry of Agriculture at the selected vegetable farms in Serbia (in South Banat District). Developed system could be used in many activities at the farm level that require availability of electric energy. Basically, the system was tested for the vegetable irrigation (drip or sprinkler irrigation) at the farms that disposes with up to 3 ha of UAA, but it could be also used for fish pond aeration, automatic animal or fish feeding, operating the certain agro-machines and equipment in the farm yard, etc. The system is noiseless and enables the zero tolerance towards the GHGs emission.

Picture 7.1 The mobile robotised solar electro-generator. (Source: Ref. [8])



Picture 7.2 Use of the mobile robotised solar electro-generator in irrigation. (Source: Ref. [16])

The core of the system involves solar panels (300 W each) linked with the solar tracking system (maximal utilisation of available solar energy in any moment), GSM/GPRS remote commanding and wireless communication with the system (data transmission from the device), system could be moved by trailer (Picture 7.2), while generated energy could be accumulated in battery bank storage with 30 KWh, i.e. 400 Ah capacity (e.g. depending on the variant of electro-generator and way of irrigation, the system could stand alone in operation during the nights for at least 4 hours), three phases inverter and power conversion subsystem, PV electric generator (220/380 V) allows scalability, so installed power could range from 4.8, 7.2, to 12 KW, it could be networked with various sensors used in soil management or meteorological station, in case it could be plugged to public electric-grids, etc. [17, 57].

It must be emphasized that the operative period of such a system is over two decades, as it does not require large reinvesting and frequent repairs. The system is designed to substitute the gasoline electricity or diesel aggregates widely used in agriculture, especially for irrigation. Even if it is still more expensive than the commonly used aggregates, there is a strong belief that in the upcoming future, the price of certain compounds of system, or solar electro-generator as a whole system, will have constantly decreased trend [37].

Its price is estimated at 7500 EUR for a basic model, while it could reach over 12,500 EUR for advanced (empowered) models. As mentioned, the system is being tested in the irrigation of farms that produce seasonal vegetables (cabbage, cauliflower, early potatoes, tomatoes, green onions, red peppers, etc.) in an open field. The productive size of farm ranges from one to three hectares. It is assumed that the initial investment in the system could be repaid just from energy cost reduction made by shifting from fossil fuels to solar energy used in irrigation process (depending on grown crop(s); costs of diesel annually could be up to 1500 EU/ha). In line with the

expected further increase of diesel and food prices at the global market, solar-electric aggregate could be perfect solution for small farmers, as currently its use enables payback period, depending on size of irrigated surfaces, type of irrigation system used, irrigation frequency, used model of solar electro-generator, use of public subsidies or not, number and kind of grown crops, presence of double cropping and level of gained yields, etc., in the best case less than three years, or in much realistic scenario around five years.

Case Study II – Smart Land: Innovative Solutions for Remote Smart Land Management in Agriculture

During the period 2018–2020, IMP – Belgrade (realisation of technical activities), in association with IAE – Belgrade (realisation of agro-economic-ecological activities), developed experimental pilot system for power supply based on renewables (solar and wind energy) and smart land management at the property of selected family farm in Serbia (in Srem District). The project was funded by the UNDP and national Ministry for Environmental Protection, and involved farm primarily turned to vegetable production in open field at 10 ha. The developed system could be strictly used for generation and electric energy supply for the crops irrigation (drip irrigation) at the production unit of the farm that is almost 4 km dislocated from farm yard. The system operates under the low-level noise, eliminating the GHGs emission, and could be run remotely.

Full utilisation of the system at any moment will make accessible to farmer electric energy and water required for crop production (Picture 7.3). Practically, this standalone system offers continuity in production, or extension of production season, enabling the double cropping, reduced use of agrochemicals and increase in gained yields, as well as better and homogeny quality of gained products (food safety impact). Besides the low GHGs emission (use of green energy) and energy costs cut,

Picture 7.3 Smart land system. (Source: Ref. [32])

system provides remote access to the irrigation activity, i.e. decrease in labour costs and more free time to farmer. Also, in condition of increased climate risks (frequent semi-severe drought occurrence), the system significantly decreases impact of production risks, enabling the stable yielding, and above all local competitiveness of the farm. From the aspect of ecology, use of soil sensoring and monitoring of local weather conditions (weather station) supports the system to optimise the use of natural resources (primarily water and soil), lowering the use of water and agrochemical at the optimal level.

Briefly, development of this power supply system implies solar power plant of 8 kW and wind electro-aggregate of overall power of 0.5 kW, as well as the battery bank of 48Vdc/720 Ah, and operative software package. Complete system also involves system for remote irrigation (drip irrigation is realised in several water lines throughout the production parcel, while each line could be individually remotely driven, according the signals gained from wireless soil moisture sensors and digital weather station). Energy production area is fenced, and includes lightning rod and grounding system for complete facility and surveillance system [19].

As for the economic aspect of investing in such a system of energy production, the following could be reconsidered. The estimated value of implemented technological solution at 10 ha is around 100,000 EUR, while roughly 50% of that sum could be later subsidised. Farm usually has crop rotation mostly based on sweet corn and red papers, as well as cabbage, spinach, etc. By simple approximation, it is estimated that regular profit of around 7500 EUR/ha gained in regular conventional production of vegetables could be increased by around 5500 EUR/ha as certain production savings after the system utilisation (save in energy inputs, fuel used for daily drive from farm yard to the production unit, labour, applied agro-chemicals, etc.), or as gaining better market price for products (better products quality derived from controlled production). So, savings are around 75% of profit regularly gained in conventional production, thus the system could be generally repaid in one year. Deeper and more realistic investment analysis that does not include potential subsidies and intensive crop rotation could turn the payback period to slightly above four years. Estimating the ecological impact, it is assumed that intensive irrigation requires annual spending of roughly 500–750 l/ha of diesel or fuel, so considering the emission of CO_2 during the fuel combustion, by implementation of this system it could decrease the CO_2 emission for over 1.5 t/ha/annually.

Case Study III – Hybrid System for the Energy Production Based on Solar and Wind Energy Used in Greenhouse Production

During the period 2019–2021, IMP from Belgrade in consortium with IAE from Belgrade has been developed the hybrid system for the energy production based on solar and wind energy that is later implemented in greenhouse vegetable production (Picture 7.4). The testing of the system is funded by the national Ministry of Agriculture, while it was done at the experimental farm of the secondary agricultural school from Obrenovac, Serbia (in Belgrade District). Hybrid energetic system was primarily adjusted for the energy supply required in irrigation (subsurface drip irrigation) in 5 are greenhouse, as well for lifting of side walls at the production

Picture 7.4 Use of hybrid system in energy production. (Source: Ref. [31])

facility (powering the electro-motors), or for powering the digital weather station and placed soil and under-ground sensors, etc. Generally, the system was tested in vegetable production (garlic, lettuce, tomatoes, cucumbers, red peppers, etc.), but it could also be used for some other purposes at the farm level. The system is fully automatised, does not produce noise or pollution, so it could be considered as environmentally friendly solution for any farm (it is scalable and could fit the different size of farms).

Irrigation and greenhouse ventilation are directly controlled by installed digital weather station, internet modem and sensors (soil and air) that are operating 24/7, producing the real time data (inside and outside temperature, humidity, wind speed and direction, level of rainfalls), while they are storing the data history for up to three months. Irrigation process could be started manually or fully automatised according to previously set alarms (level of predefined soil and weather parameters), while the warning system sends [22] adequate SMS notification to farmer.

Energetic hybrid system is static. It interlinks the wind power generator (6 m high) with installed power of 500 W (during the wind speed of at least 5 m/s), solar power generator that contains 4 solar panels with overall power of 1100 W, battery bank 24Vdc/240 Ah that prolong the use of system in situation where the farm is out the wind and sun, invertor of 1600 W, etc. The system could be exploited for 30 years. The pole of the wind turbine could be put in a horizontal position, which makes it easy for technical checking and sporadic repairs, or protects the turbine during the storms. The hybrid system could also be easily switched to public power grid [20, 34]. The system enables complementarity the use of renewables, providing its continuity with electric power supply [21].

Testing shows that in average hybrid system could annually produce in total almost 2170 KWh (around 1290 KWh from solar and almost 880 KWh from wind energy), [18]. The costs of such a system development are around 10,000 EUR. Use of the system in vegetable production in greenhouse initiates production costs cut (decrease in energy costs mainly from savings derived from transferring fossil fuels to free renewable energy), i.e. increase in annual net profit of over 1800 EUR, enabling to farm the payback period of invested assets in slightly above 5.5 years (or in 3.3 years if farm apply for the public subsidies).

7.4 Conclusion

Not just for the sector of agro-food production, globally both energy and water have been already becoming strategic resources. Currently, there are limited availability, growing demand and certain issues related to undisturbed distribution of dominantly used fossil fuels and fresh water, as well as expectations of much frequent appearance of energy shocks and water deficit, with increase trend in mentioned inputs prices. These require from farms and processing industry to widely implement energy and water management procedures, while affect the development of adequate (inter)national policies. Besides, these requests for ago-food producers to be more proactive in seeking the adequate innovative alternatives (e.g. shifting to other available resources, such as renewables) that will allow stabilisation or increase in production profitability, better quality of products and increase of overall farm sustainability and competitiveness.

From the presented example of certain already tested and implemented technical innovations at micro level, it could be considered that renewable energy resources could serve as perfect alternative for the most of production lines in agriculture. No matter that they are used in crop production organised in the field or protected areas, they surely contribute to advancement in economic performance of the farm (costs cut), leaving the 'green' stamp on gained yields (transfer to renewables), while affecting the decrease in production risks.

The presented innovations are in line with the potential postulate of global progress, which could be defined as the wider implementation of production alternatives which affects the decrease in production costs, or increase profitability for even 1% and leads to economic revolution, with at least 1% decrease in ecological issues (e.g. pollution, pressure to climate change, etc.) and leads to environmental revolution. These are ultimately certain justifications that tested innovative alternatives would support to increase overall sustainability at the micro, regional or global level.

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Chapter 8
Scenarios for the Allocation of Direct Payments under the CAP National Strategic Plan 2023–2027: Coupled Support

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Abstract Due to its 15% allocation of Pillar I envelope, the highest possible, coupled support is an important component of direct payments in Romania. The present paper brings as a novelty a proposal to calculate the level of coupled support starting from the profitability analysis of the sectors for which it is allowed to be granted. The profitability analysis of the o sectors in difficulty was performed based on the 2018 data collected by the Romanian Farm Accountancy Data Network from about 5000 agricultural holdings. Starting from the calculation of the profitability indicators for 15 crop and livestock sectors, eligible for coupled support in the period 2023–2027, an objective way of identifying a level of support was sought to ensure the profitability of those sectors. The level chosen for the amount of coupled support defines the 'profitability' scenario, its relevance being briefly analysed by comparison with the 'negotiations' scenario, defined by the proposals resulting from consultations organised by Ministry of Agriculture.

Keywords Coupled payments · Profitability · Net margin · Level of support

8.1 Introduction

Coupled income support is one of the types of interventions in the form of direct payments alongside decoupled forms of support. Due to the magnitude of coupled support allowed under regulation (15% of Pillar I envelope), it is an important component of direct payments. Its relevance has varied over the last decades depending on how strong the market orientation of the Common Agricultural Policy has been. Although coupled support has a rather long track record in the EU, after a

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period of limiting its use (by replacing it with decoupled direct payments as of 2003), it returned to attention with the 2013 CAP reform, when Romania also moved to the maximum level allowed by the Regulation.

This paper brings as a novelty a proposal to substantiate the level of coupled support based on the analysis of the profitability of the sectors for which it is allowed, namely the results of profit margins at farm level, for the livestock or crop activity under consideration. The difficulty involved processing microdata collected through the Farm Accountancy Data Network (data provided by the Ministry of Agriculture and Rural Development), according to established models at European Union level [13], but adapted to the characteristics of Romanian holdings.

8.2 Literature Review

In the 2015–2020 programming period, whose provisions were extended into the 2021–2022 'transition period', Romania proposed coupled support measures for 24 products of great diversity [7], with a total number of beneficiaries of around 23.7 thousand. The most significant amounts were paid for dairy cows, sheep and goats and beef – in the livestock sector – and soya, alfalfa, sugar beet, early potatoes and vegetables indoor – in the crop sector [8].

The effects of voluntary coupled support (voluntary, as it is the choice of each Member State if and to what extent it is used) at the EU level were generally considered positive, but evaluations indicated that there was room for improvement in its effectiveness [3]. In Romania, the impact of coupled support on certain sectors was analysed during last years: soybeans [2, 9], fruits [5], rice [11], cattle [6], with mixed conclusions related to efficiency support, but its level has not been questioned.

The implementation of the direct payment schemes – including coupled support – for the period 2021–2027 was to be in line with the new regulation proposed by the European Commission in 2018 [12]. Although the final decision on how the new regulation would look like was shared between the European Parliament and the Council of the EU, it was the European Commission's proposal that set the direction of the reform. Negotiations on voluntary coupled support in the context of the new regulation (reduced to 2023–2027) took place in the framework of this trilogue (Commission, Council, and Parliament).

The Commission proposal on voluntary coupled support provided that Member States may grant coupled income support to genuine farmers under the conditions set out in the Regulation and as further specified in their CAP Strategic Plans. Member States' interventions were to help the sectors and products listed in the proposal to cope with their difficulties by improving their competitiveness, sustainability and quality. Coupled income support shall take the form of an annual payment per hectare or animal. The foreseen allocation was 10% of direct payments plus 2% for protein crops. The Council agreed with these provisions, but increased the

maximum from 10% to 13% and slightly modified the list of products. Parliament considered it to be 10%, but included ways of addressing difficulties and improving the structure, alongside competitiveness, sustainability and quality of the sectors/productions concerned. Furthermore, it explained that coupled support is a production-limiting scheme which takes the form of an annual payment based on fixed areas and yields or a fixed number of animals and observes the financial ceilings to be established by Member States for each measure and notified to the Commission.

The compromise reached in November 2021 set out the general rules, scope and eligibility, but also a limit on allocations. The general rules provide that Member States may grant coupled income support to active farmers under the conditions set out in the Regulation and specified in detail in their CAP Strategic Plans.

8.3 Methodology

The profitability analysis of the sectors in difficulty was carried out based on the data for 2018 collected by the Farm Accountancy Information Network (FADN) of the Ministry of Agriculture and Rural Development (MARD). In 2018, accountancy data was collected from 5113 holdings with an economic size of more than EUR 4000 Standard Output, information provided, as microdata anonymised, to the Institute of Agricultural Economics, on the basis of which a database of around 240 variables per holding was developed. The key indicators selected for analysis were calculated as an average of the records of all farms with areas with certain crops or growing animals specific to sectors in difficulty.

The conclusions are based on the calculation of the profitability indicators [4] (gross margin, net margin, economic net margin) for the 15 sectors (10 crop and 5 livestock) that received coupled support in the period 2015–2022 and which are eligible for the period 2023–2027. By computing the difference between receipts (sales revenue) and the various categories of costs (recorded or estimated) from FADN data for the year 2018, an objective way of identifying the level of support ensuring the profitability of those sectors was sought.

Thus, the criterion for allocating coupled support proposed by the authors is the average level of the net margin of holdings with negative values for that margin. This level ensures profitability for almost all farms in each sector, an important condition for overcoming the difficulties inherent in the adjustment period of farms in Romania. This method of identifying the level of support required has been labelled as the 'profitability' scenario and its relevance will be briefly analysed by comparing the amounts actually paid in 2018 [1] to the sectors in difficulty (resulting from the 2015 negotiations) and the resulting amount necessary to ensure profitability (recovery of the negative net margin) based on FADN data from 2018.

Finally, the comparison with the 'negotiation' scenario will be based on the November 2021 proposals of the MARD for the period 2023–2027, also resulting from the complex mechanism of negotiations between the social partners, as part of

the consultations accompanying the drafting of the 2023–2027 CAP National Strategic Plan [10].

For a direct comparison with the amounts allocated in the previous programming but also with those of the future programming, also considering the specificity of coupled support (which is denominated in euro), the levels resulting from the profitability analysis (based on the data in RON) were expressed in EUR (at the 2018 exchange rate).

8.4 Results Interpretation

For soybeans (Table 8.1), holdings with a negative net margin represent 37% of the sample holdings. The amount of coupled support proposed in the 'profitability' scenario is EUR 173/ha, below the level actually received in 2018 (EUR 206/ha). It should be noted that the area supported in 2019 was 143,019 ha and the number of beneficiaries 3532 holdings according to APIA.

For alfalfa crop (Table 8.2), holdings with negative net margin represent 31% of the holdings of the sample. The amount of coupled support proposed in the 'profitability' scenario is EUR 208/ha, above the level actually received in 2018 (EUR 95/ha). The area supported in 2019 was 157,306 ha and the number of beneficiaries 33,455 holdings, according to APIA data.

For leguminous crops (Table 8.3), holdings with a negative net margin represent 53% of the holdings of the sample. The amount of coupled support proposed in the 'profitability' scenario is EUR 292/ha, above the level actually received in 2018

Table 8.1 The level of different margins on soybeans (year 2018)

Indicators	Average of all holdings (euro/head)	Share of holdings with negative margin (%)	Average of holdings with negative margin (euro/head)
Gross margin	30	60	−19
Net margin	−26	68	−21
Economic net margin	−76	82	−25

Source: Authors' calculations from FADN data provided by MARD

Table 8.2 The level of different margins for alfalfa crop (year 2018)

Indicators	Average of all holdings (euro/head)	Share of holdings with negative margin (%)	Average of holdings with negative margin (euro/head)
Gross margin	381	12	−135
Net margin	197	31	−208
Economic net margin	113	56	−250

Source: Authors' calculations from FADN data provided by MARD

Table 8.3 The level of different margins for leguminous crops (year 2018)

Indicators	Average of all holdings (euro/head)	Share of holdings with negative margin (%)	Average of holdings with negative margin (euro/head)
Gross margin	148	34	−141
Net margin	−57	53	−292
Economic net margin	−85	64	−313

Source: Authors' calculations from FADN data provided by MARD

Table 8.4 The level of different margins for hemp (year 2018)

Indicators	Average of all holdings (euro/head)	Share of holdings with negative margin (%)	Average of holdings with negative margin (euro/head)
Gross margin	624	0	0
Net margin	418	36	−200
Economic net margin	392	36	−235

Source: Authors' calculations from FADN data provided by MARD

Table 8.5 The level of different margins for potatoes (year 2018)

Indicators	Average of all holdings (euro/head)	Share of holdings with negative margin (%)	Average of holdings with negative margin (euro/head)
Gross margin	1925	9	−656
Net margin	1232	23	−476
Economic net margin	924	51	−716

Source: Authors' calculations from FADN data provided by MARD

(EUR 84/ha). The area supported in 2019 was 3011 ha and the number of beneficiaries 122 holdings.

For hemp crop (Table 8.4) holdings with negative net margin represent 36% of the holdings of the sample. The amount of coupled support proposed in the 'profitability' scenario is EUR 200/ha, above the level actually received in 2018 (EUR 88/ha). The supported area 2019 was 476 ha and the number of beneficiaries was 11 holdings.

For potato cultivation (Table 8.5) holdings with a negative net margin represent 23% of the sample holdings. The amount of coupled support proposed in the 'profitability' scenario is EUR 476/ha, below the level of the two types of support actually granted in 2018 (EUR 1900/ha for seed potato and EUR 1000/ha for early potato. The area subsidised in 2019 was 527 ha (seed potato) plus 2473 ha (early potato) and the number of beneficiaries 39 holdings (seed potato), 88 holdings (early potato).

Table 8.6 The level of different margins for sugar beet (year 2018)

Indicators	Average of all holdings (euro/head)	Share of holdings with negative margin (%)	Average of holdings with negative margin (euro/head)
Gross margin	2049	11	−499
Net margin	1573	35	−392
Economic net margin	1518	44	−423

Source: Authors' calculations from FADN data provided by MARD

Table 8.7 The level of different margins for vegetables in the field (year 2018)

Indicators	Average of all holdings (euro/head)	Share of holdings with negative margin (%)	Average of holdings with negative margin (euro/head)
Gross margin	3046	20	−894
Net margin	1735	33	−1841
Economic net margin	802	55	−2384

Source: Authors' calculations from FADN data provided by MARD

Table 8.8 The level of different margins for indoor vegetables (year 2018)

Indicators	Average of all holdings (euro/head)	Share of holdings with negative margin (%)	Average of holdings with negative margin (euro/head)
Gross margin	9654	18	−2835
Net margin	2361	43	−9813
Economic net margin	−5972	76	−14,247

Source: Authors' calculations from FADN data provided by MARD

For sugar beet crop (Table 8.6), farms with negative net margin represent 35% of the sample holdings. The amount of coupled support proposed in the 'profitability' scenario is EUR 392/ha, below the level actually received in 2018 (EUR 825/ha). The area supported in 2019 was 22,019 ha and the number of beneficiaries 660 holdings.

For the cultivation of vegetables in the field (Table 8.7) holdings with negative net margin represent 33% of the holdings of the sample. The amount of coupled support proposed in the 'profitability' scenario is EUR 1841/ha, above the levels actually received in 2018, EUR 1715/ha (for tomatoes for industrialisation) and EUR 530/ha (for cucumbers for industrialisation). The area supported in 2019 was 666 ha (tomatoes) and 15 ha (cucumbers) and the number of beneficiaries 108 holdings (tomatoes), 5 holdings (cucumbers).

For the cultivation of vegetables in protected premises (Table 8.8), holdings with the negative net margin represent 43% of the holdings of the sample. The amount of coupled support proposed in the 'profitability' scenario is EUR 9813/ha, above the

Table 8.9 The level of different margins for other fruits (year 2018)

Indicators	Average of all holdings (euro/head)	Share of holdings with negative margin (%)	Average of holdings with negative margin (euro/head)
Gross margin	2767	11	−997
Net margin	2015	29	−653
Economic net margin	1638	56	−1220

Source: Authors' calculations from FADN data provided by MARD

Table 8.10 The level of different margins in dairy cows (year 2018)

Indicators	Average of all holdings (euro/head)	Share of holdings with negative margin (%)	Average of holdings with negative margin (euro/head)
Gross margin	475	32	−331
Net margin	245	49	−363
Economic net margin	116	73	−461

Source: Authors' calculations from FADN data provided by MARD

Table 8.11 The level of different margins for cattle breeding (year 2018)

Indicators	Average of all holdings (euro/head)	Share of holdings with negative margin (%)	Average of holdings with negative margin (euro/head)
Gross margin	−7	46	−280
Net margin	−153	57	−398
Economic net margin	−210	75	−427

Source: Authors' calculations from FADN data provided by MARD

level actually received in 2018 (EUR 7600/ha). The area supported in 2019 was 1347 ha and the number of beneficiaries 4224 holdings.

For the cultivation of other fruits (plums, cherries, sour cherries, apricots) holdings with a negative net margin represent 29% of the holdings of the sample (Table 8.9). The amount of coupled support proposed in the 'profitability' scenario is EUR 653/ha, above the level actually received in 2018 (EUR 182/ha for industrialised fruits). The area supported in 2019 was 1805 ha (including for industrialised apples) and the number of beneficiaries 113 holdings.

For the rearing of dairy cows (Table 8.10) holdings with a negative net margin represent 49% of the holdings of the sample. The amount of coupled support proposed in the 'profitability' scenario is EUR 363/head, close to the level actually received in 2018 (EUR 341/ha). Note that the number of animals supported in 2019 was 249,020 heads and the number of beneficiaries 14,665 holdings.

For cattle breeding (Table 8.11), holdings with negative net margin represent 57% of the holdings of the sample. The amount of coupled support proposed in the

Table 8.12 The level of different margins for buffalo cows (year 2018)

Indicators	Average of all holdings (euro/head)	Share of holdings with negative margin (%)	Average of holdings with negative margin (euro/head)
Gross margin	1409	33	−175
Net margin	1294	33	−188
Economic net margin	1133	67	−482

Source: Authors' calculations from FADN data provided by MARD

Table 8.13 The level of different margins on sheep farming (year 2018)

Indicators	Average of all holdings (euro/head)	Share of holdings with negative margin (%)	Average of holdings with negative margin (euro/head)
Gross margin	30	60	−19
Net margin	−26	68	−21
Economic net margin	−76	82	−25

Source: Authors' calculations from FADN data provided by MARD

Table 8.14 The level of different margins on goat farming (year 2018)

Indicators	Average of all holdings (euro/head)	Share of holdings with negative margin (%)	Average of holdings with negative margin (euro/head)
Gross margin	30	60	−19
Net margin	−26	68	−21
Economic net margin	−76	82	−25

Source: Authors' calculations from FADN data provided by MARD

'profitability' scenario is EUR 398/head, above the level actually received in 2018 (EUR 291/ha). The number of animals supported in 2019 was 52,794 heads and the number of beneficiaries was 1412 holdings.

For the rearing of dairy buffaloes (Table 8.12), holdings with a negative net margin represent 33% of the holdings of the sample. The amount of coupled support proposed in the 'profitability' scenario is EUR 188/head, above the level actually received in 2018 (EUR 161/ha). The number of animals supported in 2019 was 9609 heads and the number of beneficiaries 2582 holdings.

For sheep breeding (Table 8.13), holdings with a negative net margin represent 68% of the sample holdings. The amount of coupled support proposed in the 'profitability' scenario is EUR 21/head, above the level actually received in 2018 (EUR 16/ha). The number of animals benefitting from this scheme in 2019 was 3,183,564 heads and the number of beneficiaries reached 11,267 holdings.

For goat rearing (Table 8.14), holdings with negative net margin represent 59% of the sample holdings. The amount of coupled support proposed in the 'profitability'

scenario is EUR 33/head, above the level actually received in 2018 (EUR 16/ha). The number of animals supported in 2019 was 233,153 heads, while the number of beneficiaries stood at 1605 holdings.

For rice, hops and silkworms crops there are no entries in FADN 2018. The amount of coupled support for rice actually received in 2018 was EUR 660/ha, for an area of 7817 ha (in 2019) and 10 beneficiaries. The amount of coupled support for hops actually received in 2018 was EUR 517/ha, for a subsidised area of 249 ha (in 2019) and 3 beneficiaries. The amount of coupled support for silkworms actually received in 2018 was EUR 450/kg, for a supported production of 330 kg (in 2019) and 5 beneficiaries.

8.5 Conclusions

Summarising the results of the 'profitability' scenario, the amounts needed to be allocated to each sector in difficulty are obtained by multiplying the amount resulting from the analysis of the 2018 margins by the corresponding areas. The comparison between this value, which defines the 'profitability' scenario, with the similar value defining the scenario of 'negotiations' proposed by the MARD, indicates 'savings' under the 'profitability' scenario for crop sectors (Table 8.15).

In the case of livestock sectors, the situation is different: the amounts resulting from the 'profitability' scenario are higher than the 'negotiations' scenario

Table 8.15 Scenarios of support to crop sectors in 2023

	The 'profitability' scenario			The 'negotiations' scenario		
Production	Amount (euro/ha)	Area (ha)	Allocation (thou euro)	Amount (euro /ha)	Area (ha)	Allocation (thou euro)
Soybeans	173	143,019	24,771	240	176,000	42,240
Alfalfa	208	157,306	32,790	112	225,000	25,200
Pulses	292	3011	881	250	5160	1290
Hemp	200	476	95	240	1021	245
Rice	660	7817	5159	750	4800	3600
Potatoes	476	527	251	2073	750	1555
Hops	517	249	129	600	275	165
Sugar beet	392	22,019	8626	900	26,000	23,400
Tomatoes	1841	666	1226	2050	970	1989
Cucumbers	700	15	11	700	23	16
Veg. Indoor	9813	1347	13,219	5300	2500	13,250
Fruit	653	1805	1178	332	3100	1029
Total crops	–	–	**88,335**	–	–	**113,979**

Source: Synthesis of authors from own calculations and MARD proposals

Table 8.16 Scenarios to support livestock sectors in 2023

Production	The 'profitability' scenario			The 'negotiations' scenario		
	Amount (euro /ha)	Area (ha)	Allocation (thou euro)	Amount (euro /ha)	Area (ha)	Allocation (thou euro)
Dairy cows	363	249,020	90,489	358	280,000	100,240
Cattle	398	52,794	20,988	265	52,500	13,913
Buffalo cows	188	9609	1805	160	10,000	1600
Sheep	21	3,183,564	68,207	14	4,000,000	54,800
Goats	33	233,153	7691			
Silkworms	450	330	149	69	380	26
Total livestock			**189,329**			**170,579**

Source: Synthesis of authors from own calculations and MARD proposals

Table 8.17 Coupled support allocation scenarios by sector in 2023

Sectors	The 'profitability' scenario		The 'negotiations' scenario	
	Allocation (thou euro)	Weight (%)	Allocation (thou euro)	Weight (%)
Crop sector	88,335	31.8	113,979	40.1
Livestock sector	189,329	68.2	170,579	59.9
Total	277,664	100	284,557	100

Source: Synthesis of authors from own calculations and MARD proposals

(Table 8.16), an indication of the need for additional support for the development of livestock farming.

Overall, for the two wide sectors (crops and livestock), the 'profitability' scenario proposes a lower allocation for the former compared to the scenario 'negotiations', but a higher share for the latter (livestock): 68.2% compared to 59.9% (Table 8.17).

However, the amounts of the two scenarios are close, as the one proposed by the scenario 'negotiations' is exactly the one corresponding to the 13 + 2% ceiling of direct payments (foreseen by the Regulation on support for strategic plans).

A limitation of the research is the fact that the analysis was performed for one year, 2018 (the last year for which the data were available at the beginning of the research).

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Chapter 9
Romanian Agri-Food Products Competitiveness – An Analysis Using Trade Balances and Unit Values: Did the COVID-19 Crisis Influenced It?

Camelia Gavrilescu

Abstract In the present paper we explore the changes in the Romanian international agri-food trade competitiveness over two decades, from the pre-accession period (2002–2006) to present time (2017–2021). The methodology of Gehlhar & Pick (Agribusiness 18(1): 60–79, 2002) was used to classify the 24 HS agri-food product groups in four categories, according to the combination of trade balance values and differences between export and import unit prices, for both the EU and extra-EU trade flows. The results show that few product groups are truly price competitive (such as cereals and oilseeds) and remained so over the years, but some other products such as oils & fats, milk & dairy products or tobacco & tobacco products gained competitivity over the years by shifting their trade balance from negative to positive or by diminishing their export unit price. The analysis also showed that COVID-19 pandemic did not have significant impact on Romanian agri-food trade flows.

Keywords Trade balances · Unit prices · Agri-food products competitivity

9.1 Introduction

Competitiveness has been an extensively studied topic in economic literature. However, due to its wide use and many views on it, there are many definitions, interpretations and hence ways to measure it.

This is also valid when studying trade competitiveness. A first measure of trade competitiveness is the trade balance. A basic theoretical assumption in trade analysis is that price competition explains the direction and intensity of trade flows. There are many factors influencing prices in trade flows; continuous unexpected events on

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world markets result in their high volatility, so true prices are difficult to observe and use in analyses. Therefore, many empirical analyses use unit values as proxies for prices.

In the present paper, we explore the Romanian agri-food trade competitiveness in its evolution over two decades: from the pre-accession period (2002–2006) to the present time (2017–2021), using trade balances and unit values method.

9.2 Literature Review

In international trade theory, goods with lower prices flow to markets with higher prices. Unit values differences should thus explain the directions of the trade flows. Although they may not be a very exact representation according to Kravis and Lipsey [8], they are still used, being a way of consistent measurement across various traded goods. But problems arise because in many cases the unit price differences are not consistent with the real trade flow direction.

Such inconsistencies were explained in more than one way. Kravis and Lipsey [8] say that the problem lies mainly with aggregation: the higher aggregation in a group of products, higher the probability of apparent inconsistency arises, since a larger group of products may obscure differences between different variants or qualities of the same product which are present in the aggregated group. King [7] states that the time gap between the contract conclusion and the real delivery time of traded goods influences the accuracy of unit prices measurement. Aiginger [1] shows that products from price-competitive industries and quality-dominated industries perform different in trade competitiveness when unit prices are used for analysis. In Ulff and Nielsen [10] opinion, unit values differences can be explained by quality differences arising from various producing regions.

A comparative study of agri-food trade competitiveness in Romania and Hungary in 2001–2013, using trade balances and unit values [6], showed that for both countries, there were competitivity gains in cereals, oilseeds and edible oils, while for products such as meat products in Hungary and sugar and beverages in Romania, competitivity diminished significantly.

9.3 Methodology

The international Romanian agri-food trade was analysed, focusing on the changes in value, volume, and directions of the flows. The analysis has been made on dynamic trends of export, import and trade balance, comparing five-year averages from the pre-accession period (2002–2006), and post-accession – averages for 2017–2021. A comparative composition of the trade flows detailed by product groups (chapters 01–24 in the Harmonized System) [9] is also presented. The data used for calculations is from Eurostat database [2], in the CN (Combined Nomenclature).

Combining trade balances, export and import unit prices, and export and import equivalent price and quality, Gehlhar and Pick [5] defined four categories of trade: (1) successful price competition, (2) unsuccessful price competition, (3) successful non-price competition and (4) unsuccessful non-price competition. That particular method was used in the present paper.

We denote:

$VExp_{(m,n)}$ = value of export for *m*-th product to *n*-th destination

$QExp_{(m,n)}$ = corresponding quantity of the *m*-th product exported to the *n*-th destination

$UVExp_{(m,n)} = VExp_{(m,n)} / QExp_{(m,n)}$ = export unit value of the *m*-th product exported to the *n*-th destination

$VImp_{(m,n)}$ = value of import for *m*-th product from *n*-th origin

$QImp_{(m,n)}$ = corresponding quantity of the *m*-th product imported from the *n*-th origin

$UVImp_{(m,n)} = VImp_{(m,n)} / QImp_{(m,n)}$ = import unit value of the *m*-th product imported from the *n*-th origin

$TBal_{(m,n)} = VExp_{(m,n)} - VImp_{(m,n)}$ = trade balance for the *m*-th product traded with the *n*-th partner

$\Delta UV_{(m,n)} = UVExp_{(m,n)} - UVImp_{(m,n)}$ = unit value difference for the *m*-th product traded with the *n*-th partner

Using these calculations, the four categories of trade defined above are:

1. successful price competition: $TBal_{(m,n)} > 0$; $\Delta UV_{(m,n)} < 0$; positive trade balance (export value higher than import value); export unit price lower than import unit price;
2. unsuccessful price competition: $TBal_{(m,n)} < 0$; $\Delta UV_{(m,n)} > 0$; negative trade balance (export value lower than import value); export unit price higher than import unit price;
3. successful non-price competition: $TBal_{(m,n)} > 0$; $\Delta UV_{(m,n)} > 0$; positive trade balance (export value higher than import value); export unit price higher than import unit price;
4. unsuccessful non-price competition: $TBal_{(m,n)} < 0$; $\Delta UV_{(m,n)} < 0$; negative trade balance (export value lower than import value); export unit price lower than import unit price.

For categories 1 and 3, the positive trade balance indicates a successful competition, based on price difference (category 1), and on quality differentiation (category 3, generating a trade surplus despite the price disadvantage).

Categories 2 and 4 indicate an unsuccessful competition resulting from the deficit in the trade balance. Category 2 is showing a total lack of competitivity (unit import prices are higher than export prices, and the origin country is a net importer of the product), while in category 4, despite the negative trade balance, products are exported to the destination due to lower unit export price, based on quality advantage.

9.4 Analysis/Results Interpretation

9.4.1 General Trends of the Romanian Agri-Food Trade

Major changes have occurred in the world agri-food markets in the last two decades; most important of all is the intensification of the trade flows. Along with the USA and BRIC countries, the EU has been constantly among the first three major actors on the world agri-food markets. The EU trade expansion is a result of several factors, with mixed influences, such as: the EU enlargement process, changes in the exchange rates among the main currencies (EUR vs. USD), increase in world food prices etc.

The EU enlargement process, from 15 to 28 Member States in 10 years only (2004–2013), contributed significantly to the trade expansion: total trade value (export + import) increased 1.9 times, and exports 2.1 times, and the upward trend continued up to the present day. Until 2012, the EU agri-food trade balance has been continuously slightly negative, with a small deficit, which went as high as (−)13% of the total trade value during the economic crisis years (2008–2009), then it slowly reduced to almost zero in 2013–2019. The United Kingdom has shown during the last decade the largest agri-food trade deficit among the Member States; consequently, since Brexit (in trade statistics terms UK became an 'non-EU' country as of 2020), the EU exports and total trade value increased, and the balance became visibly positive. The continuous increase in the volume of marketed products contributed significantly to the continuous upward trend of the trade value, despite the price variations – the world food prices (measured by the FFPI=FAO Food Price Index) partially diminished in 2015–2020, after a steady increase in 2000–2014 [3, 11].

At the time of its accession (2007), Romania joined the EU with an increasing but non-competitive international agri-food trade compared to either old or new Member States, based on its non-competitive domestic agri-food sector [4].

The European funding accessed from both pillars of the CAP, together with other domestic and foreign investments enabled positive developments in the sector, resulting in major positive changes of the Romanian agri-food products, in terms of both volume and quality.

Free access to the EU markets came with advantages and disadvantages. On the positive side, it favoured Romanian exports and pushed for meeting the quality required by implementing the EU rules. On the negative side, it allowed for unrestricted access of Community products on the less competitive Romanian markets, making more difficult for the domestic sector to develop, enter and remain present on the domestic markets.

In the pre-accession period, exports and imports increased in value and quantity because of the implementation of the Trade Agreement with the EU (that granted various facilities for Romanian agri-food products entering the Single Market, albeit with quotas) and of CEFTA membership (see Fig. 9.1).

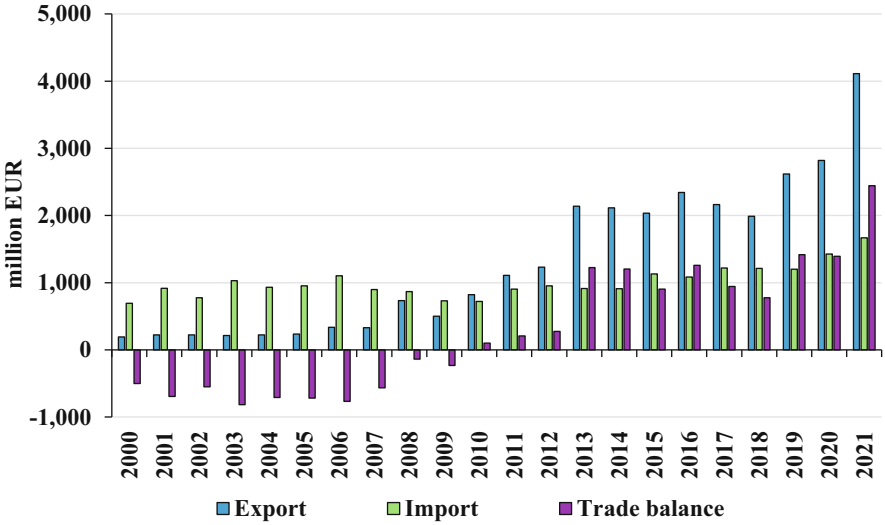

Fig. 9.1 Agri-food trade with non-EU countries. (Source: Calculations based on Eurostat data)

In 2007–2008 (first two years after the EU accession), Romania increased significantly its agri-food trade; in 2008 it was already double as compared to 2006; the exports increased by a factor of 2.5, while imports by a factor of 1.8.

The European economic crisis impacted negatively the Romanian agri-food trade which contracted by 12% in 2009 as compared to previous year, but the upward trend resumed subsequently.

Maintaining the growth rate gap, the trade balance deficit which reached its peak in 2007 (EUR −2.2 billion) diminished gradually, to change to positive values in 2013–2014. Nonetheless, the superior competitiveness of products imported from the EU, as well as the increasing demand of high-quality products on the domestic market resulted in new increases of imports and returning to deficit of trade balance in 2015–2021.

The orientation of Romanian exports to the EU increased continuously from 2002 up to 2009 (the share in the total agri-food exports went from 51.3% in 2002 up to 77.7% in 2009); it decreased subsequently due to penetration and expansion on Middle-Eastern cereal markets. On the other hand, the share of imports originating from the EU increased continuously, from 37.8% in 2002, up to 83.5% in 2021. Trade balance with the EU has been permanently negative.

Trade with non-EU countries saw a very different evolution: export value doubled from 2012 to 2013, varied between EUR 2–3 billion, and surged to EUR 4.1 billion in 2021 (see Fig. 9.1). As a result, the negative trade balance with the EU (which varied from EUR 0.6 to 3 billion) was partially countervailed by the surplus of the trade balance with extra-EU (see Fig. 9.2).

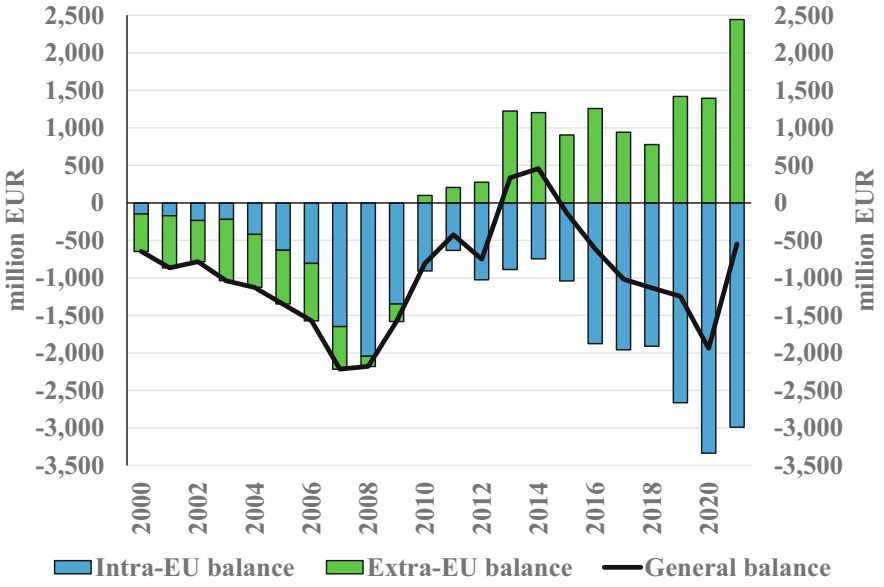

Fig. 9.2 Agri-food trade balance by main partners (2002–2021). (Source: Calculations based on Eurostat data)

9.4.2 Trade Balances and Unit Values in the Romanian Agri-Food Trade

All along the studied period (including both pre- and post-accession years), a common pattern can be observed in the agri-food trade: the presence of cereals, oilseeds and live animals among the top 5 exported product groups (see Table 9.1). In the post-accession period, the export value of oils and fats (group 15 – $VExp_{15}$) increased in by a factor of 5, while the group trade balance ($TBal_{15}$) changed from negative to positive. Same evolution was shown by tobacco and tobacco products (group 24), where $VExp_{24}$ increased in 2017–2021 by a factor of 11.9 as compared to 2002–2006. The group trade balance ($TBal_{24}$) also became positive for both the EU and non-EU destinations.

Romanian pre-accession agri-food exports showed a medium concentration rate: the first 5 product groups accounted for 63% of the total export value (65% in exports to the EU and 70% in exports to non-EU countries). Concentration increased significantly after accession, up to 74% in total exports, and to 86% in extra-EU exports, respectively.

In the pre-accession years, only 3 product groups showed surplus in total trade balance: 01-live animals, 12-oilseeds and 14-other vegetable products. In the flows to the EU, also groups 07-vegetables and 10-cereals recorded trade surpluses

Table 9.1 Top 5 product groups exported by destination

2002–2006 average export values (EUR million) to:						2017–2022 average export values (EUR million) to:					
All countries		EU		Non-EU		All countries		EU		Non-EU	
HS code	VExp	HS code	VExp	HS code	VExp	HS code	VExp	HS code	VExp	HS code	VExp
01	137.49	01	78.11	01	59.37	10	2505.74	12	1009.68	10	1605.42
12	91.84	12	61.39	10	37.46	12	1208.38	10	900.32	01	268.17
10	77.32	10	39.87	12	30.45	24	1018.84	24	847.89	12	198.70
15	44.15	07	35.72	15	29.83	01	426.90	02	201.08	24	170.95
07	38.03	04	24.15	22	16.65	02	243.57	15	180.27	23	114.30
Total 01–24	614.64	Total 01–24	368.11	Total 01–24	246.53	Total 01–24	7332.32	Total 01–24	4592.21	Total 01–24	2740.11
CR-5	63%	CR-5	65%	CR-5	70%	CR-5	74%	CR-5	68%	CR-5	86%

Source: Calculations based on Eurostat data

Notes:

1. The chapters 01–24 in the Harmonized System are covering all agri-food products. The 24 chapters are included in 4 sections, listed as such in the Official Journal of the European Union (https://eur-lex.europa.eu/legal-content/EN/TXT/HTML/?uri=OJ:C:2019:119:FULL & from=EN), as following:
   - Section I: Live animals and animal products (01-live animals; 02-meat and offal; 03-fish and seafood; 04-dairy products, eggs and honey; 05-other animal products)
   - Section II: Vegetable products (06-live plants; 07-vegetables; 08-fruit; 09-coffee, tea and spices; 10-cereals; 11-products of the milling industry; 12-oilseeds; 13-lacs, gums and resins; 14-other vegetable products)
   - Section III: Animal or vegetable fats and oils and their cleavage products; prepared edible fats; animal or vegetable waxes (15-oils and fats)
   - Section IV: Prepared foodstuffs; beverages, spirits and vinegar; tobacco and manufactured tobacco substitutes (16-meat and fish preparations; 17-sugar and confectionery; 18-cocoa and cocoa products; 19-cereal baking and pastry products; 20-vegetable and fruit preparations; 21-miscellaneous edible preparations; 22-beverages; 23-animal feed; 24-tobacco and tobacco products)
2. CR-5 = concentration ratio of the top 5 product groups in total exports

Table 9.2 Trade balances in Romanian agri-food trade by product and partner groups

HS code	Average 2002–2006 (EUR million)			Average 2017–2022 (EUR million)		
	Total TBal	TBal with EU	TBal with non-EU	Total TBal	TBal with EU	TBal with non-EU
01	105.50	57.35	48.16	244.15	−23.85	268.00
02	−318.48	−177.32	−141.16	−638.17	−670.53	32.36
03	−41.98	−12.32	−29.66	−189.41	−164.05	−25.36
04	−7.89	−4.62	−3.27	−391.29	−415.08	23.79
05	−13.64	−1.20	−12.44	−33.11	−18.76	−14.36
06	−18.36	−15.43	−2.94	−150.27	−147.92	−2.35
07	−10.25	14.50	−24.75	−366.12	−252.87	−113.25
08	−74.99	−9.65	−65.34	−605.75	−473.44	−132.31
09	−70.29	−27.23	−43.06	−234.96	−200.89	−34.06
10	−53.05	6.32	−59.37	1999.05	423.80	1575.25
11	−38.20	−23.60	−14.60	−93.63	−95.68	2.05
12	37.76	44.48	−6.72	770.81	769.73	1.08
13	−6.06	−4.08	−1.98	−27.48	−22.52	−4.96
14	1.31	1.55	−0.24	−0.18	0.28	−0.47
15	−17.78	−17.39	−0.39	40.08	15.29	24.78
16	−3.91	6.00	−9.91	−68.41	−65.22	−3.20
17	−126.52	−20.11	−106.41	−247.41	−174.58	−72.83
18	−33.09	−21.83	−11.27	−223.26	−221.48	−1.78
19	−31.58	−23.16	−8.42	−330.20	−312.47	−17.73
20	−53.60	−20.18	−33.41	−289.88	−240.94	−48.94
21	−104.83	−65.25	−39.58	−352.53	−329.46	−23.08
22	−22.95	−26.15	3.20	−323.80	−302.19	−21.60
23	−70.89	−38.47	−32.43	−320.88	−243.79	−77.09
24	−199.84	−83.97	−115.87	656.83	596.02	60.81
Total	**−1173.62**	**−461.76**	**−711.86**	**−1175.82**	**−2570.59**	**1394.77**

Source: Calculations based on Eurostat data
Note: see Note 1 in Table 9.1

(cumulating EUR +130 million; while in the flows to the non-EU countries, only 2 product groups (01-live animals and 22-beverages) showed trade surpluses, and cumulated EUR 51 million (see Table 9.2).

In the studied post-accession period (2017–2021), although the overall agri-food trade balance was close in value terms (about EUR −1.2 billion), there were 5 product groups scoring surpluses (10-cereals, 12-oilseeds, 24-tobacco products, 01-live animals and 15-oils and fats), which together amounted EUR +3.7 billion. In relation with the EU, besides cereals, other four product groups registered $TBal_{(m)} > 0$, cumulating EUR 1.8 billion (out of a deficit of EUR −2.6 billion). On the contrary, trade balance with non-EU countries was constantly positive. Eight out of 24 product groups showed surpluses, accounting for EUR +2 million.

After calculating unit prices for exports and imports for all 24 product groups, for total trade and by trade destinations (EU and non-EU countries), for the two studied

periods (pre-accession 2002–2006, and post-accession 2017–2021 respectively), and coupling them with the respective trade balances, the product groups were separated in the 4 categories according to the Gehlhar & Pick classification. The results are shown in Table 9.3.

Before accession, Romania showed a successful price competition for live animals, cereals and oilseeds for both trade flows to the EU and non-EU countries.

Overall lack of competitiveness (category 2 – negative trade balance and higher export prices) are consistent with the product groups for which Romania is net importer and has the highest deficit in trade balance: meat, milk & dairy products, fruit, and sugar & confectionary. These products are included in category 2 for trade with both the EU and non-EU countries.

Although in trade with EU, vegetables and meat & fish preparations are classified in category 3, as successful non-price competition products, indicating exports of higher quality, in total trade and trade with non-EU countries they are in category 2, since the largest part of these products are originating from non-EU countries such as Turkey for vegetables ($TBal_{07} < 0$) and Thailand and Philippines for meat & fish preparations ($TBal_{16} < 0$), both with high deficits).

In category 4 – unsuccessful non-price competition one can find products showing negative trade balances but coupled with competitive prices (export prices lower than import ones). Despite the price advantage, Romania is not able to generate a positive trade balance, because it imports larger quantities than is able to export, generally due to lower production capacities, or to high demand for higher quality (and more expensive) products; it is the case for beverages and cereals baking & pastry products. In the case of oils & fats, it is due to small processing capacities, combined with successful price competition for oilseeds (sunflower, soybeans and rapeseed).

In the post-accession studied period (2017–2021), some changes occurred in the classification of product groups by competitive conditions. The share of the four categories in exports changed from the pre-accession to the post-accession studied periods as well (see Table 9.4). Despite that the shares of several categories diminished in 2017–2021 as compared to 2002–2006 (such as category 1 in exports to EU, category 2 in exports to non-EU countries, and category 4 for both destinations), in value terms the changes were significantly positive for all.

Successful price competition remained for cereals and oilseeds. Their cumulated share in overall exports increased to 79% in 2017–2021 (as compared to 52% in 2002–2006), amounting a gain of EUR +2 billion. Live animals traded with the EU shifted from category 1 to category 4, due mostly to intensification of imports of live piglets from Hungary.

In trade with EU, milk & dairy products and sugar & confectionary increased their competitivity, migrating from category 2 to category 4 – unit export prices became lower than unit import prices, while retaining a negative trade balance. In trade with non-EU countries, milk & dairy products became competitive (moved to category 1 through dairy products exports), meat moved from category 2 to 3 by shifting the trade balance from negative to positive (through beef and chicken meat exports).

Table 9.3 Categories in Romanian agri-food international trade: product groups classification for the pre-accession period (2002–2006)

	(1) successful price competition $TBal_{(m)} > 0$ $UVexp_{(m)} < UVimp_{(m)}$	(2) unsuccessful price competition $TBal_{(m)} < 0$ $UVexp_{(m)} > UVimp_{(m)}$	(3) successful non-price competition $TBal_{(m)} > 0$ $UVexp_{(m)} > UVimp_{(m)}$	(4) unsuccessful non-price competition $TBal_{(m)} < 0$ $UVexp_{(m)} < UVimp_{(m)}$
Pre-accession period (2002–2006)				
Total trade	01-live animals 12-oilseeds 14-other vegetable products	07-vegetables 08-fruit 04-milk & dairy products 16-meat & fish preparations (02, 17, 05, 18, 03)[a]		10-cereals 15-oils & fats 22-beverages 19- cereal baking & pastry products (23, 20, 21, 24, 09, 11, 06, 13)
Trade with EU	01-live animals 12-oilseeds 10-cereals 14-other vegetable products	04-milk & dairy products 08-fruit 02-meat 05-other animal products (17, 18, 03)	07-vegetables 16-meat & fish preparations	15-oils & fats 22-beverages 20-vegetable & fruit preparations 19-cereal baking & pastry products (23, 21, 24, 06, 09, 11, 13)
Trade with non-EU countries	01-live animals 10-cereals 12-oilseeds 14-other vegetable products	08-fruit 04-milk & dairy products 17-sugar & confectionary 02-meat (16, 07, 18, 05, 03)		15-oils & fats 22-beverages 19-cereal baking & pastry products 23-animal feed (20, 24, 11, 21, 09, 11, 06, 13)

Post-accession period (2017–2021)				
Total trade	10-cereals 12-oilseeds 01-live animals 15-oils & fats	02-meat 19-cereal baking & pastry products 21-miscellaneous edible preparations 16-meat & fish preparations (07, 18, 08, 20, 09, 03, 11, 06, 14)	24-tobacco & tobacco products	23-animal feed 04-milk & dairy products 22-beverages 17-sugar & confectionary (05, 13)
Trade with EU	12-oilseeds 10-cereals 15-oils & fats 14-other vegetable products	02-meat 16-meat & fish preparations 19-cereal baking & pastry products 21-miscellaneous edible preparations (07, 18, 08, 20, 03, 06)	24-tobacco & tobacco products	04-milk & dairy products 01-live animals 23-animal feed 22-beverages (17, 05, 09, 11, 13)
Trade with non-EU countries	01-live animals 12-oilseeds 10-cereals 14-other vegetable products	08-fruit 04-milk & dairy products 17-sugar & confectionary 02-meat (18, 05, 03)	07-vegetables 16-meat & fish preparations	15-oils & fats 22-beverages 19- cereal baking & pastry products 23-animal feed (20, 24, 21, 09, 11, 06, 13)

Source: Calculations based on Eurostat data

Notes:

1. See Note 1 in Table 9.1

2. [a]In each category, only the top 4 product groups are nominated explicitly, the remaining products are mentioned by their HS code, in brackets. The product groups are ranked decreasingly by their export value

Table 9.4 Share of categories in Romanian agri-food international exports (%)

Category	2002–2016			2017–2021		
	Overall exports	Exports to EU	Exports to non-EU countries	Overall exports	Exports to EU	Exports to non-EU countries
1	37.6	49.2	51.7	59.8	45.6	79.0
2	24.6	18.8	13.5	17.2	21.4	5.8
3	0.0	13.3	0.0	13.9	18.5	8.0
4	37.8	18.7	34.8	9.1	14.5	7.2

Source: Calculations based on Eurostat data

There are very few product groups in category 3 (successful non-price competition), and they include mainly tobacco & tobacco products in trade with the EU. Despite a higher unit export price, the trade balance is positive.

Category 4 (unsuccessful price competition) experienced most changes between the two studied periods; the number of product groups included diminished over time, as well as their share in exports (from 19% to 15% in trade with EU, and more abruptly, from 35% to 7% in trade with non-EU countries. Group 15-oils & fats became competitive (moved to category 1) in trade with EU, while some processed products (such as cereal baking and pastry products, vegetable and fruit preparations, and miscellaneous edible preparations) further lost competitivity by moving from category 4 to category 2 (while maintaining a negative trade balance, the export unit price increased, surpassing the import one).

9.4.3 Changes in the Romanian Agri-Food Trade in 2020–2021 (Years Under COVID-19 Restrictions)

We are trying to briefly assess the changes in the Romanian agri-food trade in 2020–2021, as compared to 2018–2019. Undoubtedly, the COVID-19 pandemic had a notable impact on economy, employment, and finance in Romania, as well as in the EU and all over the world.

Despite the lockdown periods in most countries, and brief interruptions in transports, governments made efforts to maintain the agri-food trade flows, to avoid food shortages and major disruptions on the world food markets.

The continuous upward trend of the Romanian exports (since 2012) was briefly interrupted in 2020 by a very slight decrease (−2.7% as compared to previous year), which was generated by the diminishing in exports to the EU (see Table 9.5).

Alternately, the imports upward trend continued uninterruptedly all along the studied period. The same can be stated for total trade as well, since the slight decrease in exports was offset by increasing imports; therefore, the trade balance deficit pursued its deepening trend (that started as early as 2015).

The year 2021 saw a significant upward trend in exports (+31% to the EU and + 46% to extra-EU countries, amounting EUR +1.3 billion and EUR +1.29

Table 9.5 Changes in Romanian agri-food trade in 2018–2021

	2018 (EUR million)	2019 (EUR million)	2020 (EUR million)	2021 (EUR million)	2020/2019 yearly change (%)	2021/2020 yearly change (%)	2020–2021/ 2018–2019 average change (%)
Total agri-food trade							
Total trade (export+import)	14,137	15,613	15,919	19,710	2.0	23.8	19.8
Total export	6502	7183	6990	9582	−2.7	37.1	21.1
Total import	7634	8429	8929	10,127	5.9	13.4	18.6
Total trade balance	−1132	−1246	−1940	−545	55.7	−71.9	4.5
Coverage of import by export (%)	85.2	85.2	78.3	94.6	−8.1	20.9	1.5
Share of trade balance (TBal) in total trade (%)	−8.0	−8.0	−12.2	−2.8	52.7	−77.3	−6.5
Agri-food trade with the EU member states							
Trade with the EU (export +import)	10,937	11,793	11,672	13,930	−1.0	19.3	12.6
Export to EU	4514	4565	4169	5471	−8.7	31.2	6.2
Import from EU	6423	7229	7503	8459	3.8	12.7	16.9
Trade balance with EU	−1908	−2664	−3334	−2988	25.1	−10.4	38.2
Coverage of import by export (%)	70.3	63.1	55.6	64.7	−12.0	16.4	−9.9
Share of $Tbal_{EU}$ in trade with the EU (%)	−17.4	−22.6	−28.6	−21.4	26.4	−24.9	24.9
Agri-food trade with non-EU countries							
Trade with non-EU (export +import)	3200	3819	4247	5779	11.2	36.1	42.8
Export to non-EU	1988	2619	2820	4111	7.7	45.8	50.5
Import from non-EU	1212	1200	1426	1668	18.8	16.9	28.3
Trade balance with non-EU	776	1418	1394	2443	−1.7	75.3	74.8
Coverage of import by export	164.0	218.2	197.7	246.4	−9.4	24.6	16.2
Share of $Tbal_{non\text{-}EU}$ in trade with non-EU (%)	24.3	37.1	32.8	42.3	−11.6	28.8	22.3

Source: Calculations based on Eurostat data

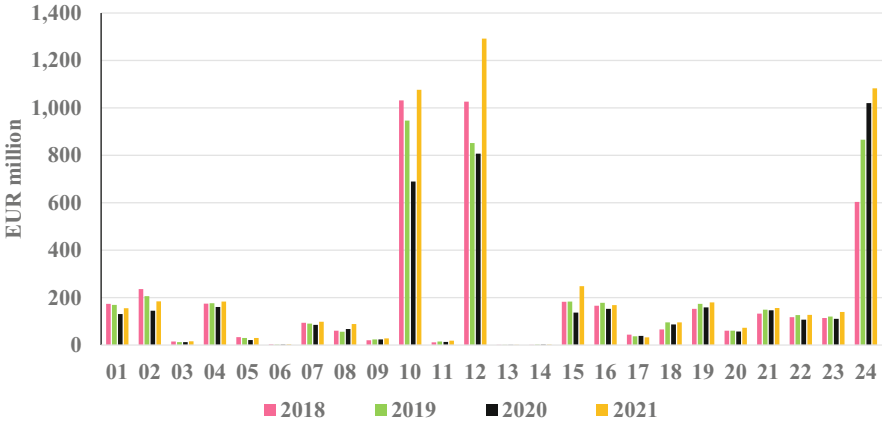

Fig. 9.3 Romanian agri-food exports to the EU countries by product groups (2018–2021). (Source: Calculations based on Eurostat data. Note: see Note 1 in Table 9.1)

billion, respectively). Imports increased as well, but at a slower pace (+13% from the EU and + 17% from extra-EU); as a result, the total trade deficit diminished significantly, from EUR −1.9 billion in 2020 to EUR −545 million in 2021.

Extending the analysis by product groups, the slight diminishing exports to the EU in 2020 came mainly from the product groups with largest share in exports (cereals, oilseeds, live animals and oils & fats), as well as from most processed products (groups HS 16–23) (see Fig. 9.3).

The decrease in cereals and oilseeds exports can be correlated with the diminished production due to the severe drought in winter and spring 2020: the cereals production decreased by 40% and the oilseeds production by 33% as compared to 2019.

Nevertheless, one should observe that for products with large share in exports to the EU (as well as competitive ones, see Table 9.3 in Sect. 4.2), the values increased significantly in 2021 as compared to 2020: oilseeds (+60% in 2021/2000, amounting EUR +484 million), cereals (+56%, amounting EUR +386 million) and oils & fats (+82%, amounting EUR +112 million); for these products, 2021 value surpassed the values in 2018–2019 as well.

9.5 Conclusions

Competitiveness of agri-food products has been studied and interpreted in many ways in economic literature. For our analysis of the Romanian international agri-food trade evolution over the last two decades, encompassing both pre-accession and post-accession years, we used trade balances and unit trade values.

In the 15 years after the EU accession, Romanian agri-food trade increased significantly in both values and volumes, to the EU and extra-EU destinations. Total trade balances have been mostly negative (except for 2013 and 2014). The constant deficits in trade with the EU countries started to be partially offset by continuous surpluses in trade with extra-EU countries since 2010.

In the pre-accession period (2002–2006), live animals, oilseeds and cereals were the product groups that showed successful price competitivity. Vegetables and meat & fish preparations were classified as products successful in non-price competition with the EU (despite higher export unit prices, they were still able to provide positive trade balances).

Products that lacked competitivity in trade with the EU in 2002–2006 were mainly meat, fish, milk & dairy products, fruit and beverages (these product groups show the largest negative trade balances as well, together with high unit prices, thus classified in category 2 – unsuccessful price competition).

In the post-accession studied period (2017–2021), in exports to EU, despite the gain in export values, the share of competitive products (category 1) diminished. Cereals and oilseeds remained competitive, but live animals lost some competitivity (moved in category 3) – they retained positive trade balance, but unit export prices became higher than import ones. A major change was shown by oil & fats, which became price competitive (moved from category 4 to category 2).

Quite important, milk & dairy products gained competitivity in post-accession period, by shifting the trade balance from negative to positive, but their export unit prices are still higher than import ones.

Products of the milling industry, beverages and animal feed did not see change in competitivity, in both pre- and post-accession periods they remained in category 4 (unsuccessful non-trade competition – negative trade balance, but lower unit export prices).

In extra-EU trade, no major changes occurred in product competitivity. The main export products (live animals, cereals and oilseeds) remained competitive over the years, while the main import products (fruit, milk & dairy, sugar & confectionary, fish) did not show any gains (remained in category 2 – unsuccessful price competition).

Irrespectively of the positive or negative changes in share of the four categories, for all trade destinations, the export values (in monetary units) increased significantly.

In studying the changes of the Romanian agri-food trade in the years under COVID-19 pandemic, the main conclusion is that the general upward trends in trade were mostly maintained. A slight decrease in exports (−2.7%) was recorded in 2020 as compared to 2019, driven by the drop in exports to the EU (−8.7%), but it is correlated with the significant decrease in the production of the main export products rather than attributable to COVID-19 influence.

In the second year under COVID-19 pandemic, both Romanian agri-food exports and imports showed important upward trends, so the hypothesis of a negative influence of COVID-19 upon trade flows was completely refuted. Nevertheless, one should remember that 2020 has been a very poor agricultural year, and then 2021

has been a favourable agricultural year, with high productions for most products, thus providing a good background for export expansion.

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Chapter 10
The Economic and Social Impact of Increasing Electricity Prices: Estimates, Analysis and Predictions

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Abstract The current global energy crisis highlights the need to continue investigating the impact of energy prices on the budget of different types of consumers, by using appropriate modeling methods to substantiate the economic policies. The paper presents a research conducted by the authors, based on a case study structured in two parts: the first part aims to capture the dependencies between the electricity market, on the one hand, and the industry and construction sectors, on the other hand, but also the impact felt by the final consumer in relation to changes in the electricity market. The second part of the study aims to complete the conclusions obtained in the first part of the case study with the analysis of the indicators with monthly frequency to compare between energy price levels in different European Union (EU) countries and Romania, and to quantify the relations between imports, exports, net exports, supply, respectively the total production of electricity and the price of a kilowatt-hour of electricity. Finally, the authors characterise how changes in electricity prices might influence the following macroeconomic aggregates: gross added value at economy level and different economic sectors, gross domestic product, population consumption, government consumption, investment, trade balance.

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10.1 Introduction

The current global energy crisis highlights the need to continue investigating the impact of energy prices on the budgets of different types of consumers, by using appropriate modeling methods to substantiate economic policies. Increase of energy prices in general, and electricity prices in particular, have multiple causes and are reflected in rising product prices and service tariffs.

Liberalisation of the electricity market is a hot topic, which is still the subject of debate. The market has made progress in this area, including the opening of an energy exchange, the entry of energy trading companies and even the formalisation of the liberalisation of the energy market for domestic consumers in 2007. Regardless of the situation, however, the social component related to energy prices remains a sensitive topic addressed by all market participants [13], including the population.

Almost ten years ago, the Romanian Government, based on an agreement with the World Bank, the IMF and the EU, concluded an agreement on the liberalisation of the energy market, which involved the completion of intermediate stages, such as [1]:

- Preparing consumers through multiple programmes for disseminating information specific to the free market
- Restructuring, depoliticising and streamlining the institutions that are meant to ensure the functionality of the free market
- Establishment of an Entity for Alternative Dispute Resolution, between consumers and suppliers
- Implementing a strategy to reduce energy shortages and protect vulnerable consumers
- Gradual deregulation of energy prices, the only part of the actions partially implemented

In the last year, there have been factors that have changed the balance of the electricity market, such as: the change of GAZPROM policy on the supply of natural gas during the summer, when additional and cheap deliveries were made to Europe, the change of gas flows in the Balkans, which led to the relocation of the main gas import point in Romania to the west, on the border with Hungary, a lower capacity point and with a higher cost than in the rest of the points, speculations of suppliers who imposed higher prices and inappropriate contractual clauses.

The authors of this study conducted a case study for Romania that aims to capture the dynamics of the electricity market and the dependence of other sectors of activity, such as industry and construction, on energy. The role of statistical and econometric models is to quantify the impact that a change in the electricity market has on gross domestic product, consumption, investment, trade balance and other indicators of macroeconomic importance. For this study, the data were selected from

sources such as Eurostat [4], the National Institute of Statistics of Romania [9] and the World Bank [15]. Macroeconomic indicators were selected in the form of monthly, quarterly, half-yearly and annual time series for the analysis period January 2008–June 2021. Time series modeling using linear functions was used to fill in the missing values.

The case study was structured in two parts: the first part aims to capture the dependencies between the electricity market, on the one hand, and the industry and construction sectors, on the other hand, but also the impact felt by the final consumer in relation to changes in this market. The second part of the study aims to complete the conclusions obtained with analyses of the indicators with monthly frequency to compare between energy price levels in different EU countries and Romania, and to quantify the relations between imports, exports, net exports, supply, respectively the total production of electricity and the price of one kilowatt-hour of electricity. Finally, the authors characterised how changes in electricity prices might influence the following macroeconomic aggregates: gross added value at economy level and different economic sectors, gross domestic product, population consumption, government consumption, investment, trade balance.

10.2 Literature Review

Input-output (IO) models are often applied to assess the impact of prices increase of different cost elements, such as energy on the price of products and services. As a limitation of IO models is the assumption that input requirements are set. To overcome this limitation, Truchon [14] defined a method of updating the coefficients of the model due to the changes of prices. Lange [10] proposed a procedure for including technological alternatives in the IO model. Kratena [8] combined a conventional IO model with demand functions of econometric factors and price equations.

The models of energy supply and demand might include coefficients of elasticity to characterise how responsive the quantity demanded and supplied is to other relevant variables. On-demand price elasticities determine whether price increases will lead to an increase or decrease in total spending in a market, while revenue elasticities will determine how a product's budget share changes. Cross-price elasticities also might be used for indicating how related prices influence the quantity demanded or supplied from a specific good.

Hamilton [6] identified a relationship between the rise of oil prices and the economic recession. Kilian [7] showed that the source of rising oil prices (demand or supply) is significant for its impact on production and inflation. Li et al. [12] used translog (Transcendental Logarithmic) cost functions to analyse the potential for energy, capital and labour replacement in the Chinese economy between 1981 and 2017.

The impact of carbon tax on electricity prices was analysed by Lee et al. [11], following the example of the Korean energy sector, using the scenario technique, taking into account four groups of factors: demand, conversion efficiency, fuel and price. Gelos and Ustyugova [5] perform an analysis of the consumer basket from the calculation of the consumer price index focusing on the impact of the shock of rising energy prices, as well as the role of central banks in managing inflationary pressures.

In 2019, the European Commission analyses, in a special report [2] the evolution of energy prices and the stage of achieving the energy union, comparing the advantages and disadvantages of high energy prices. A comparison is made of the situation of the European economy from 1970–1980 generated by the oil shock. The framework strategy and the stage of achieving the objectives of the roadmap for an energy union are analysed.

The Intelligent Energy Organization publishes in June 2021 an analysis [3], on the increase of electricity and natural gas prices in the context of complete market liberalisation for domestic consumers, with emphasis on the ratio between the consumption served by the free market, respectively by the regulated one, but also on the difference between the market prices and those under regulated regime.

10.3 Research Methodology

The research aims to identify the dependencies between the electricity market, on the one hand, and the industry and construction sectors, on the other hand, but also the impact felt by the final consumer in relation to changes in this market.

For this study, the data were selected from sources such as Eurostat [4], the National Institute of Statistics of Romania [9] and the World Bank [15]. Macroeconomic indicators were selected in the form of monthly, quarterly, half-yearly and annual time series for the analysis period January 2008–June 2021. Time series modeling using linear functions was used to fill in the missing values. The indicators included in the analysis refer to the monthly evolution from January 2008 to June 2021 of imports (E1), exports (E2), net imports (E3), supply (E4) and total electricity production (E5).

Two indices were selected to characterise the construction sector: the construction works index (C1) and the construction cost index (C2). The dynamics of the industrial sector for the analysed period is described by means of four indicators: the labour productivity index in industry (I1), the value index of the turnover from the industrial units in total (internal market and external market) (I2), the industrial production index in total industry (I3) and the total industrial production price index (I4). The average monthly consumer price index (CPI) was introduced in the analysis to determine how the population feels the changes in the electricity market.

To determine the dependencies between the electricity market, the construction sector, the industrial sector and the final consumers, the correlation matrix was used.

Other objectives of the study were to compare between the energy price levels in EU countries and Romania and to quantify the relationship between imports, exports, net exports, supply, respectively total electricity production and the price of one kilowatt-hour of electricity. Finally, we looked at how changes in the price of electricity influence the following macroeconomic aggregates: gross added value at economy level and different economic sectors, gross domestic product, population consumption, government consumption, investment, trade balance The last objectives were achieved by using data with a half-yearly frequency (bi-annual), the indicators including observations from 2007S1–2021S1. Some of the data were obtained by aggregating either the monthly time series or the quarterly time series for various macroeconomic indicators.

10.4 Research Results and Discussions

To identify relationships between monthly indicators, the correlation matrix was developed (see Table 10.1).

Analysing the correlation matrix above, we can see that the monthly imports of electricity are strongly and directly correlated with the net imports of electricity, with the two indices for the construction sector, with the four indices for the industrial sector. Also, electricity imports have no impact on the consumer price index, the correlation coefficient in this case being zero.

There is a direct, medium-intensity link between electricity exports and total gross electricity production. The higher the domestic production, the more the export activity in this field will be stimulated. In addition, electricity exports are positively correlated, but the links are of medium to low intensity with all four indices for the industry sector.

Table 10.1 The correlation matrix for monthly indicators

	E1	E2	E3	E4	E5	C1	C2	I1	I2	I3	I4	IPC
E1	1											
E2	0.19	1										
E3	0.51	-0.74	1									
E4	0.27	0.1	0.09	1								
E5	-0.14	0.52	-0.55	0.77	1							
C1	0.47	-0.03	0.35	0.06	-0.22	1						
C2	0.77	0.02	0.5	0.16	-0.22	0.31	1					
I1	0.52	0.26	0.13	0.06	-0.04	-0.18	0.7	1				
I2	0.72	0.24	0.27	0.13	-0.1	0.13	0.88	0.89	1			
I3	0.57	0.36	0.07	0.19	0.09	-0.08	0.7	0.92	0.92	1		
I4	0.66	0.15	0.32	0.09	-0.16	0.07	0.91	0.82	0.87	0.77	1	
IPC	-0.01	-0.18	0.14	0.3	0.16	0.09	-0.04	-0.17	-0.14	-0.13	-0.14	1

The supply of electricity is directly correlated with the index of industrial production by total industry.

There are inverse links between the total gross electricity production and the two indices for the construction sector, of low intensity, the correlation coefficients being in both cases equal to −0.22.

Starting from the correlation matrix above, Table 10.2 presents a series of regression models in which the dependent variables are, in turn, indices from the industry sector and the construction sector. The factors are represented by the monthly indices (I1–I5) specific to the electricity market. Thus, the general case equation for the models below is as follows:

$$Y = \beta_0 + \beta_1 \cdot X_1 + \beta_2 \cdot X_2 + \beta_3 \cdot X_3 + \beta_4 \cdot X_4 + \beta_5 \cdot X_5 + \varepsilon_t \tag{10.1}$$

The unifactorial and multifactorial regression models for the monthly time series of indicators for the electricity market, for the construction sector and for industry are presented in Table 10.2.

The evolution of the labour productivity index in industry (I1) is explained in proportion of 30% by the variations of the electricity import (E1) and the electricity export (E2) according to the equation of the model (M02). Value index of the turnover of industrial units on the total (internal market and external market) (I2) is influenced in proportion of 53% by the variations of the electricity import (E1) and electricity export (E2) according to the equation of the model (M05). The index of industrial production for the total industry is 40% impacted by both the import (I1) and the export of electricity (I2) according to the model (M09). The total industrial production price index (internal market and external market) (I4) is determined in proportion of 44% by imports (I1) of electricity, as shown in model (M13).

$$I_1 = 82.81–0.03 \cdot E_1–0.09 \cdot E_2–\varepsilon_t \tag{M02}$$

$$I_2 = 76.91–0.08 \cdot E_1–0.01 \cdot E_2–\varepsilon_t \tag{M05}$$

$$I_3 = 81.03–0.04 \cdot E_1–0.01 \cdot E_2–\varepsilon_t \tag{M09}$$

$$I_4 = 93.32–0.03 \cdot E_1–\varepsilon_t \tag{M13}$$

For the construction sector, the variation of the two characteristic indices, the construction works index, respectively the construction cost index, is explained by the models (M16), respectively (M19), in proportion of 24% and 61%, respectively, of the electricity import (E1) and total gross electricity production (E5).

Table 10.2 Unifactorial and multifactorial regression models

Model	Dependent variable	Model validity F-stat (P-F-stat)	Degree of determination R^2	Dependent variables and their coefficients					
				β_0 (prob)	β_1 (prob)	β_2 (prob)	β_3 (prob)	β_4 (prob)	β_5 (prob)
M01	I1	61.92 (0.00)	0.27	86.49 (0.00)	0.04 (0.00)	–	–	–	–
M02	I1	34.35 (0.00)	0.30	82.81 (0.00)	0.03 (0.00)	0.009 (0.00)	–	–	–
M03	I1	11.63 (0.00)	0.06	88.40 (0.00)	–	0.01 (0.00)	–	–	–
M04	I2	174.30 (0.00)	0.52	80.80 (0.00)	0.09 (0.00)	–	–	–	–
M05	I2	90.61 (0.00)	0.53	76.91 (0.00)	0.08 (0.00)	0.01 (0.05)	–	–	–
M06	I2	9.95 (0.00)	0.05	89.67 (0.00)	–	0.02 (0.00)_	–	–	–
M07	I2	13.56 (0.00)	0.07	104.63 (0.00)	–	–	0.02 (0.00)	–	–
M08	I3	80.89 (0.00)	0.33	87.03 (0.00)	0.04 (0.00)	–	–	–	–
M09	I3	54.12 (0.00)	0.40	81.03 (0.00)	0.04 (0.00)	0.01 (0.00)	–	–	–
M10	I3	35.92 (0.00)	0.40	77.20 (0.00)	0.04 (0.00)	0.01 (0.00)	–	0.00 (0.73)	–
M11	I3	25.20 (0.00)	0.13	87.01 (0.00)	–	0.02 (0.00)	–	–	–
M12	I3	6.2 (0.01)	0.03	60.57 (0.00)	–	–	–	0.007 (0.01)	–
M13	I4	126.53 (0.00)	0.44	93.32 (0.00)	0.03 (0.00)_	–	–	–	–
M14	I4	18.33 (0.00)	0.10	101.69 (0.00)	–	–	0.009 (0.00)	–	–
M15	C1	46.68 (0.00)	0.22	96.18 (0.00)	0.03 (0.00)	–	–	–	–
M16	C1	26.47 (0.00)	0.24	121.18 (0.00)	0.03 (0.00)	–	–	–	−0.004 (0.02)
M17	C1	8.39 (0.00)	0.04	138.94 (0.00)	–	–	–	–	−0.006 (0.00)
M18	C2	241.62 (0.00)	0.60	94.55 (0.00)	0.06 (0.00)	–	–	–	–
M19	C2	126.71 (0.00)	0.61	114.08 (0.00)	0.06 (0.00)	–	–	–	−0.003 (0.02)
M20	C2	8.66 (0.00)	0.05	145.87 (0.00)	–	–	–	–	−0.007 (0.003)

Table 10.3 Correlation matrix between the price of electricity and the quantities imported, exported, offered and produced in the period 2007–2021

	Import	Export	Net import	Offer	Total gross production	Price
Import	1					
Export	0.315548	1				
Net import	0.4781072	-0.6825629	1			
Offer	0.5549779	-0.2386672	0.6483827	1		
Total gross production	0.5725038	0.4225352	0.0498539	0.7222174	1	
Price	0.7541116	0.4208673	0.1912278	0.2290193	0.3293025	1

$$C_1 = 121.18–0.03 \cdot E_1–0.004 \cdot E_5–\varepsilon_t \quad \text{(M16)}$$

$$C_2 = 114.08 + 0.06 \cdot E_1–0.003 \cdot E_5–\varepsilon_t \quad \text{(M19)}$$

In conclusion, the industry and construction sectors are influenced by the changes taking place in the electricity market. The analysis by monthly time series, which summarises information on imports, exports, supply and total gross electricity production, shows that changes in the price index of consumer goods, and thus in inflation does not have a significant impact on short term, but might have an impact on long term.

The correlation matrix between electricity prices and imports, exports, net imports, supply and total gross electricity production is represented in Table 10.3. It can be seen that imports are strongly influenced by the level of electricity prices. The links between exports and prices, respectively between the total gross production and prices are directly proportional, but of medium intensity, the correlation coefficients having the values equal to 0.42, respectively to 0.32. Using raw data, $Q = f(P)$ functions may be developed for revealing the price dependence on electricity quantities.

The equation that describes the dependence between imports and price is as follows:

$$Q_{\text{import}} = -18623.133 + 107323.4 \cdot P + \varepsilon_t \quad (10.2)$$

The price variation explains 56.86% of the variation in the amount of imported electricity.

10.5 Conclusions

The literature review revealed that assessing the impact of changing energy prices on different types of consumers is a necessity, especially to substantiate economic policies during global energy crises. It was also revealed that the use of appropriate modeling methods brings great benefits in conducting these studies.

The authors of this paper have conducted a case study for Romania which aims to capture the dynamics of the electricity market and the dependence of other sectors of activity, such as industry and construction, on energy. The role of statistical and econometric models is to quantify the impact that a change in the electricity market has on gross domestic product, consumption, investment, trade balance and other indicators of macroeconomic importance. For this study, the data were selected from sources such as Eurostat, the National Institute of Statistics of Romania and the World Bank. Macroeconomic indicators were selected in the form of monthly, quarterly, half-yearly and annual time series for the analysis period January 2008–June 2021. Time series modeling using linear functions was used to fill in the missing values.

The main conclusions obtained from this study are the following:

(a) The industry and construction sectors are influenced by the changes taking place in the electricity market. The analysis by monthly time series, which summarises information on imports, exports, supply and total gross electricity production, shows that changes in the price index of consumer goods, and thus in inflation does not have a significant impact on short term, but might have an impact on long term.
(b) the evolution trend is similar both in the European context and in the Romanian economy, but the average price in the period 2017S1–2021S1 is 0.04 euro/kilowatt-hour lower in Romania, compared to the European average.
(c) Imports are strongly influenced by the level of electricity prices. The links between exports and prices, respectively between the total gross production and prices are directly proportional, but of medium intensity, the correlation coefficients having the values equal to 0.42, respectively to 0.32.

The authors intend to extend the research if the decision makers will show interest in nuanced assessments already made.

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Chapter 11
Maintaining Green Goals in Disruptive Times: Evidences from the European Energy Sector

Mirela Panait, Razvan Ionescu, Iza Gigauri, and Maria Palazzo

Abstract The COVID-19 pandemic has proven to be a challenge for the global energy sector. As lockdowns and movement restrictions around the world have slowed travel, commerce, and industrial activities during the first stages of the health crisis, the global energy demand has plummeted with the prices of commodities such as crude oil and natural gas reaching all-time lows. This chapter focuses on the European energy market and the way in which companies are managing the challenges in an attempt to supply with the necessary energy while adhering to environmental targets in accordance to their corporate social responsibility commitments. As a looming energy crisis threatens to sweep across Europe in the winter of 2021/2022 just as countries have pledged to reduce emissions and phase out fossil fuels at the COP 26 UN climate summit in Glasgow, the energy sector faces the prospect of having to use more fossil fuels than ever before in order to avert possible energy shortages on the continent. The possibility of blackouts across Europe has taken the forefront, and the effects of climate change and the need to mitigate its causes seem to have been, for the moment at least, cast aside.

Keywords Social responsibility · Climate change · Energy crisis · COVID-19 pandemic

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11.1 Introduction

In the winter of 2021/2022, the European Union is facing an unprecedented energy crisis. A multitude of factors have led to this unfolding situation: the global effects of the COVID-19 pandemic, the transition to more expensive and sometimes unreliable green energy sources in a bid to reduce carbon emissions, geopolitical tensions between the EU and the Russian Federation, as well as a colder-than-usual winter across the continent. Skyrocketing energy prices across the board (with natural gas reaching unprecedented levels) are putting enormous pressure on average household consumers, businesses, as well as governments across Europe (Fig. 11.1). The need to shield consumers in general and vulnerable, low-income groups in particular from high-energy prices has seen European governments forced to take action such as reducing energy taxes, regulating retail price, offering direct cash aid to vulnerable households, and even considering windfall profits taxation for energy companies. The energy crisis poses a dilemma for the European energy sector. Burning more fossil fuels would aid in easing the pressure on consumers, but at the same time, it would derail the EU's ambitious climate goals. The European Union is determined to lead the way when it comes to making the switch to renewable energy sources. As the entire world looks with great concern at the ever more damaging effects of anthropogenic climate change, the EU has set ambitious goals in regard to green energy.

The European Green Deal proposed by the European Commission in September 2020 aims to reduce greenhouse gas emissions to zero by 2050 as well as to decouple economic growth from resource use. The Intergovernmental Panel on Climate Change (a body from the United Nations structure responsible for advancing knowledge on human-induced climate change) concluded in its report ("Climate Change 2021: The Physical Science Basis") that humanity has influenced the climate at a rate

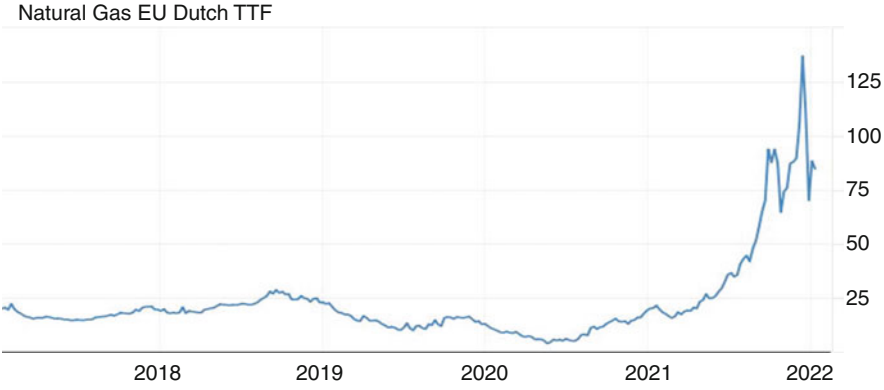

Fig. 11.1 Evolution of the price of natural gas traded at the title transfer facility in the Netherlands. (Source: tradingeconomics.com)

that is unprecedented in at least the last 2000 years [49]. Left unmitigated, the accelerating negative effects of climate change will have a severe impact on the habitat of all life on earth including humans. The European Union leads the way when it comes to ambitious climate goals [25, 34, 42]. Achieving a climate neutral EU by 2050 will prove to be challenging. However, the pressure is on, as climate extremes have a devastating effect on the European continent, its inhabitants, and its economy. A report published by *The Lancet* medical journal in 2020 found that the inhabitants of Europe have been the most vulnerable on earth to extreme heat waves [3]. The report also found that Europe has the highest number of premature deaths caused by PM2.5 particle pollution [49]. EU's JRC PESETA project (*Projection of Economic impacts of climate change in Sectors of the European Union based on bottom-up Analysis*) estimates that if climate change is left unchecked and global temperatures increase by an average of 3.5 degrees celsius, climate-related damages to the EU economy could be as high as 190 billion Euros [48]. The food supply is also at risk as a result of climate change [7, 38, 41]. A recent study revealed that climate change has reduced global agricultural productivity by 21% since 1961 [29].

The aim of this chapter is to assess the impact of the current converging crises on the European energy sector and to determine whether or not major EU energy companies are still on the path to fulfilling their climate goals when under pressure.

11.2 Literature Review

The world is facing environmental, economic, and social issues, which required complex solutions for sustainable development [16, 31, 34, 44, 47]. The United Nations Sustainable Development Goals (SDGs) address those challenges and appeal for social responsibility, in order to move toward clean energy [12, 20, 27]. In particular, SDG 7 aims at improving energy sustainability including energy security, accessibility, and clean energy [24]. Energy poverty is quickly becoming a pressing social issue in the European Union, with the prices of energy commodities seeing a sharp rise. EU citizens are often struggling with higher energy costs, 8% of them stating that they were unable to keep their homes adequately warm in 2020 [11]. Furthermore, sustainability issues create the global demand for the energy transition in terms of using cleaner, greener, and affordable energy resources [28, 30]. Previous research shows that the majority of energy companies implement corporate social responsibility (CSR) to contribute to moving to renewable energy [1, 47, 50] and to protect the environment from pollution [6]. Additionally, renewable energy sources have become prevalent discussions about climate change, environmental degradation, pollution, and resource depletion. As a response, renewable sources of energy can solve the problem of climate change, since industrialization, population densities, and lifestyles have increased the demand and forced supply to be increased accordingly [22, 33]. While CSR initiatives have been implemented with positive outcomes [1, 13, 17, 32, 43], some negative effects

need to be mentioned as well. For example, producing alternative fuel and green energy brings pressure on land and, hence, impacts food supply, especially, in poor countries [4, 7, 38, 41]. Besides, renewable energy depends on the weather, which makes it unreliable source, not to mention capital cost [36]. Although renewable energy is growing, the scale is still small, and storage technologies need to be advanced; currently, the largest renewable resource is hydropower, but solar energy can be an everlasting source of energy, while about 85% of commercial energy in the world is still produced from fossil resources [21]. Sustainability of the energy system can be ameliorated through innovative techniques, new materials, or technologies [2, 5, 26, 35]. Moreover, renewable energy projects need to meet the requirements of investors in order to become a solution to the climate and energy crisis [18]. Scholars also emphasize the state's responsibility in the energy transition to provide accessible renewable energy, given the risk of energy poverty that dramatically affects unfavorable groups [19, 39]. In the post-COVID era, the demand for sustainable energy will predictably grow [5], enabling economic recovery with sustainable development.

11.3 Methodology and Framework

For the purpose of this study, the five largest EU energy companies by market value (Fig. 11.2) were chosen for analysis (Royal Dutch Shell was excluded from the study, as it plans on moving its headquarters from the Netherlands to the United Kingdom). These companies are selected for their high environmental risk profile as well as for their major role in tackling pollution and the effects of climate change in Europe and beyond [8–10]. Data was collected from the websites and reports of the companies (including reports on sustainability, CSR, and climate action). A qualitative research method was chosen for the purpose of this study in the form of a modified framework based on the DPSIR model (drivers-pressures-state-impact-response) developed by Smeets & Weterings [37]. The DPSIR model has been modified to act as a framework for action at an organizational level as opposed to a national, state level. Employed by international organizations such as the Food and Agriculture Organization, the European Environment Agency, the United Nations

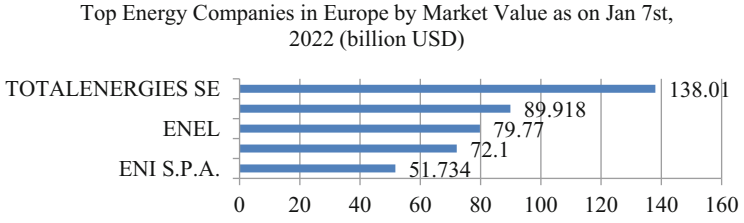

Fig. 11.2 Top energy companies in Europe by market value as of Jan 7, 2022 (billion USD). (Data source: www.value.today)

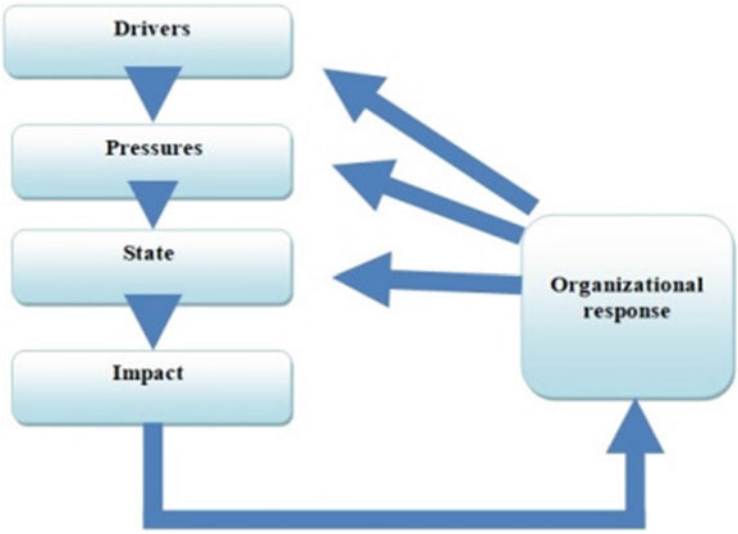

Fig. 11.3 DPSIR model used for analysis. (Authors' own work)

Environment Programme, and the Organization of Economic Cooperation and Development, the DSPIR framework is regarded as highly capable of providing comprehensive courses of action for combating the negative effects of environmental issues.

There companies were selected for their high environmental risk profile as well as for their major role in tackling pollution and the effects of climate change in Europe and beyond. The DPSIR model used for the analysis is presented in the figure below.

Content analysis of company sustainability reports is a new practice used in the international scientific literature [14, 23]. Even if at first sight, this analysis seems to be biased because it involves the exclusive use of information provided by companies, the preparation of sustainability reports, and the materiality matrix through discussions with various categories of stakeholders to ensures the objectivity of published data reflecting non-financial performance. In addition, the use of certain international non-financial reporting standards ensures not only the comparability of data between companies but also the accuracy of the information. Taking in account the information presented by the companies on their sustainability or CSR report, the DPSIR model used for the analysis is presented in Fig. 11.3 and Table 11.1.

Table 11.1 Drivers, pressures, states, and impacts affecting energy companies

Drivers	Pressures	States	Impact
Profitability	Exploitation of finite resources	Decreasing availability of resources	The need to enact changes to the business model of energy companies in order to ensure both continued profitable operation and the enactment of climate-related goals
Maintaining technological advantages over competing companies	Greenhouse gas emissions into the atmosphere	Increasing negative effects as a result of climate change	
Offering competitive prices for energy consumers	Pollution as a result of accidents	Increasing public scrutiny over the sustainability of energy companies	
Meeting European and international regulations			

Source: Authors' own work

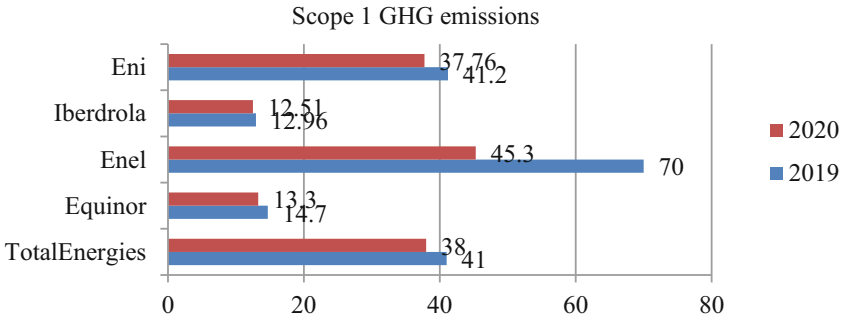

Fig. 11.4 Scope 1 GHG emissions (MtCO2eq). (Source: www.eni.com, www.iberdrola.com, www.enel.com, www.equinor.com, www.totalenergies.com)

11.4 Results and Discussions

he organizational response of the companies analyzed will be assessed in this section of the study. The most important climate indicator for any energy company is the Scope 1 GHG (greenhouse gasses) emission. Scope 1 emissions represent the direct emissions from company owned and controlled resources. Reducing greenhouse gas emissions is a mandatory organizational response toward meeting self-imposed legally binding climate goals.

Figure 11.4 shows that all companies have reduced their Scope 1 emissions in 2020 when compared to the previous year. However, upon looking at energy consumption data provided by Eurostat, it can be seen that consumption in both primary energy and final energy has decreased in 2020 compared to the previous year as visualized in the chart below (Fig. 11.5). The decrease in GHG emissions however is in line with the commitment made by all five companies to achieve net

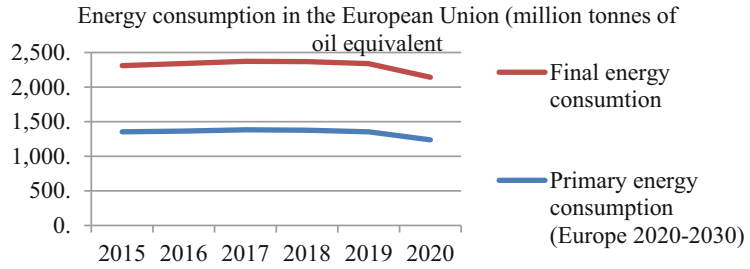

Fig. 11.5 Energy consumption in the European Union. (Source: Eurostat)

Table 11.2 Involvement in renewable energy, carbon capture, and energy storage projects

	Renewables	Carbon capture	Energy storage
Total energies	Solar and wind power	10% of R & D project will go toward carbon capture, utilization, and storage	Involved in battery storage projects
Equinor	Solar and wind power	Part of 40 carbon capture and storage projects	Involved in battery storage projects
Enel	Solar and wind power	Enel CEO has expressed skepticism over carbon capture and storage technology	Involved in battery storage projects
Iberdrola	Solar and wind power	No carbon capture and storage projects	Involved in battery storage projects
Eni	Solar and wind power	Involved in multiple carbon capture and storage projects	Involved in battery storage projects

Source: Authors' own work

zero carbon emissions within a certain time frame. Eni, Iberdrola, Equinor, and TotalEnergies have committed to achieving net zero by 2050, while Enel's target is reaching the goal by 2040.

Innovation is one of the main focuses of all the analyzed companies. Innovation can provide solutions to many of the issues identified by our DPSIR model: maintaining a competitive advantage, ensuring legal compliance with regulations, reducing pollution, and the dependency on fossil fuels. The study of Hanak and Manovic [15] concluded that renewable, carbon capture technology and energy storage will play a crucial role in achieving net zero targets.

All of the companies analyzed in this study are involved in renewable energy and energy storage projects and three of them in carbon capture projects as well (Table 11.2). This is a crucial step toward achieving their climate-related goals within the proposed time frame.

11.5 Implications, Conclusions, and Future Research

The global energy sector is transforming, and European companies are often leading the way when it comes to renewable energy and climate change. Pressured by regulators and the public, these corporations are investing heavily in new technologies and have self-imposed pollution and climate goals. This analysis has revealed that action is being taken toward providing more sustainable energy to consumers. The cyclical nature of renewable energy is being mitigated by investments in energy storage solutions. And while all five companies have adopted battery technology as an energy storage option, it should be noted that batteries are not a green option. Pumped storage hydroelectricity is a much more sustainable, less polluting means of energy storage. However, the upfront cost is often higher, and the long-term feasibility would recommend it as a better option.

This research has found that in Europe, the clean energy revolution is well under way and that the major players have acknowledged that a rollback toward fossil fuels is unlikely to be accepted by the governing bodies of the EU or by its ever-increasing climate-conscious citizens. Actually, the analysis of the findings emphasize that managers are interested in embracing the clean energy revolution and a more responsible orientation must not limit their approach to sustainability to the implementation of a simple tactic, but it needs a radical change in organization, especially because companies have to answer to contextual changes due to the COVID-19 pandemic situation. While several companies have changed much during the last years, the external context has been even quicker to suffer transformations: the energy issue is at the top of governments and research institutions' agenda, so clean energy revolution has gained traction, especially for the economic and social value of the energy utilities industry.

For this reason, strong interconnections between strategic and social policies have pushed companies to interpret this revolution in a global way, that is, by relentlessly pursuing stakeholders collaboration and legitimacy [30]. This will enable, in the future, organizations to move from a generic and sporadic approach to the clean energy revolution to a more systematic and durable approach to this issue, which has to permeate all levels of corporate strategy [40, 44]. Hence, the study conducted on the capacity of selected companies to integrate new activities – focused on sustaining the clean energy revolution – in their strategy confirms that the way in which companies proceed can be considered a first step of a long path that will be followed only by firms that really understand the importance of applying the three pillars of the sustainability approach: people, profit, and planet [45, 46].

The authors are aware of the limitations of the research considering that they used only the content analysis of the sustainability reports. For this reason, further research is needed and will not only focus on the situation of the European energy sector from the perspective of non-financial performance of companies, based on Eurostat data, but also study the behavior of companies toward final consumers, given the increase of energy poverty phenomenon. In this way, the research will reveal the discrepancy or concordance between the declarative behavior of the

companies presented, perhaps in a much too good light in the sustainability reports, and the real behavior toward the final consumers who face difficulties in paying the energy bills.

Future research can expand knowledge of the clean energy revolution by analyzing different strategies developed by energy companies. Depending on the strategies employed, company responses can backfire or prove ineffective in the COVID-19 pandemic situation. Thus, researchers should aim to develop specific measures for the various facets of this revolution and explore how these factors are related or whether each construct plays a role in producing a positive or a negative effect on key stakeholders. Particular attention will be paid to the analysis of distributional effects of current energy and climate policies, taking into account the importance of consumers in this complex energy transition processes.

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Chapter 12
Transition to a Low-Carbon Economy and the Impact on the Urban Regeneration Process

Anna-Maria Vasile

Abstract The transition to a low-carbon economy, based on restructuring processes in energy-intensive industries, is underway in Romania. The decline began about 20 years ago, with a gradual reduction in the activity of some branches of heavy industry and major redundancies.

Romania's trajectory to reduce GHG emissions is similar to that of the EU.

The direct effect of the transition from a carbon-constrained economy to activities that do not put a strain on the climate to a climate-neutral economy is mainly the reduction of greenhouse gases (GHG), with major impact on the energy sector.

The second component of the overall impact is the impact due to the change in fuel demand following the promotion of electromobility.

The third component refers to the degree of damage to the area, the area in the process of urban regeneration, due to its significant role in urban transformation and development in general.

Thus, the process of transition to a low-carbon economy will determine the need to reconvert contaminated and abandoned territories, and their eventual transformation will require a significant volume of investment.

Investments that improve the quality of life could help attract and retain a more skilled workforce, along with business support schemes aimed at high-knowledge services and technology, as well as territorial reconversion, which will inspire the process of urban regeneration.

The opportunities and challenges can pose dangers to the environment, given their nature, or a threat to the urban structure that distorts mobility, generating spatial segregation and inhibiting development in their vicinity.

Such land reserves, especially those located in urban areas, can be capitalized as valuable assets for public or public-private investment in industrial conversion.

Keywords Just transition · Carbon reduction · Urban regeneration

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12.1 The Climate Transition Process

The climate transition process intends to handle the effects of the transition actions to get to a climate-neutral economy movement. It has a specific goal set mostly at the same level as the policy objectives set out in Article 4 of the EU Regulation (new DRC).[1]

The economic diversification in general and especially of the most affected territories requires the application of measures for the transformation of industrial processes, which involves not only the nodification of the work process but also, most often, the reconversion of industrial sites, thus transitioning to a neutral economy.

Thus, measures must be taken for economic growth and diversification, employment through retraining or retraining, decontamination of polluted sites and circular economy, clean energy by reducing GHG, energy saving, as well as digitalization of the clean energy.

12.1.1 Identifying the Affected Territories

The main national challenges for Romania are analogues to the fulfilment of the transition to a sustainable climate in the energy, mobility, and transport sectors, leading to the need for an integrated approach to measures to implement new strategic approaches to investment, technology, and urban regeneration.

The decline began about 20 years ago, with a gradual reduction in the activity of some branches of heavy industry and major redundancies, which means that completion of industrial restructuring and adjustment are needed to be able to transform all economic sectors into a climate-neutral economy. This will have to take place in the next 5–10 years, taking into account PNIESC (Integrated National Plan in the field of Energy and Climate Change 2021–2030) targets, PEE targets, and international commitments on climate action. The six counties in transition are affected differently, due to the types of industries on which these territories are dependent, due to differences in professional skills, level of education, ambition and desire to change the population, and entities that need support in this process.[2]

The 2020 country report highlights that due to political efforts for the development of RES and due to the market orientation toward reducing carbon emissions and more competitive activities, Romania has reached its climate targets for 2020. However, only through existing efforts, Romania has a difficult path toward achieving the 2030 targets. Although there is a faster pace of development, the proposed

[1] REGULAMENT AL PARLAMENTULUI EUROPEAN ŞI AL CONSILIULUI de instituire a Fondului pentru o tranziție justă – Bruxelles, 14.1.2020 COM(2020) 22 final 2020/0006(COD).

[2] ANNEX V – Just Transition Operational Programme – POTJ – ECOMP.2.B – 10291/19 NTC/AFG/cs.

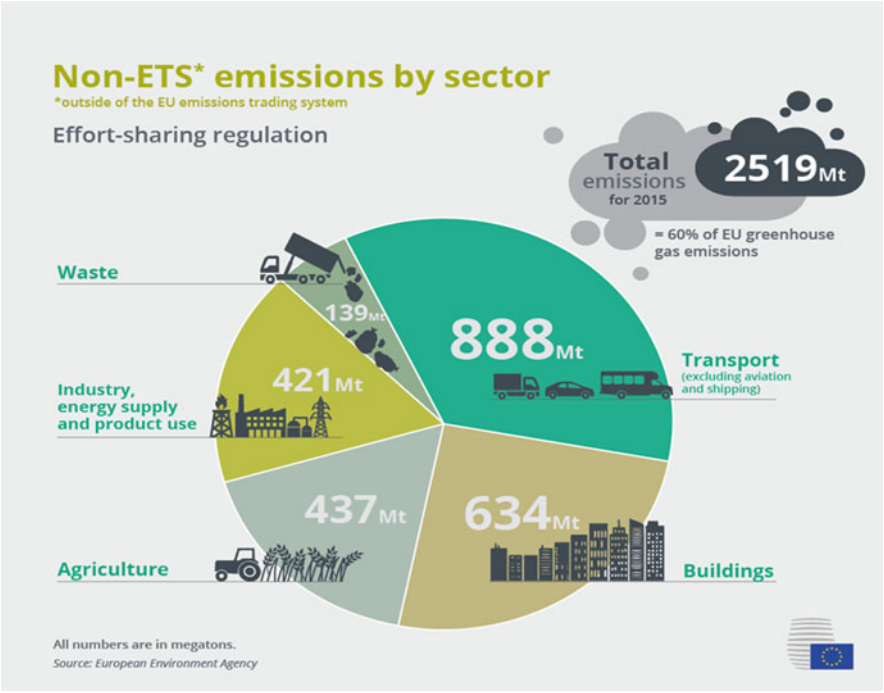

Fig. 12.1 Infografic: non-ETS emissions by sector. (Source: European Environmental Agency (https://www.consilium.europa.eu/en/infographics/non-ets-emissions-by-sector/))

target for 2030 for an installed renewable energy capacity of 30.7%, according to PNIESC, is still below the national potential for efficient development. RES at present has a low impact, and the EU collective target for 2030, is to get to 34%.

The share of GHG in gross final consumption has stagnated (and even decreased) in the last 5 years in Romania, which differs from the EU-28 trend. The share of RES at national level evolved from 8.6% to 24.8% in 2014. Since then, it has stagnated and has been decreasing slightly between 2017 and 2018, with the share of RES currently standing at 24.3%.[3]

The European Effort Sharing Regulation fixes the binding targets for the reduction of emission for each Member States and also for sectors that do not fall entirely within the scope of the EU Emissions Trading Scheme (ETS) for the period 2021–2030. These include buildings, agriculture (other than CO_2 emissions), waste management, and transport (excluding aviation and international maritime transport) (Fig. 12.1).

Romania's trajectory to reduce GES-GHG emissions is similar to that of the EU, with steady declines compared to 1990 and a sharper decline between 1990 and

[3] PNIESC 2021–2030.

2000, when most of the industrial restructuring processes took place. However, since 2013, emissions in Romania have stagnated, and efforts are needed to intensify this.

The Effort Sharing Regulation sets Romania's national target for 2030 to reduce emissions by 2% compared to 2005, a target that can be achieved more easily and sustainably with FTJ support.[4]

In Romania, local authorities have shown interest in taking action on reducing GES emissions.

By decreasing the population density, it tends toward a suburbanization of the population and an increase of the built surface, leading to a greater number of requests for utilities, a greater number of kilometers traveled by vehicles, as well as for the road infrastructure.

Undertaking to annul this effect along with ensuring the reduction of GHG emissions in this sector determined inclusion of some strategic objectives on the national strategy on climate change and low-carbon growth for the period 2016–2030[5]:

- Encouraging unyielding development measures, with complex utility, focused on activities that conduce to low-carbon emissions, increase mobility as a way to reduce vehicle distances, develop infrastructure, and thus reduce preservation costs:
  - Approval and promoting innovative land management policies.
  - Developing policies for creating incentives for the transformation of neglected areas.
  - Establishing the maximum size of parceled land in which to promote the activities.
  - Increasing, if needed, the degree of build allowed on a certain plot.
- Encouraging unyielding development measures to increase the level of energy efficiency in buildings and in major urban infrastructure systems:
  - Creating public policies to provide economic incentives for the rehabilitation of existing buildings.
  - Encouraging the acquisition of energy-efficient housing.
  - Promoting district heating as well as water supply systems and solid waste collection systems that save energy.

[4] REGULATION (EU) 2021/1119 OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL of 30 June 2021 establishing the framework for achieving climate neutrality and amending Regulations (EC) No 401/2009 and (EU) 2018/1999 ['European Climate Law'].

[5] PNIESC 2021–2030 p 143.

12.1.2 Just Transition and the Green Deal in Prahova County

The communication on the European Climate Pact was adopted on December 11, 2019, by the European Commission. This document defined the blueprint to a new policy for Europe's development. This policy has as base on the goals of a clean environment and has ambitious climate aspirations. The fight against climate change and environmental safeguard should bring citizens, cities, and regions together to smoothly move to a climate-neutral economy and thus society.

The Climate Pact, part of the European Green Deal, has set goals to become the first climate-neutral continent in the world by 2050.

To have the means to get to the goals set, the European Climate Pact has proposed a Just Transition Mechanism, to help provide change in an efficient and equitable way countries' economies so that no one is left behind.

Environmental degradation affects a lot of people who are exposed to harmful effects of climate change, so the Just Transition Mechanism should have procedures to induce significant structural changes. But these changes will affect the citizens of Prahova County in different ways, each of it influenced by the industrial sites existing within; therefore, the process will differ from one to another, as well as its ability to react to the transition to a low-carbon economy process.

Underground coal mining, as well as crude oil mining, in the current technological conditions and in the absence of investment, generates high environmental costs, which can influence also the cost of energy production.

These areas exist, therefore the restriction of industrial activity and the closure of mines in Prahova County, in the Just Transition Mechanism, will generate brownfield territories, that should be renewed though an urban regeneration process. The availability of mining, the extractive industry, and the refining of oil products, intervened without creating alternative job offers and without a reconversion program, has generated and is generating the depopulation of the regions in the county. Labor migration, especially that with a high degree of specialization, is a determining factor in reducing the possibilities of internalizing the factors generating local welfare and thus reducing the public, local, and central budget.

The Just Transition process involves the emphasis on cooperation and the development of close and efficient collaborations between the Petroleum-Gas University of Ploiesti and the local industry. Significant transformations of the local industrial paradigm will accentuate the need for an orientation toward innovation, the transfer of knowledge and new technologies, the creation of spin-offs, or, as the case may be, the provision of professional training required by the transition to new specializations.

12.2 Literature Review

12.2.1 Urban Regeneration in the Context of a Just Transition

Urban regeneration, in the context of the Just Transition, becomes a route to change and improve the aspect of the region, aiming to transform post-low-carbon transformation in areas with energy efficiency and social inclusivity, prosperity, and quality of life.

Urban regeneration has mainly three pillars: physical, economic, and social. After the evaluation of the respective area and depending on the result of this evaluation, for each of the three pillars, more or less, interventions are proposed by developing an urban regeneration plan.

The only way to ensure reach in an urban renewal is to undertake a process of urban texture redevelopment, adjusted to the other elements such as heritage preservation, a comprehensive mixture of vision and action aimed at transforming the multifaceted problems of deprived urban areas in order to improve their quality of life, toward a just transition.

To reach a sustainable development, to retrieve the underrated assets, and to redistribute opportunities, increasing urban prosperity and quality is necessary to resolve the multifaceted problems of deprived urban areas on all its types, economic, social, or environmental.

12.2.2 Barosio, Eynard, Marietta, Marra, et al. [1]

As Barosio, Eynard, Marietta, Marra, et al. in their paper published in 2016 concluded, the evolution of planning tools and approaches and cities faced complex challenges. These challenges were addressed as physical measures that range from built-environment improvements to environmental actions. These measures include all those interventions that will improve the environment, creating visual attractiveness of towns and cities and ensuring more efficient use of land through new construction, renovation, and maintenance projects.

In their work, Barosio, Eynard, Marietta, Marra, et al. highlight the differences between urban renewal and urban regeneration, which are often used as synonyms.

The renewal includes also the development of transport infrastructure, car parking and public transport facilities, and road policies, which will incorporate environmental concerns, such as energy, quality of land, food system, agricultural demands, and use of water systems and mineral resources.

The transition to a low-carbon economy will bring about a lot of brownfield territories that will need to pass through a regeneration process and encourage new urban development.

12.2.3 Roberts Peter, Sykes Hugh, Granger Rachel [3]

Peter Roberts et al. point out in their paper published in 2000 that this is a very little understood phenomenon and needs more inspiration to provide insights and provocations. Moreover, he mentions that it is important to emphasize that there is no one recommended form for urban regeneration practice and no unique theoretical explanation that can be used to analyze all urban dilemma and develop appropriate solutions. Thus, it transpires that the process of urban regeneration must emulate the local particularities that define the area.

The author tried to provide a perspective on the reasons for the emergence and persistence of identified urban problems, and the successive changes that may occur in the theory, practice, and lessons of good (or bad) practice of urban regeneration.

He acknowledges that a complete treatment of an identified situation cannot be determined. In his book, the indication is, that the approach to be taken within is a dynamic one; the evolution during the regeneration routine depends on the results of the action carried out immediately before it determine with no doubt the course to be followed as well as the outcome.

Within the Just Transition to a low-carbon economy, the proceedings for renewal have to be continuous, so the regeneration process will provide permanent solutions, taking in account the priorities, capacity, and available resources.

Cities as well as urban areas are complex and dynamic systems, are centers of political power, and determine and reflect the physical, social, environmental, and economic status of the area to be studied.

Urban regeneration turns up as a response to the downfall occurred within a just transition process, concluding to an appropriate implementation response.

Urban regeneration must be a proactive process to modernize the old but also to avoid an emerging problem.

12.2.4 Nae Mariana [2]

Like Peter Roberts et al., Mariana Nae considers that urban regeneration should be interpreted in a comprehensive way, in full concurrence with the region metamorphosis. In her opinion, the ordeal of urban renewal process has to be seen as a conglomerate, as the entire image of the whole society should be reflected in it.

The author asserts that the process involves mostly the evaluation and transformation of abandoned industrial areas, the brownfields sites, to the point of sketching new and agreeable habitat, and thus recovering its appearance so it can captivate new enterprises and society.

Territories are dynamic and sensitive to socioeconomic transformations; the rehabilitation of an abandoned industrial area becomes a subject of these changes, under the influence all economic opportunities. Socioeconomic transformations are induced by economic crises, restructuring, de-industrialization, or urban decline,

combined with aggravation poverty and social marginalization, unemployment, delinquency, etc.

Territorial regeneration processes are intricate and influenced by socioeconomic factors. They are endogenous in nature, focused on industry and crafts, and they need to be understood as being linked to spatiality, susceptible to history, change, conflicts, and contradictions.

In this context, urban regeneration should investigate the territories subject to Just Transition, from more than one perspective, and create new capacities to increasing the attractiveness for all fields of the low-carbon economy.

Territorial attractiveness represents the articulation of the notions of competitiveness, territorial marketing, and territorial offer, having as finality cultural regeneration.

The author considers culture to be a tool for territorial development; all the actions and programs concerned identify the normalization of regeneration instruments, whether they are flagship instruments, cultural districts, or cultural clusters, and museums have become instruments of cultural regeneration.

12.2.5 Juan Rubio del Val [5]

As the author mentions in this paper, it is important to find the equilibrium between the recovery of the constructed sites and the adding new feature, and this process should begin with a multidisciplinary diagnosis that can ensure proper implementation procedures.

In short, the objective of facing the Just Transition process passes though renewal of the degraded areas, stopping in the same time the decay of the infrastructure and, with this, strengthening the social, economic, and territorial cohesion with the specific goal of improving the quality of life of residents.

The goal of restoring and renovating contaminated areas must take into account the current condition, stop the deteriorating infrastructure, and preserve the values while transitioning to a lot more environmentally friendly industry.

The author, in his paper, acknowledges that the process of urban rehabilitation in Zaragoza could not have been carried out without agreeing on the following factors:

- Setting clear goals
- Previous experience
- Collaboration with technical staff, economists, urban planners, social workers, etc.
- Social opinion and proposals of civil society actors
- Political support
- Inter-institutional collaboration

The author finally proposes the development of urban revitalization and rehabilitation processes through a well-defined model in a regulated sector of activity. Thus, he argues that the process of urban regeneration is a minority activity compared to the construction of new buildings, and thus urban regeneration projects, although presenting memorable experiences, are in reality very few globally.

At the same time, it proposes, for the success of the urban regeneration process, finding the balance between the exploitation of the built urban fabric and the incorporation of new constructions, a concept that I consider interesting and worth developing.

As Rubio de Val stated, "The different dimensions – environmental, economic, social and cultural – of urban life are interdependent and the success of urban development can only be achieved through an integrated approach."[6]

Integrated approach means undertaking efforts to renew the cities on physical, social, environmental, educational, and economic development.

These actions cannot take place without the implications of the local society, the local economy and its citizens, the civil society, and the various levels of government. All of the indicated actors will have to contribute to the urban regeneration process generated also by the transition to a low-carbon economy ambit.

12.2.6 Ștefănescu, Mihaela Weitere Beteiligte: Bălan, Lidia-Lenuța; Radu, Laurențiu [6]

As the authors point out, the European Environment Pact has a fundamental and strategic role to play in promoting the goal of climate neutrality and includes a set of legislative and non-legislative actions, proposals, and initiatives aimed at regulating key areas such as environmental protection, climate change, energy, industry, transport, agriculture, digitization, and the financial sector. The European Green Pact sets out plans and actions to limit the effects of climate change in a relatively short time and to enable the adoption of policies conducive to a just transition to a green economy.

The paper presents the paradigm shift of natural disaster management, by transforming the challenges into new opportunities to adapt measures at the level of all sectors of activity, targeted by it.

According to the authors, funding for the transition to a just and inclusive green economy will be ensured by:

- Greening the national budgets of EU states, respectively.
- Better integration of environmental aspects into the financial accounting system, with regard to environmental protection revenues and expenditures, the creation of fiscal reform programs to eliminate fossil fuel subsidies, the encouragement of aid priorities and initiatives; state on environment and energy.
- Making investments in the modernization and refurbishment of equipment.
- Supporting research and innovation; encouraging the citizens of the European Union to use private and public infrastructure in conditions of hygiene, accessibility, and health.

[6]RUBIO DE VAL, Juan 2013, p. 275.

- Decarbonization of the energy field.
- Improving the energy efficiency of buildings.
- Exchange of best practices and international collaboration in the field of climate change.

All the measures presented by the authors are characteristic of an urban regeneration process, which should also ensure the implementation of actions leading to low-carbon emissions, as well as an integrated urban regeneration process.

12.2.7 Mario Pianta, Matteo Lucchese [4]

The transition to climate neutrality is also favored by investments that improve the quality of life and combat energy poverty. All investments should confer actions that will develop low-carbon procedures (2050) and, as such, achieve the set environmental targets.

Climate change policy aims at a just and inclusive transition, as the authors identify that the Green Deal is short of the vision to achieve a just low-carbon economy for Europe. Accessible resources are insufficient to be able to attain the specified objectives, along with the limitations of the implementation's tools.

As the study shows, production systems will have to adapt to be carbon neutral, and in order to achieve this goal, "green" industrial policies must be established, which must take into account the environment as well as the reconversion of territories; in other words, it must provide for an integrated process of urban regeneration in the context of the transition to a low-carbon economy.

12.3 Methodology

Several stages of research methodology have been taken in order to ensure the increase of available information to present the situation in a clear manner, in relation to examples of good practice and the existing relations between correspondents.

The research methodology is aimed at integrating the analyses performed on the European legislative aspects and the existing good practices in the analyzed activity sectors.

Through the proposed qualitative and quantitative analyses, it was possible to identify the characteristics that can facilitate the transition process.

These analyses were performed in the following stages.

Stage I: Thematic Documentation
This stage is intended to analyze the technical documents in order to determine the current state of the existing situation at the level of the studied territories.

Specific actions were envisaged:

- Analysis of the European and national legislative framework
- Consultation of stakeholders

The main conclusions concerned the need for a European instrument to promote sustainability at local level as well as the need to operationalize sustainable development through cross-sectoral collaboration in the field.

Stage II: Qualitative and Quantitative Analysis
During this stage, the data for determining the potential for a just transition were analyzed, the challenges associated with just transition versus urban regeneration were taken into account, and relevant existing good practices at European and national level have been identified.

Stage III: Elaboration of Proposals
Within this stage, the actions were aimed to integrating findings resulting from the qualitative and quantitative analysis in the elaborated proposals considered; it tried to provide answers on the specificities of the relationship between just transition and urban regeneration and identification of best practices in the field.

12.4 Analysis/Results Interpretation

The transition to a low-carbon economy, based on restructuring processes in energy-intensive industries, is underway in Romania. Electro-intensive industrial sectors were restructured such as steel production in Galați, fertilizer production in Mureș, oil and gas extraction and refining in Prahova, and coal extraction and coal-fired energy production in Hunedoara, Gorj, and Oltenia, as well as other heavy industries that were gradually eliminated, such as the production of fertilizers in Dolj and the manufacture of steel in Hunedoara.

The stakes of urban regeneration become important in the process of Just Transition, given that this process has some peculiarities regarding the processes of physical degradation of the built environment, but also in other aspects of social and economic nature.

In the process of urban regeneration, development programs have been promoted to help this process. Although the idea of a just transition did not exist at the time they were introduced, it became essential given the need to address climate change and the European Union's development goals. For instance, in the UK, "ABI (Area-Based Initiatives) system has been promoted and has become one of the main tools and policies available to governments to start the regeneration process, included in urban community initiative-focused approaches."[7]

[7] NAE, MARIANA 2015, pg 16.

Practically, the programs and stakes of urban regeneration have materialized not only in revealing some peculiarities regarding the processes of physical degradation of the built environment, but also in other aspects of social and economic nature.

12.4.1 Just Transition in Romania

The idea describes the impact of the transition to climate neutrality in the context of the PNIESC 2021–2030, through which Romania is pitching in to achieve the EU energy and climate targets for 2030 and climate neutrality in 2050.

Within the objectives to better the climate change is to provide policies that can cope with the social, employment, economic, and environmental effects; thus, there is a need for rethink the long-haul strategy to regenerated and sustainable territories.

The transition to climate neutrality also requires the decarbonization of the industrial sector and new blueprints and procedures to primarily reduce the intensity of emissions approved by PNIESC. Industrial emissions are concentrated in Galati, Prahova, and Mures counties. Thus, of the total emissions at national level in 2020 (Annex 1, Table 3, cf. ANPM), 26% represents the share of emissions related to the production of steel, ammonia, nitric acid, and fuels in these counties.[8]

The measures to be promoted must be mainly integrated, interconnecting the economic-productive dimension with aspects related to the circular economy, territorial regeneration, and creation of new sustainable jobs.

12.4.2 The Present Situation in Prahova County

Like many regions with high potential for endowment with natural resources in Europe, Prahova County has developed around their capitalization and diversification of production focused on these resources of oil, natural gas, forest resources, etc.

Villages, towns, schools, hospitals, and cultural centers were built to accommodate Romanians and foreigners who came to work in mines, refineries, and oil fields in the second half of the nineteenth century, so that when predominant industries of this type are in decline, what is left behind is an extraordinary challenge in terms of economic development.

Prahova County has traditionally had an industrial economy. The share of industry in terms of turnover in total economic activity is approx. 53%, and within the industrial activities, the main shares are held in the extractive industry, crude oil processing and coal coking, etc.

[8] Just Transition- 2021RO16JTPR001 – https://mfe.gov.ro/wp-content/uploads/2022/07/8b2b2dc3b86f1eba94fb8ca851b60543.pdf.

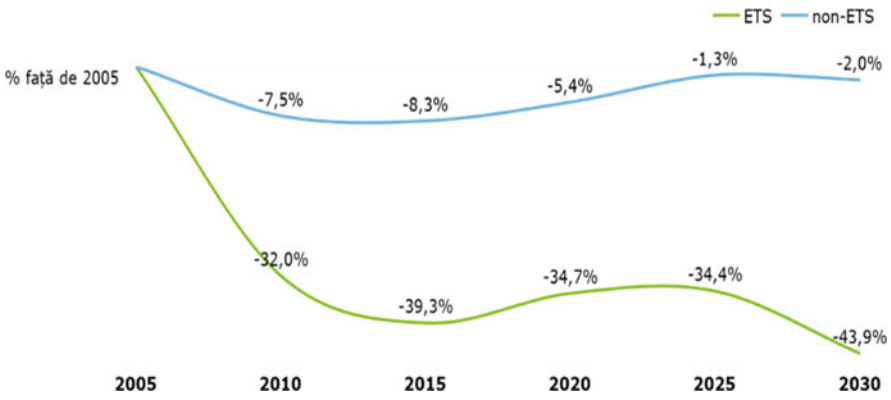

Fig. 12.2 Historical and expected evolution of emissions from the sectors ETS și non-ETS. (The values of the emissions correspond to the forecasts elaborated during December 2018, according to the PNIESC Project; by the final months of 2030, the emissions are set to diminish due to energy consumption levels; Source: Ministry of Environment, based on Deloitte calculations Romania's reporting on GHG emission 2018)

The mechanism for a just transition for Prahova County will focus on the areas that still depend on fossil fuels within the industrial processes.

The necessity to reduce GHG will eventually lead to a breaking point for employment within the sectors of the economy that emit large amounts of greenhouse gases. These sectors should be in decline. There should be identify technological alternatives to its high-carbon processes in order to maintaining economic production, reducing the GHG encouraging a low-carbon technological reconversion etc.

The territories selected for intervention will be chosen from the territories where the negative effects of the transition at economic and social level are strongest, especially in terms of estimated increase of unemployment in the process of transformation of production processes and industrial installations with the highest GHG emissions in Prahova County.

The PNIESC approved by the European Commission in 2020 allocates 50% reduction of GHG emissions compared to the level from 1990 to 2030, which translates into a goal of GHG reduction of 2% compared to 2005.[9]

The evolution of the reduction of GHG emissions compared to 2005 for the EU ETS and non-EU ETS sectors according to the evaluations from PNIESC is presented in the graph below (Fig. 12.2):

The economic structure is dominated by industrial activities. The largest share in industrial production is held by the oil processing industry, followed by food, beverage, and tobacco industry, machinery and equipment, chemical and rubber processing, mining, textiles and clothing, metallurgy, construction, metal and metal

[9] PNIESC 2021–2030, p. 46.

products (except equipment, machinery, and installations), wood processing (including furniture), and pulp, paper, board, and polygraph.

The EU's integrated policy on climate change and energy believes that if the growth of global temperature stays below 2 °C (preferably below 1.5 °C) compared to pre-industrial level, this will not risk numerous, dangerous, and unpredictable changes, which could lead to an exponential increase in adaptation costs compared to the costs of intervening and slowing down this phenomenon. To achieve this goal, the European Union has developed the European Green Deal package, and for areas whose industry is dependent on fossil fuels, the EU has developed the Just Transition Mechanism with the stated aim of supporting these areas to create policies that could ensure transition to a climate-neutral economy. Prahova County is part of the list of counties from Romania benefiting from the Just Transition Mechanism and can benefit from these funds.

The historical pollution with petroleum products still makes its presence felt in the county. Currently, there are a number of 11 contaminated sites that need restoration: 3 contaminated sites (2 deposits of phosphogypsum, Valea Călugărească, 1 of pyrite ash Valea Călugărească), 7 potentially contaminated sites (from the mining industry), and an abandoned orphanage site (oil waste battle, Vega Zone).

12.4.3 The Affected Territory for a Just Transition, in Prahova County

The territory affected for a just transition in Prahova County are the mining areas Filipești Târg and Ceptura, as well as the workers from these areas; the former industrial areas that are characterized by potentially contaminated sites owned by public administration are:

- Ploiești – Batal Orfan
- Ploiești – Tarlaua T14 Parcela 228
- Ploiești – Triaj – Rafinaria Astra Romana
- Ploiești – Nord – Batal reziduri petroliere Rom Petrol
- Breaza – Statie alimentare carburanti
- Boldesti Scaieni – Statie de tratare si epurare a apelor uzate
- Boldesti Scaieni – Parc 573 Gageni – sonda 38 UN Boldesti – OMV PETROM
- Boldesti Scaieni – Parc 669 Boldesti – OMV PETROM
- Comarnic – Statie alimentare carburanti
- Campina – batal BUCEA – batal gudron acid – Rafinaria Steaua Romana
- Campina – batal Turnatorie – batal gudron acid – Rafinaria Steaua Romana
- Campina – batal Lacul Pestelui – batal gudron acid – Rafinaria Steaua Romana
- Valeni de Munte – halde de steril, iazuri de decantare
- Baicoi – Valea lui Dan – depozit deseuri
- Poiana Varbilau – Tarlaua 36 – Statie alimentare carburanti
- Ceptura – Cariera Malu Rosu – extractie de carbune inferior
- Ceptura – Caciera Ciucur– extractie de carbune inferior

– Filipesti de Padure – Cariera Valea Grecilor – extractie de carbune inferior
– Filipesti de Padure – Cariera Voiculet – extractie de carbune inferior
– Filipesti de Padure – Mina Cervenia – extractie de carbune inferior
– Filipesti de Padure – Cariera Ulioaia – extractie de carbune inferior
– Filipesti de Padure – Mina Palanga Sud – extractie de carbune inferior
– Valea Călugărească – Batal fosfogips
– Valea Călugărească – Depozit cenusă de pirită

These proposed territories, extended to localities with potential for economic development and possibilities of professional reconversion to the developed area from an agricultural point of view, at a more detailed analysis reiterated the need to consider the whole Prahova County, for the following reasons. In this county, CO_2 emissions have a complex context determined by the higher degree of industrialization.

The two of the top ten CO_2 pollutants in Romania are located here, namely, the Petrobrazi oil refinery and the Brazi NGCC power plant.

Integrated urban planning, which ensures urban regeneration and sustainable development based on an industry that leads to the reduction of carbon emissions, must be done through a process that is adaptable and integrated, defined by its capability to harmonize its objectives defined by the local community, in relation to the concerns of urban actors.

12.4.4 The Economic Situation in Prahova County

The population of the county was 789,935 inhabitants in the middle of 2019, of which 401,464 inhabitants were in the urban area, with the number of individually

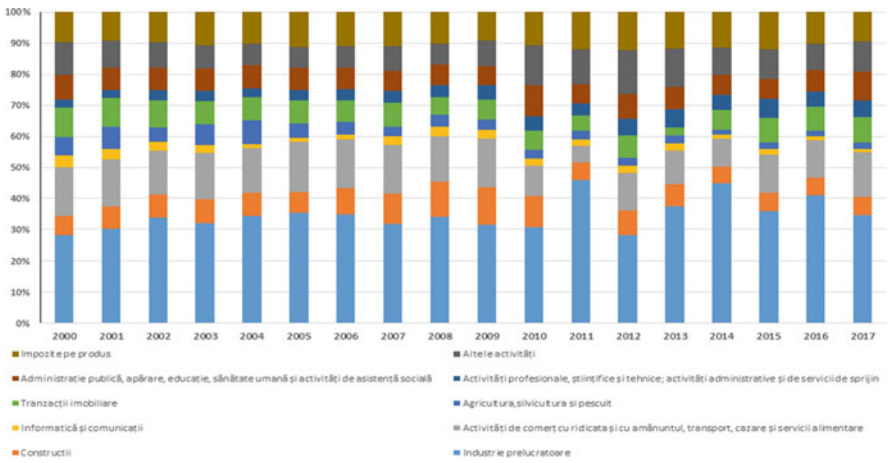

Fig. 12.3 The structure of the gross domestic product of Prahova County. (Source: INS, Eurostat)

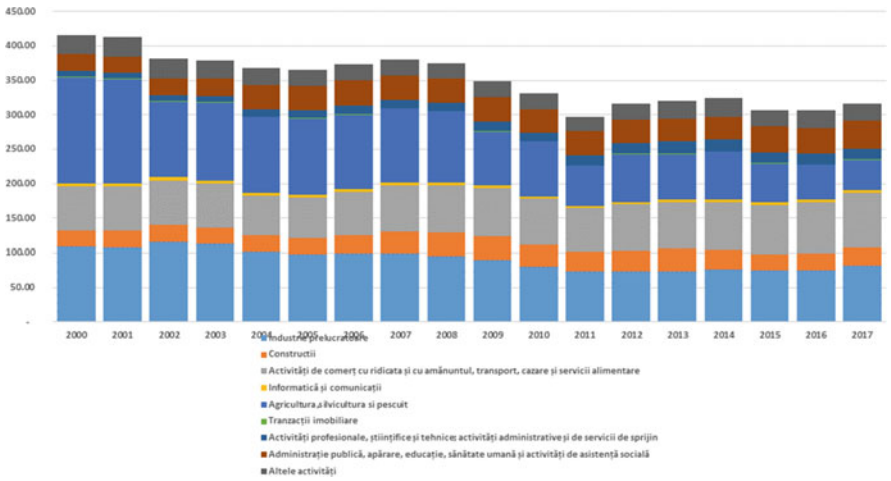

Fig. 12.4 Evolution of the number of employed persons in the economy of Prahova County by main activity sectors (thousand persons). (Source: INS, Eurostat)

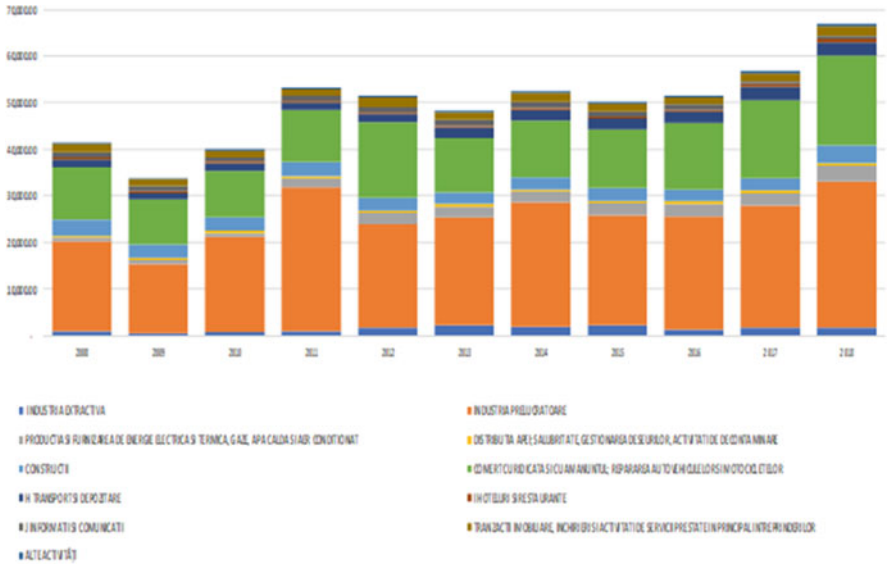

Fig. 12.5 Evolution of turnover from industry, trade, and services in Prahova County. (Source: INS, Eurostat)

concluded employment contracts being 512,724. The unemployment rate stood at 2.6% in 2018, lower than 3.3% nationally. The county GDP in current prices was 33.4 billion lei in 2017. The GDP per capita is 9% higher than the national average.

Regarding the comparison with the EU average for GDP per capita, the county's GDP per capita is 34% in 2017, compared to 20% in 2006.

Figure 12.3 shows the structure of the gross domestic product of Prahova County on the main sectors for the period 2000–2017. Figure 12.4 shows the evolution of the number of employed persons (employees, employers, and self-employment) in the economy of Prahova County for the same period as Fig. 12.3. Figure 12.5 shows the evolution of total turnover for industry, trade, and services in Prahova County for 2008–2018.

From the corroborated analysis of the above graphs, we have the following conclusions:

1. The main sectors of activity, both as a share in GDP and as a share in turnover, are the manufacturing industry and the wholesale and retail sector.
2. Agriculture has a significant share in the employed population, but as a share in the county's GDP, it is insignificant.
3. A 10% reduction in staff in the manufacturing industry leads to a 3.4% reduction in staff employed in trade.
4. The 10% reduction in gross value added has the effect of reducing the gross value added in the trade sector by approximately 4.5%.

An integrated approach is also needed to optimally address all local community issues, focusing on a synergy of all elements of integrated development. At the European level, it is considered that development can be defined as integrated, if the following areas are addressed simultaneously: urban physical infrastructure, economic and social.

12.4.5 Main Directions of Economic Development in Prahova County for an Integrated Urban Development in the Context of Reducing Carbon Emissions

Obviously, the problems identified in the relevant cities and communities are becoming a challenge for the authorities, so urban planning must be considered a fundamental tool for urban development and effective community management.

Prahova County, in light of economic activity pollutants that take place in the territory, can follow the following directions of economic development:

- Highlighting the natural potential in the northern part of the county having as poles Prahova Valley, Slănic, and Văleni de Munte – the key possibly with emphasizing the green character on the last two by promoting electric transport, using only renewable energy, valuing agricultural resources and forestry in the area.

- Development of the agricultural potential of the county by supporting the creation of value chains based on organic agriculture – the connection between the agricultural potential and the enhancement of the tourist and natural potential.
- Development of land degraded or occupied by landfills by afforestation or for cultivation, if possible, of renewable energy resources.
- Covering with sewerage and water treatment systems of all localities of the county by emphasizing the subdivision to allow access to SMEs in the county to these works. Most companies in Prahova County have up to 50 employees.
- Technology transfer and research center for GHG use technologies for the production of usable chemicals. This will allow, if desired, the implementation in production to companies that need transformation, thus preserving jobs.
- Technology transfer and research center for the production of green hydrogen from vegetable waste from agriculture, waste from livestock farms, and municipal waste.
- Development of CO_2 capture and green mass production capabilities using bio-reactors for use in either aquaculture or as a resource for hydrogen production.

Through a process of sustainable urban regeneration linked to the process of Just Transition, sustainability is ensured for the whole society with adequate indicators to measure actions of value to the community and the evaluation of the measurement, providing manageable information units and supporting us in taking decisions.

12.5 Conclusions

The process of urban regeneration is a complex one, as it must address multidimensional targets that address the challenges of urbanization, urban sustainability and climate change, innovation, and digitalization and succeed in addressing increasingly pressing social challenges in the regions and cities in Romania.

After identifying the opportunities and actions needed to complete the Just Transition process correlated and integrated with the urban regeneration process, it is necessary to develop a strategy to turn into actions.

In particular, it becomes necessary to identify projects that, through consultations with the support of all local actors, must place in a strategic context complex investment that are decisive for the urban regeneration of the study area, emphasizing the connections between them and the need for different coordination.

Support infrastructure and future investments that are missing need to be made to maximize the benefits created by these projects.

The aim of this chapter is also to create a complete and inclusive understanding of the Just Transition process integrated with the urban regeneration process.

The process will it should be transparent to have legitimacy as well as its support by local actors and not only.

Urban regeneration aims at revitalizing urban areas in difficulty, improving living conditions, arranging public space, offering sustainable solutions for urban mobility, increasing the quality of life, etc.

The process of rebirth of the built heritage, along with the transition to a low-carbon economy, helps in ameliorating the quality of life and the environment for the benefit of the citizens and in neutralizing climate change. Invigorating the urban strength for regeneration becomes the mission of the transition process to a low-carbon economy, reducing effects of climate change and environmental disasters.

Therefore, in order to achieve the proposed goals of sustainability and climate protection, "green" industrial policies should be adopted that provide for an integrated urban regeneration process in the context of the transition to a low-carbon economy.

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Chapter 13
Analysis of Changes Induced by the COVID-19 Crisis in the Structure of Daily Electricity Consumption

Diana-Mihaela Jula

Abstract In this chapter, we analyzed, for Romania, the evolution of the hourly structure of electricity real consumption, over the period 2006–2021. In order to estimate the magnitude of the SARS-CoV-2 pandemic impact on the dynamics of average daily electricity consumption, we used, as counterfactual, the forecasts constructed through SARIMAX type models. We evaluated the impact of the coronavirus on energy real consumption between March 2020 and December 2021 and found that the effects are differentiated both by hourly intervals and time periods. For 2020, the outcomes of the econometric models show that the statistical criteria support a hypothesis according to which, during the state of emergency and with the exception of time slots from 8:00 to 10:00 a.m. and 7:00 to 8:00 p.m., at the beginning of the state of alert, the COVID-19 crisis induced the decline in the hourly electricity real consumption. In the summer of 2020, consumption increased but fell again in winter. In 2021, except for the autumn months, electricity consumption was higher than the pre-crisis values, for all hourly time intervals.

Keywords Electricity real consumption · Hourly profile · COVID-19 crisis impact · SARIMAX model · Counterfactual analysis

13.1 Introduction

As the main objective of the chapter, we aimed, first of all, to identify the patterns of hourly electricity consumption profiles for Romania, over the period 2006–2021. Then, starting from these analyses, we focused on the changes induced, in the respective profiles, by the COVID-19 crisis.

As a global assessment, we mention the finding of the International Energy Agency (IEA), according to which, although the COVID-19 pandemic has severely affected the global energy system (energy use down by 4% in 2020 and only in 2021

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reached the pre-pandemic level [12]), however electricity uses down by only 1% [11, p. 195]. On the other hand, Lazo, Aguirre and Watts (15, p. 5) and Au et al. [3, p. 7] state that both total energy demand and electricity consumption can be considered as indicators of the economic situation as a whole.

With regard to the profile of electricity consumption, the IEA notes that, in some countries, the COVID-19 crisis has pushed the hourly electricity consumption pattern from weekdays to a Sunday-specific structure [9, p. 23]. On the other hand, as positive effect, with lockdown measures, the share of energy from renewable resources in total energy generation increased, across all major world regions [10].

By Decree no. 195/2020 [22], the state of emergency was established from Romania (the decree was approved by the Decision of the Romanian Parliament [22]). The state of emergency has been extended by Decree no. 240 of the President of Romania [23]. By Law no. 55 [21], the state of alert was established at national level, so the measures from the state of emergency were gradually relaxed.

The state of alert has been extended by government decisions given at 30-day intervals, until the beginning of March 2022. The measures adopted during the COVID-19 pandemic have affected the evolution of most economic and social activities.

In this chapter, we analyzed the effect of the coronavirus on real electricity demand in Romania. To evaluate the effect of the pandemic on hourly structure of electricity consumption, counterfactual values were calculated, through a SARIMAX type models.

13.2 Literature Review

The recent economic literature lists many articles concerning the impact of pandemic on electricity markets. For example, Lazo et al. [15] examined a selection of 106 articles and reports from international institutions, published from the beginning of 2020 to the end of May 2021. Their main conclusion is that there is a widespread consensus in literature that the SARS-CoV-2 has induced a decrease in electricity demand [15, p. 3]. The decline in energy demand is influenced by the severity of the pandemic, the intensity (duration and stringency) of lockdowns (full or partial lockdowns, severe or less restrictive measures), the economic structure (the share of different sectors in the countries' economy), other national and regional features, disruptions of supply chains, the presence of economic and social crisis, and so on.

Abulibdeh [1] demonstrated, through a spatial modelling, that in COVID-19 pandemic time, the electricity demand dropped in commercial sectors and increased in the residential sectors (p. 8). Agdas and Barooah [2] examined the electricity market in the United States during the pandemic crisis and found that there was no clear reduction in global electricity demand (the reduction in demand for commercial buildings is offset by the increase for residential ones). Au et al. [3] analyzed the effects of legislation adopted to minimize the spread of coronavirus on electrical

consumption in the state of Pennsylvania and identified a descending trend from electricity demand, due to decrease in commercial consumption.

For China, Lu et al. [16, p. 43] noticed that the pandemic strongly affected the production of energy from traditional sources, in particular due to stoppages in the production of raw materials (e.g., coal).

Soava et al. [24] analyzed, for Romania, the effect of pandemic crisis on relationship between GDP and electricity consumption. Despite the fact that the quarterly data series are nonstationary, the authors applied Granger causality tests for these nonstationary data series and built several linear regression models with the respective (nonstationary) data series. Under these backgrounds, the authors identified a strong positive relationship between the (logarithm of quarterly nominal) GDP and quarterly electricity consumption, during the 2007–2020 period ($R^2 = 0.96$), and they found (doubtless!) that the SARS-CoV-2 has negatively affected both GDP and electricity consumption. Iancu et al. [8] analyzed Romania's GDP dynamics correlated with electricity consumption and found that there is no relationship between 2008 and 2012 but a positive connection between 2013 and 2020 (including in times of crisis).

In a previous study [14], we analyzed the effects of the pandemic on electricity consumption in 2020. We found [14, p. 171] that electricity consumption has fallen sharply during March to August and return to normal value, since August.

Concerning the hourly patterns, Nguyen and Le [19] analyzed hourly electricity demand in the city of Helsinki and observed that the within-day volatility of electricity demand was smaller in summer and bigger in winter. Within the week, the electricity consumption is lower in the weekend, and within the year, they identified a decreasing trend between January and June and an increasing trend since July. During the COVID-19 crisis, Bover et al. [4, p. 3] identified for Spain declines in commercial electricity consumption and increases in that of households. But at the beginning of the COVID-19 period, for the United States, residential demand did not offset the decline in commercial demand [3]. As hourly pattern, peak consumption was reached at 6:00 p.m. (before the pandemic crisis, consumption peaks were at 9:00 a.m. and 7:00 p.m. [3, p. 6].

13.3 Data and Methodology

To estimate the dynamics of the hourly structure of electricity consumption, between 2006 and 2021, we used Electricity Real Consumption Data taken from *Transelectrica* site (https://www.transelectrica.ro/web/tel/387). *Transelectrica* is the Romanian electricity transmission operator. The available data concerning real electricity consumption are from 2006 to 2021. Between 2006 and 2020, the data are with hourly frequency, and from February 2021, the frequency is at 15 min. We constructed data with an hourly frequency, from February 2021 to December 2021, by calculating the simple arithmetic mean of the values recorded with a frequency at 15 min.

Since March 2020, electricity consumption has been influenced by the sudden onset of the COVID-19 crisis. We consider that between 2006 and February 2020, the electricity market showed a normal functioning, so these data are used to estimate the SARIMAX models. Through these models, we have built hourly forecasts of real electricity consumption and used them as counterfactuals for the consumption during the crisis.

We accept that during the crisis period, the differences between the values calculated as counterfactual and the registered values are mainly due to the COVID-19 pandemic. The SARIMAX model for y_t time series is as follows [13]:

$$\phi(L)\Phi(L^s)(1-L)^d(1-L^s)^D y_t = \theta(L)\Theta(L^s)e_t + \sum_{i=1}^{k} a_i x_{it} \qquad (13.1)$$

where $\phi(L)$ denotes a polynomial of order p in L lag operator for the non-seasonal autoregressive part of the model; Φ is the polynomial of order P, for the seasonal autoregressive part; θ and Θ are polynomials of order q and Q, respectively, for moving average parts of the model; s is seasonal length; d is the order of non-seasonal differentiation (integration); D means seasonal differencing; e_t is the error term (with zero mean, independent and identical distributed values); x_i are the k exogenous variables; and a_i are the model coefficients. Akaike Information criterion (AIC) is used to automatically select among all the combinations of the lag orders p, d, q, P, D, and Q.

Elamin and Fukushige [5] employed the SARIMAX models with interactions variables (weather, intraday, calendar, seasonal) to estimated hourly load demand in Japan, and they obtained that these models are better than others. Also, SARIMAX models were used by Nontapa et al. [20, p. 1353] when they analyzed the monthly datasets of the electricity consumption in Thailand. Authors demonstrated that SARIMAX model (with Artificial Neural Network decomposition) performed well, as compared with other methods. McHugh et al. [17] used the SARIMAX model to forecast day-ahead electricity prices. Eskandarnia and AlHamad [6] predicted energy consumption by using, the same, SARIMAX models, with data from Low Carbon London project.

Tarsitano and Amerise [25] forecasted hourly electricity load for Italia, through a two-stage-SARIMAX type technique. Ferré et al. [7, p. 21] forecasted short-term electricity price and revealed that SARIMAX models make good predictions (as compared with Holt-Winters, SARIMA, and Markov Switching Regimes models).

13.4 Econometric Models

First, we tested the stationarity of the time series concerning hourly electricity real consumption. The ADF tests reject the unit root hypothesis, and KPSS tests do not reject the hypothesis of stationarity, at the 1% level, for all hourly time series (Annex). Therefore, we accept that all series relating to hourly electricity real consumption are stationary.

For 15 out of 24 time intervals, the automatic procedure for selecting the number of lags identifies SARMAX(1, 0, 1)(1, 0, 1)$_{s=7}$ models, as the following:

$$\begin{aligned}(1-\varphi_1 L)\left(1-\varphi_7 L^7\right)(\text{time slot})_{i,t} &= (1+\theta_1 L)\left(1+\theta_7 L^7\right)e_{i,t}+ \\ &+a_0 + a_1 \cos\left(\frac{2\pi}{365}t\right) \\ &+\text{dummies(month, weekday)}\end{aligned} \tag{13.2}$$

For the time intervals between 06:00 and 9:59 a.m. and 12:00 and 4:59 p.m., the models selected are of the type SARMAX(1, 0, 1)(1, 0, 0)$_{s=7}$, i.e., compared to the previous model, it is not SMA [7] component selected.

In the above equation, i is the index for the 24 time intervals, from 12:00 – 12:59 a.m. to 11:00 – 11:59 p.m. (i.e., we have 24 different models); dummies (month, weekday) are 12 (months) × 7 (days) = 84 dummy variables introduced in each of the 24 models; and cos(.) variable is for annual seasonality.

Each of the 24 models is estimated for more than 5000 daily observations (between 2006 and February 29, 2020). The coefficients of the models are significant at the 1% level, and all the R-squared coefficients are around 0.90. The estimated values through SARIMAX models are used as counterfactuals in order to evaluate the COVID-19 impact on hourly electricity real consumption.

13.5 Results and Discussions

If SARIMAX forecasts are taken as counterfactual data, then for the whole period of March 16–December 31, 2020, hourly electricity real consumption decreased compared to normal consumption (see Fig. 13.1).

But the hourly consumption decline was not uniform (see Fig. 13.2): between 9:00 a.m. and 6:00 p.m., hourly electricity real consumption did not change significantly from normal values (the decrease is less than −0.7%).

In the other hourly intervals, the electricity consumption decreased, on average, with values between −1.5% and −2%, in the evening and −3 to −4.5%, at night.

These evolutions could be explained by the fact that between 9:00 a.m. and 6:00 p.m., the fall in commercial consumption, as consequence of the lockdown measures, was offset by the increase in household consumption. In the evening and at night, the prohibition of tourist activities, the closure of shops, the reduction of

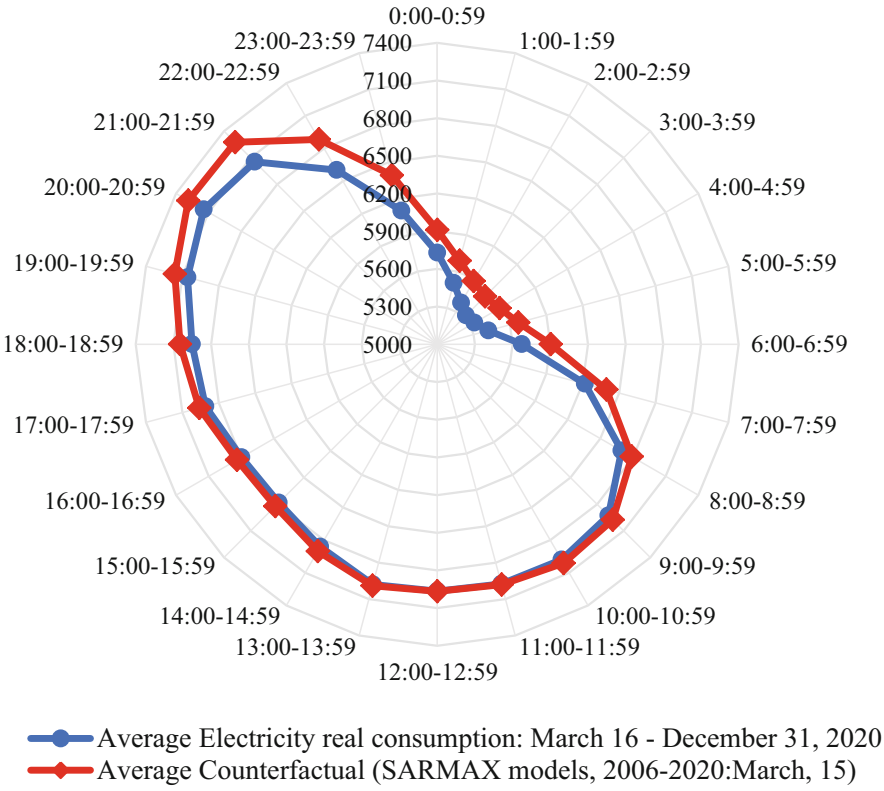

Fig. 13.1 Electricity real consumption (MW) at hourly intervals, March 16–December 31, 2020. (Source: for Hourly Electricity real consumption, Transelectrica, https://www.transelectrica.ro/web/tel/387; for counterfactual data, estimations through SARIMAX models (Based on data from 2006 to March 15, 2020))

opening hours for public-catering establishments, the closure of restaurants and nightclubs, and the prohibition of sports and entertainment activities have led to a decrease in electricity consumption.

The decrease in electricity consumption was not constant not only during the day but also throughout the year. As expected, the biggest drop was recorded during the period when the state of emergency was instituted (March 16–May 14, 2020). The decrease in real electricity consumption was about 8–9% in nighttime, 9–10% during the morning and evening, and over 11% between 2:00 and 6:00 p.m. (see the second column in Table 13.1 and panel A in Fig. 13.3).

Between May 15 and June 30, 2020 (see Fig. 13.3b) and October and December 2020 (see Fig. 13.3d), the decline in hourly electricity real consumption was relatively moderate, especially between 7:00 a.m. and 7:00 p.m. This development is due to the relaxation of prevention measures, amid declining rates of COVID-19

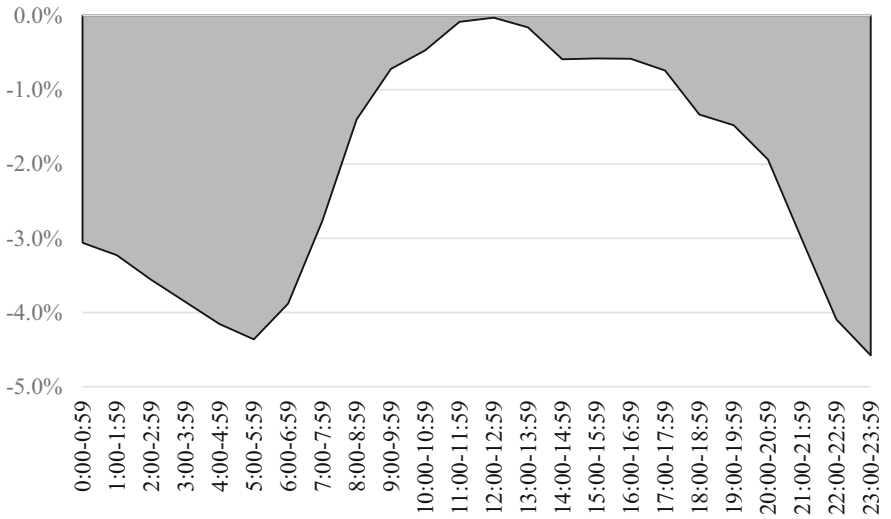

Fig. 13.2 Differences between registered and normal electricity real consumption at hourly intervals, March 16–December 31, 2020. (Source: for hourly electricity real consumption, Transelectrica, https://www.transelectrica.ro/web/tel/387; for counterfactual data, estimations through SARIMAX models (Based on data from 2006 to March 15, 2020))

infection. Moreover, between July and September 2020 (see Fig. 13.3c), the electricity consumption was higher than the forecast values. This dynamic, from the warm season, could be explained by the resumption of most economic activities, including transport, tourism, and HORECA, but also by the intensive use of refrigerators and air conditioners.

In 2021, the vaccination of the population and the decrease of infection rates in the first 8 months of the year led to the relaxation of restrictive measures by the authorities and a lighter approach by the population. These have led to a resumption of economic growth (+5.6% growth in gross domestic product in 2021, compared to 2020, after a drop of −3.7% in 2020, compared to 2019 [18]) and, hence, an increase in electricity real consumption (see Fig. 13.4).

Over the whole of 2021, the average hourly electricity real consumption increased, both compared to 2020 and compared to the counterfactual consumption (SARIMAX forecasts). As hourly dynamics, we found that between 9:00 p.m. and 6:00 p.m., the recorded values of electricity real consumption were slightly higher than those predicted for normal conditions (with about +2%). Instead, between 8:00 a.m. and 5:00 p.m., the average increases were over 6.5%.

The differences between the hourly electricity real consumption and forecasts (counterfactual data) for the entire analyzed period (March 2020 to December 2021) are described in Fig. 13.5.

The increase in energy real consumption was not recorded throughout the year 2021. In September 2021, a decrease in consumption began, which lasted about

Table 13.1 The differences between registered and normal electricity real consumption at hourly intervals, in 2020, by relevant annual periods

Hourly slot	State of emergency: March 16–May 14, 2020	State of alert		
		May 15–June 30, 2020	July–Sept. 2020	Oct.–Dec. 2020
0:00 – 0:59	−8.8%	−4.9%	2.8%	−0.7%
1:00 – 1:59	−9.0%	−5.1%	2.8%	−0.9%
2:00 – 2:59	−9.2%	−5.4%	2.5%	−1.4%
3:00 – 3:59	−9.2%	−5.5%	2.2%	−2.0%
4:00 – 4:59	−9.2%	−5.5%	1.8%	−2.6%
5:00 – 5:59	−9.3%	−6.0%	2.0%	−3.1%
6:00 – 6:59	−10.8%	−3.6%	3.5%	−2.8%
7:00 – 7:59	−10.9%	−0.9%	4.9%	−2.0%
8:00 – 8:59	−9.6%	0.0%	5.9%	−0.3%
9:00 – 9:59	−9.1%	0.4%	6.1%	0.7%
10:00 – 10:59	−9.3%	−0.2%	6.5%	1.3%
11:00 – 11:59	−9.3%	−0.3%	7.2%	1.9%
12:00 – 12:59	−9.5%	−0.6%	7.5%	2.0%
13:00 – 13:59	−10.2%	−0.9%	7.7%	2.0%
14:00 – 14:59	−11.1%	−1.6%	8.0%	1.5%
15:00 – 15:59	−11.4%	−1.6%	8.5%	1.3%
16:00 – 16:59	−11.4%	−1.1%	8.9%	0.8%
17:00 – 17:59	−11.3%	0.7%	8.7%	−0.3%
18:00 – 18:59	−10.8%	1.7%	8.4%	−2.0%
19:00 – 19:59	−9.1%	0.6%	7.6%	−2.3%
20:00 – 20:59	−7.3%	−2.3%	6.5%	−2.8%
21:00 – 21:59	−8.4%	−3.5%	4.3%	−3.4%
22:00 – 22:59	−9.2%	−3.9%	2.3%	−4.0%
23:00 – 23:59	−8.7%	−3.8%	1.8%	−5.0%

Source: Our calculations based on hourly electricity real consumption, Transelectrica, https://www.transelectrica.ro/web/tel/387 and counterfactual data, estimations through SARIMAX models (Based on data from 2006 to March 15, 2020)

3 months. This coincides with the onset of the 5th wave of the SARS-CoV-2 pandemic, the hardest of all that has hit Romania (in terms of infection rate and number of deaths). Economically, according to Romanian National Institute of Statistics, GDP fell in the fourth quarter of 2021 by 0.5% as compared to the previous quarter [18].

Then, energy real consumption increased in the first two decades of December 2021 and decreased during the winter holidays (this is a seasonal feature encountered every year).

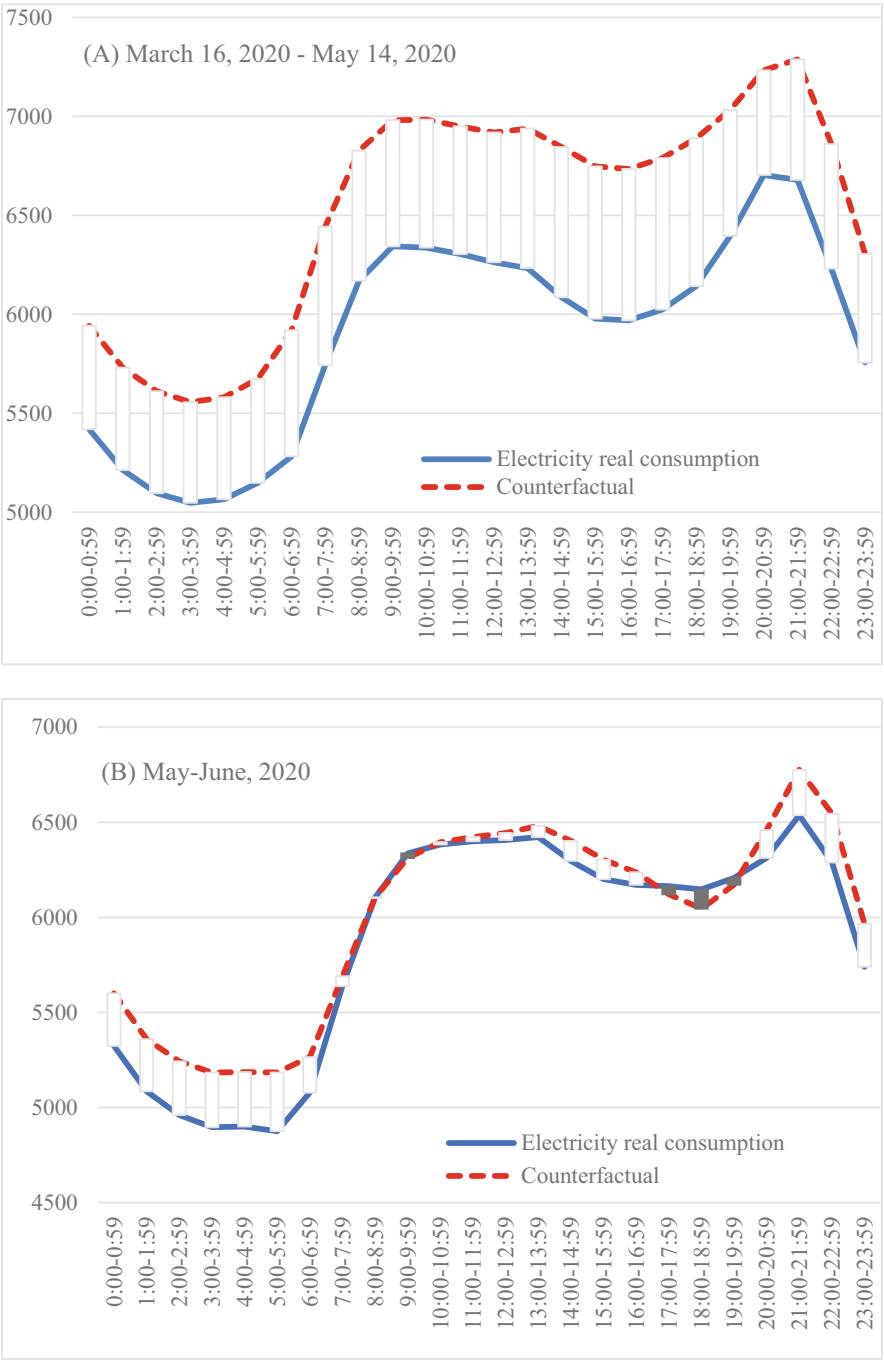

Fig. 13.3 Electricity real consumption (MW) at hourly intervals and counterfactual data, in 2020, by relevant annual periods. (Source: for Hourly Electricity real consumption, Transelectrica, https://www.transelectrica.ro/web/tel/387; for counterfactual data, estimations through SARIMAX models (Based on data from 2006 to March 15, 2020))

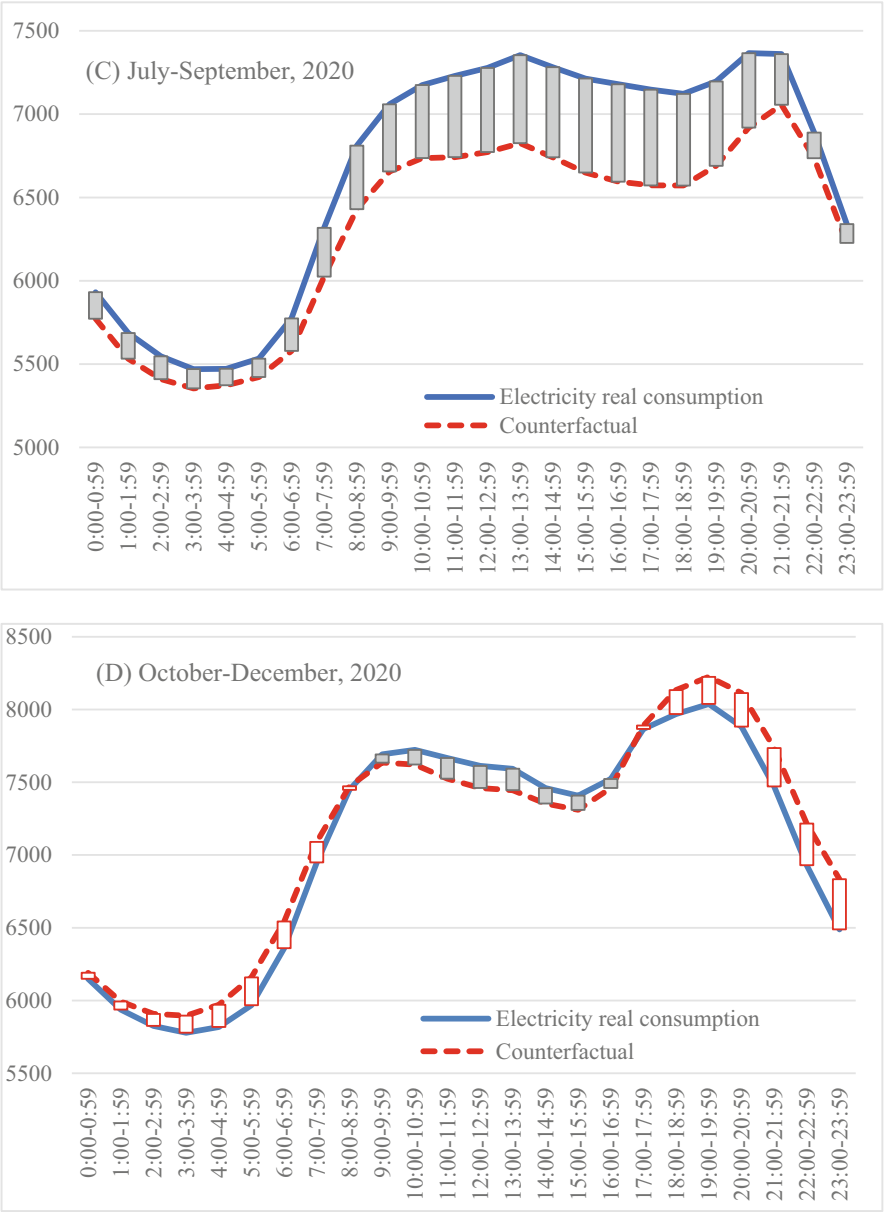

Fig. 13.3 (continued)

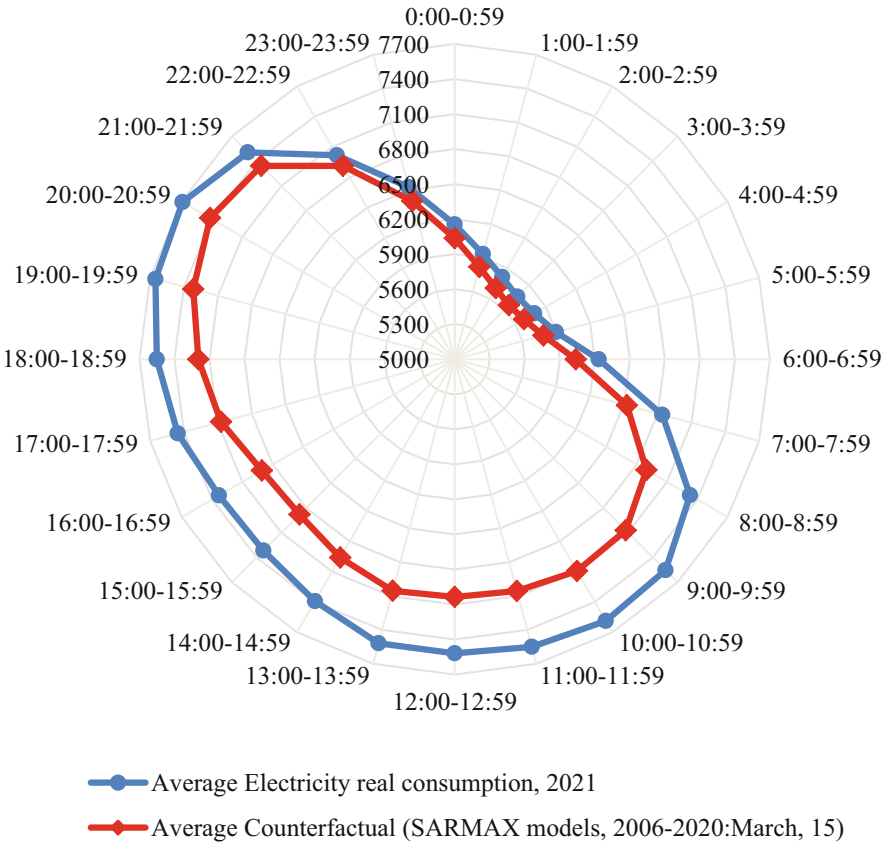

Fig. 13.4 Electricity real consumption (MW) at hourly intervals, 2021. (Source: for Hourly Electricity real consumption, Transelectrica, online at https://www.transelectrica.ro/web/tel/387; for counterfactual data, estimations through SARMAX models (Based on data from 2006 to Feb. 2020))

13.6 Conclusion

We analyzed the impact of the SARS-CoV-2 pandemic on the evolution of real electricity demand in Romania, on hourly intervals. Generally, in most analyses, the statistical data registered in the last period before the onset of the pandemic are used as basis of comparison. But such an approach presupposes the implicit hypothesis that the process does not have its own dynamics. This technique is known as naive forecasting, according to which, without COVID-19, electricity consumption in 2020 would have been identical to that recorded in 2019. To overcome the problem of naive forecasting, we used another technique in order to build values of electricity real consumption, which could have been recorded under normal conditions. These

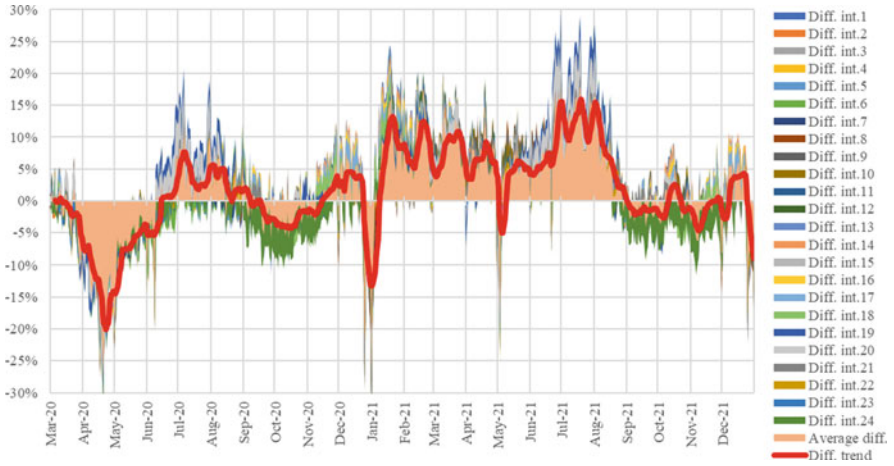

Fig. 13.5 Difference between hourly electricity real consumption and forecasts (counterfactual data). (*Source*: for hourly electricity real consumption, Transelectrica, online at https://www.transelectrica.ro/web/tel/387; for counterfactual data, estimations through SARMAX models)

counterfactual values were generated by means of SARIMAX type models with dummy variables for each month and each weekday. We used a database of over 5000 records for each of the 24 time slots.

We evaluated the effects of coronavirus crisis on energy real consumption between March 2020 and December 2021 and found that the effects are differentiated both by hourly intervals and by time periods. In 2020, as hourly averages, consumption has declined, but the declines are almost insignificant between 9:00 a.m. and 6:00 p.m. (the decrease is between 0 and −0.7%) and relatively low in the evening (less than 2%). Only during the night, the decreases are slightly higher (between −3% and −4.5%). These values were influenced by the particularities recorded in different time periods. During the state of emergency (March 16–May 14, 2020), electricity consumption decreased sharply (by more than −11% between 1:00 p.m. and 7:00 p.m. and more than −9% in the other time intervals).

In the first part of the state of alert (May 15–June 30, 2020), which meant a relaxation of the restrictions, amid declining rates of COVID-19 infection, and for October–December 2020, the decline in hourly electricity real consumption was relatively moderate, especially between 7:00 a.m. and 7:00 p.m.

In warm season, electricity consumption was higher than the forecast values (due to the resumption of most economic activities – including transport, tourism, and HORECA – and the intensive use of refrigerators and air conditioners).

In 2021, the resumption of economic growth (+5.6%) was accompanied by an increase in electricity real consumption, especially in the time interval between 8:00 a.m. and 5:00 p.m. (by more than +6.5%).

In September 2021, a decrease in consumption began, which lasted about 3 months, in the same time with the manifestation of the worst wave of the pandemic

(in terms of infection rate, number of intensive care hospitalizations, and number of deaths).

A major limitation of this research comes from the fact that we do not have data concerning hourly electricity real consumption divided between households' consumption and other consumption. Under these conditions, our assertion that the decrease in hourly consumption during the COVID-19 crisis was slight and that this is due to the offset of commercial consumption by that of households remains only a hypothesis.

ANNEX: Unit Root Tests for Hourly Electricity Real Consumption

Augmented Dickey-Fuller unit root tests (ADF)

Time slot	ADF	Time slot	ADF	Time slot	ADF
0:00 – 0:59	−5.068	8:00 – 8:59	−5.301	16:00 – 16:59	−5.766
1:00 – 1:59	−4.817	9:00 – 9:59	−5.425	17:00 – 17:59	−5.392
2:00 – 2:59	−4.761	10:00 – 10:59	−5.568	18:00 – 18:59	−5.371
3:00 – 3:59	−4.712	11:00 – 11:59	−5.728	19:00 – 19:59	−5.110
4:00 – 4:59	−4.672	12:00 – 12:59	−5.958	20:00 – 20:59	−4.344
5:00 – 5:59	−4.445	13:00 – 13:59	−6.139	21:00 – 21:59	−4.732
6:00 – 6:59	−4.626	14:00 – 14:59	−6.164	22:00 – 22:59	−5.682
7:00 – 7:59	−4.925	15:00 – 15:59	−6.059	23:00 – 23:59	−5.216

Kwiatkowski-Phillips-Schmidt-Shin unit root test (KPSS)

Time slot	KPSS	Time slot	KPSS	Time slot	KPSS
0:00 – 0:59	0.152	8:00 – 8:59	0.089	16:00 – 16:59	0.075
1:00 – 1:59	0.171	9:00 – 9:59	0.096	17:00 – 17:59	0.033
2:00 – 2:59	0.170	10:00 – 10:59	0.109	18:00 – 18:59	0.024
3:00 – 3:59	0.160	11:00 – 11:59	0.133	19:00 – 19:59	0.023
4:00 – 4:59	0.148	12:00 – 12:59	0.153	20:00 – 20:59	0.028
5:00 – 5:59	0.120	13:00 – 13:59	0.150	21:00 – 21:59	0.055
6:00 – 6:59	0.083	14:00 – 14:59	0.131	22:00 – 22:59	0.081
7:00 – 7:59	0.077	15:00 – 15:59	0.110	23:00 – 23:59	0.114

Source: EViews estimation based on hourly electricity real consumption data from Transelectrica, https://www.transelectrica.ro/web/tel/387

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Chapter 14
The Importance of R & D in Reducing CO_2 Emissions from Passenger Transport

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Abstract Improving air quality is one of the objectives of the sustainable development of the European Union Action Plan – toward zero air, water, and soil pollution. According to data provided by the European Environment Agency, although the amount of carbon dioxide emanation from the transport area varies according to the type of transport, it is higher than in 1990.

Innovative technologies have a significant contribution to prevention, respectively, remediation of pollution by reducing the number of premature deaths caused by it, their use making a significant contribution to reducing emissions from the transport sector. Reducing the impact on the environment means allocating significant funds to R & D activities.

In this context, as we are referring to the literature and to the available data, we took into consideration treating issues regarding the financing of the R & D sector, respectively, CO_2 emissions as an integrated approach.

Keywords R & D sector · Auto sector · Sustainable development

14.1 Introduction

Although the implementation of the European Council Regulation 2019 [9], which aims to set performance standards for carbon dioxide emissions for road transport and to reduce them by 37.5% until 2030, for new cars in the EU, emissions represent a quarter of those generated in the European Union.

The highest amount of carbon dioxide emissions, respectively, 60.7% of the total emissions generated by the transport sector, comes from cars, which pollute the most.

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Under the policies for the provision of clean air, the European Union has set an annual limit of fine particles of 25 μg (micrograms) per cubic meter. In this context, the European Commission is developing a common methodology at the European Union level that will constantly assess and report information about carbon dioxide emissions.

One of the ways to reduce emissions from the transport sector is to streamline transportation and change fuel. Therefore, electric vehicles that have proven to be more environmentally friendly than those powered by petrol or diesel play a key role. Reducing costs and improving the competitiveness of vehicles through the development of electric motors, energy storage systems, essential components of electric/hybrid propulsion systems, and vehicle charging infrastructure involve increasingly sophisticated technologies and the allocation of appreciable financial resources to the R & D sector being imperative necessary.

14.2 Literature Review

Numerous studies show that the competitive advantages of innovative car companies are achieved through significant investments in the R & D sector, which are regained by the benefits obtained from the implementation of an innovative strategy and from strategic cooperation partnerships.

In this regard, governments have a key role to play in implementing long-term strategic plans to develop and improve electric, hybrid, and hydrogen fuel cell vehicles by optimizing R & D investments [1].

Substantial investments in the R & D sector are real incentives for vehicle manufacturers, as the econometric analysis evidenced it, based on the values recorded for 88 manufacturers in the period 2001–2015 [10]. Also, an important characteristic of the evolution of the automotive sector, which involves the allocation of significant funds, refers to the importance of R & D centers equipped with clean technologies that support the production of auto parts [3], technologies that, in the long term, will improve air quality [4].

Inovar-Auto is one of the programs of the Brazilian government that came to support car manufacturers by reducing taxes on industrialized products thus stimulating investment in R & D. Therefore, car manufacturers had to achievement specific objectives, one of the most important being the production of more efficient and safer vehicles by implementing innovative technologies. Quality of implemented research and development projects, with or without external partnership and energy efficiency activities, confirmed the success of the Inovar-Auto program [8].

14.3 Methodology

Given the key role of R & D activities in reducing carbon dioxide emissions highlighted in numerous specialized studies, we considered it imperative to address the interrelated treatment of the two concepts. Therefore, to establish the relationship between them, we built an econometric model, on panel data.

Tudorel Andrei defines panel data in relation to two dimensions [2]. Therefore, a variable is recorded at the level of each statistical unit for each given period, for a certain time horizon. These types of data simultaneously take into account both the temporal and the territorial dimension.

Panel data analysis is an analysis of cross-sectional data and covers several periods of time. This model is well balanced only if there is a record for each unit at all times [7].

Cheng Hsiao brought many significant and important contributions to panel models, both methodological and applied. According to Hsiao Cheng, these panel data models are more and more adopted in research due to their increased ability to capture the complexity of human behavior, compared to models based on an analysis of time series or cross-sectional structures [6]. Longitudinal data allow a researcher to make economic analysis that cannot be approached by using cross-sections or time series.

Referring to the literature, on panel data, we built a VAR model on stationary data that has the benefit to estimate the response of one variable to a shock in another one, and it is presented in the following form:

$$X_t = a_0 + a_1 X_{t-1} + a_2 Y_{t-1} + \varepsilon_{1t} \tag{14.1}$$

$$Y_t = b_0 + b_1 X_{t-1} + b_2 Y_{t-1} + \varepsilon_{2t} \tag{14.2}$$

in which ε_{1t} and ε_{2t} *represent* shocks, in t period, on X and Y variables.

The VAR-type analysis aims to identify the causal relationships, to estimate the effects caused by certain shocks on the variables and to disintegrate the dispersion of the forecast error.

In the Granger sense, in order to identify the causal relations, we start from the premise that the previous values of a variable y make an important contribution in predicting the present and future values of a variable x. Only in this situation the variable y is a cause of the variable x. If the past values of x help improve (statistically) the prediction of y, then x is a cause of y.

14.4 Results and Discussions

Based on an econometric model with panel data, we analyzed the relation between the average values of CO_2 emissions generated by new cars per kilometer and R & D expenditures in business enterprise sector.

The data are recorded for Bulgaria, Estonia, Latvia, Lithuania, Poland, Romania, Slovenia, Slovakia, and Hungary, in the period of 2010–2019, according to Table 14.1.

The stationarity of the data series was verified, and various transformations of the variables were required to ensure the stationary property in the panel (Table 14.2).

According to the Eviews test, Im-Pesaran-Shin (IPS), the p values are less than 0.05, which rejects the null hypothesis of the non-stationarity of all panels.

On the stationary data obtained, we identified lag 1 as optimal, and we built the VAR model (autoregressive vector method) (Fig. 14.1).

Estimating the autoregressive vector model, the following equations were identified:

$$\begin{aligned} &\text{DAVERAGE\_CO}_2\text{\_EMISS} \\ &\quad = -0.486996391238^{*}\ \text{DAVERAGE\_CO}_2\text{\_EMISS}\ (-1) \\ &\quad - 1.43957808915^{*}\ \text{DR\_D\_ENTERP}(-1) + 1.36485192756 \end{aligned} \tag{14.3}$$

$$\begin{aligned} &\text{DR\_D\_ENTERP} \\ &\quad = 0.000516383414854^{*}\ \text{DAVERAGE\_CO2\_EMISS}(-1) \\ &\quad + 0.428263072169^{*}\ \text{DR\_D\_ENTERP}(-1) + 0.00578937371428 \end{aligned} \tag{14.4}$$

According to the Eviews test, the VAR model is valid because the polynomial roots can be found in the unit circle, and the conditions of stability are fulfilled, according to Fig. 14.2:

Also, the hypotheses regarding homoscedasticity, error independence, causal relations, and normal error distribution were verified (Fig. 14.3).

The Granger causality test identifies the causal relationship between the share of R & D expenditures and the average values of CO2 emissions (greater than 5%), and homoscedasticity is validated by the value of p 0.86 greater than 0.05.

The LM test highlights the lack of autocorrelation of errors up to lag 10, and the Jarque-Bera test highlights the inappropriate distribution type.

The analysis of the impulse functions (Fig. 14.4) highlights that when there is a shock in the modification of R&D expenditures in the business sector, the average values of carbon dioxide emissions is changing. Also, the variance decomposition highlights that after two periods from the shock the average values of carbon dioxide emissions generated by new cars, is due by the change of R&D expenditures share.

Table 14.1 R & D expenditures in business enterprise sector and average values of CO_2 emissions from new cars in some European countries, 2010–2019

Country	Year	Research and development expenditure in business enterprise sector (% of GDP)	Average carbon dioxide emissions from new automobiles (per km)
Bulgaria	2010	0.29	158.9
	2011	0.28	151.4
	2012	0.37	149.2
	2013	0.39	141.7
	2014	0.52	135.9
	2015	0.7	130.3
	2016	0.57	125.8
	2017	0.52	126.2
	2018	0.54	126.7
	2019	0.56	137.6
Estonia	2010	0.79	162
	2011	1.44	156.9
	2012	1.21	150.3
	2013	0.82	147
	2014	0.62	140.9
	2015	0.67	137.2
	2016	0.63	133.9
	2017	0.6	132.8
	2018	0.6	132.4
	2019	0.86	130.1
Latvia	2010	0.23	162
	2011	0.19	154.4
	2012	0.15	152
	2013	0.17	147.1
	2014	0.24	140.4
	2015	0.15	137.1
	2016	0.11	128.9
	2017	0.14	128.8
	2018	0.16	128.8
	2019	0.17	127.9
Lithuania	2010	0.23	150.9
	2011	0.24	144.4
	2012	0.24	144.2
	2013	0.24	139.8
	2014	0.32	135.8
	2015	0.29	130
	2016	0.29	126.2
	2017	0.33	127.4
	2018	0.39	128.6
	2019	0.43	132

(continued)

Table 14.1 (continued)

Country	Year	Research and development expenditure in business enterprise sector (% of GDP)	Average carbon dioxide emissions from new automobiles (per km)
Hungary	2010	0.68	147.4
	2011	0.74	141.6
	2012	0.83	140.8
	2013	0.96	134.4
	2014	0.96	133
	2015	0.98	129.6
	2016	0.88	125.9
	2017	0.96	125.6
	2018	1.14	127.9
	2019	1.11	131.8
Poland	2010	0.19	146.2
	2011	0.23	144.5
	2012	0.33	141.3
	2013	0.38	138.1
	2014	0.44	132.9
	2015	0.47	129.3
	2016	0.63	125.8
	2017	0.67	127.6
	2018	0.8	129.8
	2019	0.83	132
Romania	2010	0.18	148.5
	2011	0.18	140.7
	2012	0.19	139
	2013	0.12	132.1
	2014	0.16	128.2
	2015	0.21	125
	2016	0.27	122
	2017	0.29	120.6
	2018	0.3	121.5
	2019	0.28	124.3
Slovenia	2010	1.39	144.4
	2011	1.78	139.7
	2012	1.94	133.4
	2013	1.96	125.6
	2014	1.83	121.3
	2015	1.67	119.2
	2016	1.52	119
	2017	1.4	119.6
	2018	1.44	120.9
	2019	1.51	123.7

(continued)

Table 14.1 (continued)

Country	Year	Research and development expenditure in business enterprise sector (% of GDP)	Average carbon dioxide emissions from new automobiles (per km)
Slovakia	2010	0.26	149
	2011	0.24	144.9
	2012	0.33	141
	2013	0.38	135.1
	2014	0.32	131.7
	2015	0.32	127.6
	2016	0.4	124.8
	2017	0.48	126.1
	2018	0.45	127.6
	2019	0.45	133.4

Source: Eurostat, code: [SDG_12_30], [TSC00001]

Table 14.2 Testing the stationarity of the panel data series

Variable	The value of the test statistic	P-value
d_average_co2_emiss	−347,274	0,0003
d_r_d_enterp	−196,921	0,0245

Source: Authors' own research, data processed with the Eviews 12 program

14.5 Conclusions

Although the European Union is making significant efforts to reduce pollution, according to data provided by the European Environment Agency, in 2019, there were approximately 307,000 premature deaths in the Member States. Vehicles are responsible for 12%, with switching to battery-powered and plug-in hybrid electric vehicles being crucial for significantly reducing carbon dioxide emissions.

According to the [5] report, electric vehicles produce, on average, less greenhouse gases than traditional ones that use petrol or diesel and will significantly contribute to reducing the impact on climate change and air quality. By allocating significant financial resources to the R & D sector, more and more Member States are supporting electrification and implementing innovative technologies. Increasing investment in R & D is a certain way to reduce carbon dioxide emissions, and their complementarity is highlighted by Eviews tests.

VAR Lag Order Selection Criteria
Endogenous variables: DAVERAGE_CO2_EMISS DR_D_ENTERP
Exogenous variables: C
Date: 11/11/21 Time: 11:49
Sample: 2010 2019
Included observations: 63

Lag	LogL	LR	FPE	AIC	SC	HQ
0	-100.2453	NA	0.088049	3.245884	3.313920	3.272642
1	-84.64922	29.70688*	0.060941*	2.877753*	3.081861*	2.958030*

* indicates lag order selected by the criterion
LR: sequential modified LR test statistic (each test at 5% level)
FPE: Final prediction error
AIC: Akaike information criterion
SC: Schwarz information criterion
HQ: Hannan-Quinn information criterion

Vector Autoregression Estimates
Date: 11/11/21 Time: 11:47
Sample (adjusted): 2013 2019
Included observations: 63 after adjustments
Standard errors in ( ) & t-statistics in [ ]

	DAVERAG...	DR_D_ENTERP
DAVERAGE_CO2_EM...	-0.486996	0.000516
	(0.11122)	(0.00377)
	[-4.37856]	[0.13698]
DR_D_ENTERP(-1)	-1.439578	0.428263
	(3.31054)	(0.11221)
	[-0.43485]	[3.81661]
C	1.364852	0.005789
	(0.35068)	(0.01189)
	[3.89203]	[0.48707]
R-squared	0.242946	0.195350
Adj. R-squared	0.217711	0.168528
Sum sq. resids	418.6887	0.481015
S.E. equation	2.641618	0.089537
F-statistic	9.627280	7.283294
Log likelihood	-149.0539	64.16913
Akaike AIC	4.827108	-1.941877
Schwarz SC	4.929162	-1.839823
Mean dependent	0.887302	0.009683
S.D. dependent	2.986663	0.098193
Determinant resid covariance (dof adj.)		0.055526
Determinant resid covariance		0.050364
Log likelihood		-84.64922
Akaike information criterion		2.877753
Schwarz criterion		3.081861
Number of coefficients		6

Fig. 14.1 Lag selection criterion and estimation of the autoregressive vector, on panel data. (Source: Authors' own research, data processed with the Eviews 12 program)

VAR Stability Condition Check

Roots of Characteristic Polynomial
Endogenous variables:
DAVERAGE_CO2_EMISS
DR_D_ENTERP
Exogenous variables: C
Lag specification: 1 1
Date: 11/11/21 Time: 11:48

Root	Modulus
-0.486183	0.486183
0.427450	0.427450

No root lies outside the unit circle.
VAR satisfies the stability condition.

Fig. 14.2 VAR stability test. (Source: Authors' own research, data processed with the Eviews 12 program)

VAR Residual Heteroskedasticity Tests (Levels and Squares)
Date: 11/11/21 Time: 11:51
Sample: 2010 2019
Included observations: 63

Joint test:

Chi-sq	df	Prob.
6.949740	12	0.8609

Individual components:

Dependent	R-squared	F(4,58)	Prob.	Chi-sq(4)	Prob.
res1*res1	0.001539	0.022345	0.9990	0.096934	0.9989
res2*res2	0.078200	1.230097	0.3081	4.926615	0.2949
res2*res1	0.035233	0.529531	0.7145	2.219659	0.6954

VAR Residual Serial Correlation LM Tests
Date: 11/11/21 Time: 11:50
Sample: 2010 2019
Included observations: 63

Null hypothesis: No serial correlation at lag h

Lag	LRE* stat	df	Prob.	Rao F-stat	df	Prob.
1	5.919479	4	0.2052	1.505414	(4, 114.0)	0.2053
2	3.452274	4	0.4852	0.868535	(4, 114.0)	0.4852
3	4.537831	4	0.3381	1.147075	(4, 114.0)	0.3381
4	13.22569	4	0.0102	3.473584	(4, 114.0)	0.0102
5	11.31388	4	0.0233	2.946435	(4, 114.0)	0.0233
6	16.67462	4	0.0022	4.447018	(4, 114.0)	0.0022
7	3.722181	4	0.4449	0.937544	(4, 114.0)	0.4449
8	3.080876	4	0.5444	0.773841	(4, 114.0)	0.5444
9	3.822092	4	0.4306	0.963130	(4, 114.0)	0.4307
10	15.01671	4	0.0047	3.975441	(4, 114.0)	0.0047

VAR Granger Causality/Block Exogeneity Wald Tests
Date: 11/11/21 Time: 11:48
Sample: 2010 2019
Included observations: 63

Dependent variable: DAVERAGE_CO2_EMISS

Excluded	Chi-sq	df	Prob.
DR_D_ENTERP	0.189091	1	0.6637
All	0.189091	1	0.6637

Dependent variable: DR_D_ENTERP

Excluded	Chi-sq	df	Prob.
DAVERAGE_CO2_E...	0.018762	1	0.8910
All	0.018762	1	0.8910

VAR Residual Normality Tests
Orthogonalization: Cholesky (Lutkepohl)
Null Hypothesis: Residuals are multivariate normal
Date: 11/11/21 Time: 11:50
Sample: 2010 2019
Included observations: 63

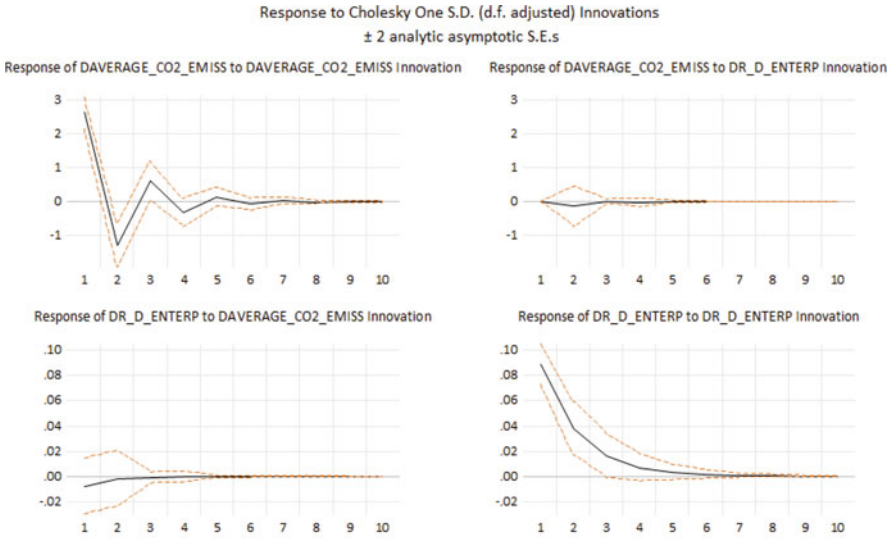
Component	Skewness	Chi-sq	df	Prob.*
1	0.531570	2.966947	1	0.0850
2	-0.389198	1.590490	1	0.2073
Joint		4.557437	2	0.1024

Component	Kurtosis	Chi-sq	df	Prob.
1	4.008483	2.669725	1	0.1023
2	4.569507	6.466299	1	0.0110
Joint		9.136024	2	0.0104

Component	Jarque-B...	df	Prob.
1	5.636672	2	0.0597
2	8.056788	2	0.0178
Joint	13.69346	4	0.0083

*Approximate p-values do not account for coefficient estimation

Fig. 14.3 Heteroscedasticity, LM, Granger, Jarque-Bera tests. (Source: Authors' own research, data processed with the Eviews 12 program)



Variance Decomposition of DAVERAGE_CO2_EMISS:

Period	S.E.	DAVERAGE...	DR_D_ENT...
1	2.641618	100.0000	0.000000
2	2.936173	99.80872	0.191279
3	3.001732	99.81635	0.183646
4	3.016976	99.81012	0.189881
5	3.020575	99.81046	0.189539
6	3.021423	99.81020	0.189804
7	3.021624	99.81021	0.189789
8	3.021671	99.81020	0.189801
9	3.021683	99.81020	0.189801
10	3.021685	99.81020	0.189801

Variance Decomposition of DR_D_ENTERP:

Period	S.E.	DAVERAGE...	DR_D_ENT...
1	0.089537	0.744998	99.25500
2	0.097366	0.669943	99.33006
3	0.098731	0.674373	99.32563
4	0.098978	0.672034	99.32797
5	0.099023	0.672287	99.32771
6	0.099032	0.672199	99.32780
7	0.099033	0.672213	99.32779
8	0.099033	0.672210	99.32779
9	0.099034	0.672210	99.32779
10	0.099034	0.672210	99.32779

Cholesky One S.D. (d.f. adjusted)
Cholesky ordering: DAVERAGE_CO2_EMISS DR_D_ENTERP

Fig. 14.4 Impulse functions and error dispersion decomposition. (Source: Authors' own research, data processed with the Eviews 12 program)

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Chapter 15
The Effects of the COVID-19 Pandemic on the Tourism Sector: New Challenges

Donatella Privitera

Abstract The COVID-19 pandemic has decimated the travel and tourism industry and is still challenging the world. Global travel restrictions have brought consequences also for the global economy. In this context, the COVID-19 emergency has further pushed existing tourism systems to their limits but has also highlighted new potentials for resilience. In the post-COVID-19 world, all countries have adopted strategies to contain the effects. Early evidence of the impacts of the pandemic and its responses on air travel, cruises, and accommodations indicate that it has been devastating. The article discusses how the pandemic has changed society's needs and in particular the impact on tourism. After giving a brief overview on Italy, it discusses the new challenges to improve and develop a new era of the tourism. The article contributes to the post-COVID tourism debate. This is a new era for tourism. Now tourism system can play a critical role in socioeconomic recovery by empowering local entrepreneurship.

Keywords Resilience · Italy · Recovery plan

15.1 Introduction

COVID-19 is undoubtedly the most influential crisis in the twenty-first century, and it has invaded the lives of people around the world. The pandemic caused by the COVID-19 infection has produced an emergency that has changed the rules and habits of many countries.

Many countries have reacted to this pandemic by applying rules of conduct that aim to ensure safety and protect public health. For example, the use of public parks has increased significantly during the pandemic, often leading to heightened feelings of connectedness with the natural world. Meanwhile, travels and holidays have been severely constrained through border closures and lockdowns. Consequently, tourism

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was the most affected sector of activity during the pandemic. It is still suffering disastrous consequences years afterward, where it had experienced a virtually constant annual growth for the 50 years before the pandemic. The year 2020 was a year full of trials and tribulations and was the most atypical and weakest year in the history of tourism. Various preventive measures have been adopted across the globe. Common practices include social distancing, quarantine, mask wearing, and so on. Additional measures were also proposed depending on the specific community behaviors that may pose a threat to the public health.

The decrease in the number of tourists was also reflected in the business and profitability of tourism companies. The trade fair and business tourism sector were also affected, with events being cancelled or postponed. International hotel chains; individual hotels; the HORECA sector; tour operators; and air, road, sea, and river transport all suffered substantial losses. Travel agencies specializing in incoming or events have suffered a drop in turnover of over 70%. In addition, a large number of tourist-related jobs have been lost.

Currently, COVID-19 is still intense with negative impacts on tourism activities in different nations. The borders of many countries are still closed, but the world is resilient. If operators and consumers can adapt, the international tourism crisis offers an opportunity to reimagine new tendencies, and domestic tourism may benefit as a result of these restrictions. However, it's relevant to conceive a new kind of tourist products also with the use of digital instruments for monitoring new development. The pandemic crisis has facilitated and increased the opportunity to exploit domestic tourism. Therefore, domestic tourism should be the main lever for the recovery of tourism. In fact, the term "staycation," or tourism consumed within national borders, is becoming increasingly popular.

In addition, the healthcare emergency has highlighted the importance of digital skills and technologies not only to make up for temporary restrictions on face-to-face activities but also to offer new services; to exploit the opportunities of online tourism; to experiment with new business, management, organizational, and communication models; to weave strategic alliances; and to rethink and restructure the offer. Also, the pandemic changed the society, economy, and tourism and may be seen as an analogue to the ongoing climate crisis [9, 21].

The article contributes to the post-COVID tourism debate. Particularly in the Italian context, it explores how the pandemic may change society and tourism. After a brief overview of global and Italian tourism data, it will examine some of the new challenges to improve and develop a new era of tourism.

15.2 Literature Review

Numerous and new trends of travel are emerging during the COVID-19 pandemic and determining innovations in the tourism sector (Table 15.1). Many scholars and recent literature have established some trends on observations in different countries, here a brief exploratory summary.

Table 15.1 Strategic asset: new travel trends

Increase of gastronomic tourism
Wellness and fitness tourism
Tourism in rural villages with landscapes and identity: Multifunctional and sustainable enhancement
Nature and sustainability: Ecotourism, cycling, and walking tourism for a "slow" model
History, myths, culture, and museums: a historical-architectural and artistic heritage
Religious tourism linked to traditions and patronal festivals History, myths, culture, and museums: a historical-architectural and artistic heritage

Source: Authors' conceptualization

Wellness and Fitness Tourism According to the World Health Organization [19], the COVID-19 infection has produced a global health emergency that has changed the concept of wellness, which drives new attitudes and behaviors. This is a change that seems to drive the most immediate effects of the pandemic, with long-term impacts and intense consequences on people's lives. In addition to influencing their purchasing choices, it is also affecting their lifestyles, with an increase in wellness and fitness activities [6, 17]. Consequently, the development of tourism products and activities related to fitness (e.g., rural spa, spa hotels, etc.) is to be developed and strengthened given the demand [3]. Digital programs and use of digital tools should be used to enhance safe mobility. In addition, tourist guides should be created via apps for smartphones and tablets. Consequently, this is a new approach of where, when, and how people train and how tourists will opt for experiences to intensify contact with nature and to find the right balance for their inner well-being.

Food and Gastronomy Experiences The trend of 2020 or "homely lockdown" is increasingly being replaced by travelers, who have cultivated new passions and more refined tastes. It is expected that tourists will leave with their passions in a suitcase, carrying forward the demand for new trends in fitness, gastronomic choices, and unique travel experiences, with a greater demand for culinary experiences. Moreover, the increasing number of consumers who travel to enjoy Italian food and wine reaffirms the importance of identifying "Made Italy" as a re-launch of the tourism sector that was placed into crisis by the pandemic. Italy has a unique cultural heritage at the European level, which is characterized by its strong identity and the high-quality characteristics of its agri-food products. Italy has 838 registered typical products, of which 312 are for the food sector and 526 for the wine sector. This confirms the primacy of geographical indications worldwide [11]. Sometimes, the consumption of gastronomic delights has the same importance as an experience of visiting a historical heritage [16]. It is now established that food is a potential driver for tourism development [7, 8]. It assumes a variety of cultural expressions giving vitality to rural communities, sustains small local food producers, and reinforces their position on the market. Actually, the concept of food is closely linked to the new role assigned to agriculture in relation to the environment, the territory, and the safety and quality of the same. In this development, food is a strategic entry point to national issues and food tourism also.

Nature and Sustainability: Ecotourism, Cycling Tourism, Walking for a "Slow" Life Model From transport (preference electric bicycles) to tourism (affirmation of ecotourism, cycling, and the like), moving from food to confirm interest in an increasingly healthy planet, travelers will have place more importance on the sustainability and well-being of the community and will want to show their affection for brands, companies, and organizations that embody their own values. This also allows the tourist to get in touch with the peoples and cultures of the destination territories, according to recent trends that see the tourist interested in the protection of the natural heritage, the conservation of biodiversity and respect, as well as knowledge of local cultures. At the same time, slow tourism (such as walking or cycling) is a tool to develop marginal destinations sustainably: specifically, rural areas with low population density where tangible and intangible assets are located [13]. Many researchers have addressed the issue of slow tourism, which allows to enhance territories for natural aspects but also therapeutic and well-being that can result from walking or cycling [14, 18]. The bicycle has been around for years, but now more than ever, it has made a comeback because it is able to cushion the anxieties arising from the continuing pandemic as a therapeutic but also mindfulness tool. Also, cycling offers recreational opportunities in sustainable destinations, which are very often uncrowded [15].

Tourism in Rural Villages with Landscapes and Identity: Multifunctional and Sustainable Enhancement Rural villages are attractive because they represent the identity and uniqueness of the territory. Villages, which are understood as minor historical centers or as primordial centers of the big cities in which the trace of their peculiarities resists modernity, represent a "characteristic, fundamental and indispensable part" [2] of Italian heritage. Therefore, smaller towns can be an alternative model to the demographic concentration of Italy's cities, becoming a fundamental resource for the revitalization of the territory through a "slow model" that is opposed to the pressure of the city to an interdependence between agro-silvo-pastoral production and care of the territory against hydrogeological disruptions and soil impoverishment to a slow lifestyle as opposed to the fast-paced life of urban culture.

History, Myths, Culture, and Museums: A Historical-Architectural and Cultural Heritage This is not a new trend, but interest in cultural tourism has always been in vogue.

Religious Tourism Linked to Traditions and Patronal Festivals The development of religious tourism destinations in recent years has allowed pilgrimages to regain the notoriety of the past and religious itineraries to recover the role of union between peoples and nations and sacred music to become a representation of religious places [4]. Pilgrims are also tourists, and both types of travelers may be justified in undertaking journeys and seeking experiences to add meaning to their inner lives. Furthermore, because of the cultural and historical component, religious heritage tourism is also a key contributor to the economy of territories, and it adds attractiveness to cities, villages, and natural areas, as well as increases sustainability [1]. The religious motivation, which is the main reason for choosing to stay, is

combined with the desire to participate in events of a spiritual and also musical nature, which are associated (among other motivations) with the need to know the customs and traditions of the local population.

15.3 Methodology

As explained in previous section, the aim of this article is to observe the emergence of new configurations for tourism activities trying to respond to the challenges of post pandemic.

The analysis is inventoried on the basis of databases available and of the theoretic background studied. The research method used in this study is qualitative. The main tool of the field research was therefore open interviews with the various actors more or less directly involved in the Italian tourism system (such as tourists, entrepreneurs, and local institutional delegates). The analytical approach was strongly influenced by the need to consider all the aspects of a complex situation, which involves other factors besides the economic factors.

15.4 Results and Interpretation

The tourism system is one of the pillars of the country's economy [20]. A significant part of the national GDP revolves around tourism, with a transversal involvement of many sectors. This cross-sectional nature makes it even more complicated to achieve the competitiveness of the system, where a wide variety of actors must play different but interrelated roles, with the support of appropriate tools for integration and governance.

The goal of the tourism industry is to increase tourism for profits, and tourists want new leisure experiences. In addition, the recent global pandemic has led to a further rethinking of the role of territories as drivers of development given that the crisis has manifested itself differently in different countries, accelerating some pre-existing dynamics and determining, potentially, further gaps. To address, reverse, and restart processes, it is appropriate to focus on projects that provide a targeted tourist offer to generate an articulated process of building a strong and shared identity to narrate the territory in a structured manner. To successfully implement the allure and reputation of the locations, it is crucial to position the landscapes and attractions within an imaginative context that aligns with genuine values. This must accompany and characterize an offer of fruition that is more in line with consumption styles marked by the search for experiences.

The pandemic has also changed the way of and approach to travel in an epochal way [10]. The traveler will certainly have experienced changes, but the beneficial power of travel still has emotion at the center, together with wellness and the search for active and engaging experiences, including a positive impact on environment and

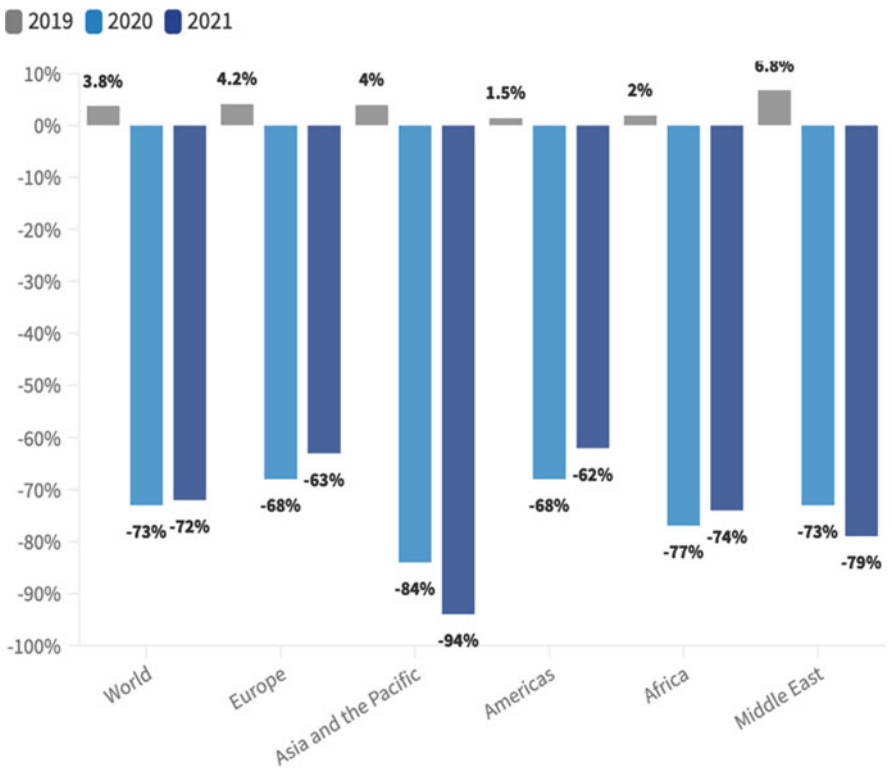

Fig. 15.1 International tourist arrivals (% change). (Source: World Tourism Organization (UNWTO), January 2022)

society. Many tourists primarily focus on the influences on and nature and significance of their experiences within a sociocultural framework. The needs of people and their relationship with tourism stand out, characterized from the sense of freedom, open spaces, security, health, normality, fragility, and a new vision of the world.

Really, what has happened? Taking tourism data in account for the tourist industry, 2021 has been a year of learning and adapting during the pandemic. According to UNWTO estimates, by 2021, International tourist arrivals decreased by 72% compared to pre-pandemic (Fig. 15.1).

International tourism qualified limited increases in 2021 compared to 2020. Europe and the Americas posted the most noticeable results but, in each case, well below to 2019. Many nations have closed their borders, not allowing mobility for tourism, and in compensation, domestic tourism has developed creating and enhancing new destinations.

The analysis of tourism indicators in Italy (Table 15.2) highlights the variations registered in the domestic and international tourism sectors. The decrease or increase in the number of tourists in 2019–2021 reflects not only the periods of total or partial

Table 15.2 Italy tourist arrivals and presences (% change)[a]

	Var. % 2021–2019		Var. % 2021–2020	
	Arrivals	Presences	Arrivals	Presences
Italians	−29.0	−20.3	9.6	14.2
Foreigners	−63.8	−56.1	31.5	40.3
Total	−46.5	−38.4	16.2	22.3

Source: Istat [12]
[a]9 months of 2021

closure of accommodation and catering units but also the periods with some relaxation of restrictions.

The 9 months of 2021 show signs of improvement, with a significant increase in attendance (+42.4 million, 22.3%) and arrivals (+8 million, 16.2%). In particular, non-resident customer flows in Italy (40.3%) and, to a lesser extent, resident customer flows (14.2%) had recovered.

In Italy in 2021, the Ministry of Tourism has provided several contributions both to travel agencies (about 590 million euros), operators that during the lockdown remained closed for a long time, accommodation facilities (181.6 million euros), institutions, and organizers of fairs (400 million euros) and also consumers with the issuance of vouchers to travel (one million euros).

Actually, the aim of the recovery and resilience plan is to increase the competitive capacity of businesses by favoring and promoting a tourist offer based on environmental sustainability, innovation, and digitalization of services. Particularly, investments in the digital sphere (114 million euros, digital tourism hub) refer to the creation of an integrated tourism ecosystem, where many public stakeholders but also private operators are involved in order to support the tourist in planning the destination and the trip. The use of tools such as data analytics and artificial intelligence is aimed at increasing the digitalization of the tourism offer such as payment systems, reservations, or management solutions. Other actions are the funds for competitiveness (598 million euros), where all is aimed at improving the accommodation facilities with also tax incentives for small and medium sized enterprises. Additionally, the recovery and resilience plan includes provisions for the implementation of public investments aimed at enhancing the accessibility of tourist heritage sites, such as museums and archaeological sites. The plan also offers credit support for the entire tourism sector and includes measures to eliminate architectural barriers and promote increased energy efficiency. Other funds (500 million euros) are planned to increase new cultural tourism sites and to increase the employment of qualified personnel for management but also to enhance minor sites and tourism in the suburbs.

15.5 Conclusions

COVID-19 continues to impact everyday life. Now is the time to implement renovations. As countries around the world prepare to recover from the COVID-19 pandemic, 2022 is a time to transform societies and territory into sustainable and

resilient economies. Policies put in place to contain contagions (such as border closures, travel restrictions, decontamination, etc.) are answers to envisioning a new way of doing tourism.

The desire to travel will not change, which is evident from past crisis events (e.g., terrorism). The impact of the COVID-19 related shutdowns will inspire the use of sustainable measures and instruments, and necessitate monitoring their development. In 2022, projected trends favor domestic tourism, as well as outdoor activities, rural tourism, and all non-crowded activities with health security (health first).

The status quo and the future of tourism destination can be better reflected in many aspects and assist as a basis for decision-making in politics and for a regular transmission of tourism and its environments. The global pandemic has had a catalytic impact at the macro and micro-levels, as well as at the cross-sector levels. Tourism can play a critical role in socioeconomic recovery by empowering local entrepreneurship.

Our knowledge and history of the COVID-19 crisis show that the tourism industry can recover and return to normal. But how? What does normal mean? A new vision can offer opportunities for hope, regeneration, and transformation of the potential of tourism. Some of the most striking images during the pandemic were how nature retrieved spaces that were usually occupied by tourist activities [5]. The balance between humans and nature had been lost in some cases, and the global emergency provided an opportunity for nature to retaliate.

The importance of the realized analysis suggest the launch of tourism policies that should capture the changing demand due to the pandemic. In order, now, more than ever, digital tools need to be used to choose travel experiences. In addition, synergistic collaboration between public and private operators is needed to improve national coordination of the image and promotional actions of destinations. And of course, we should not forget the offer of value-added services for the ecosystem by favoring environmental sustainability and also the inclusion and full exploitation of all types of territory (lake, mountain, rural, etc.).

The present study reveals certain limitations that need to be acknowledged. There are still numerous aspects that require further discussion, and extensive quantitative analysis is necessary to determine the most effective approaches for capitalizing on opportunities after the COVID-19 crisis. Additionally, it is crucial to identify the specific targets and types of tourism that should receive the highest priority for concentrated efforts.

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Chapter 16
Effects of COVID-19 Pandemic Crisis on Vulnerable Groups in Romania: Social Policy Responses

Elena Zamfir

Abstract In Romania, in just 2 years, the pandemic crisis manifested as an atypical multiple system crisis severely affecting the most important sectors of the society. It also brought visible changes in the profile of the quality of life. The new profile of the quality of life turned into a major concern of the socio-humane sciences from a pluri- and interdisciplinary perspective. Current research is faced with a set of new issues that changed the classic paradigm for the quality of life. How the quality of life will be affected in its main *objective* and *subjective* dimensions remains, however, an open question.

The study aims to evaluate the changes that occurred in Romania over the COVID-19 pandemic on a socioeconomic level and in the individual lifestyle as major dimensions of the quality of life. They also make the object of public social policies. Therefore, in the context of the current COVID-19 crisis, the issues identified as generating major changes in the profile of the quality of life, emerge as challenges in designing public social policies.

Unfortunately, the efficiency of the post-December public social policies places Romania on one of the last positions in the hierarchy of EU member-states. The present paper underlines the main reasons leading to this state of affairs and from where the state should start in bringing possible solutions for the post-pandemic stage.

Keywords Amassed crises in COVID-19 · Vulnerable groups · Economic and social inequalities · Culture of poverty and learned helplessness

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16.1 Introduction

The profile of the quality of life is multiply determined and multiply conditioned. As evaluative concept, the quality of life depends on both the objective/actual state of life at a given time and on the estimates that are very differentiated subjectively (obviously based on some evaluation criteria). The quality of life is subject to some multiple objective determinations but also to some subjective ones that are present at the level of aspirations, expectations, value orientations, etc. that substantiate individual life strategies. These are differentiated from individual to individual, depending on education and culture level, system of values, religion, ethnicity, age, gender, etc. Even though they directly reflect the lifestyle of people and their value orientations, they are correlated simultaneously and dependent on the economic growth and social inequalities model. The quality of life determines both the lifestyle of the people and their value orientations, along with the model for economic growth and social inequalities.

In fact, the marked polarization leads to massive expansion of persistent poverty especially among children and to the rapid setup of a "culture of poverty and learned helplessness", etc. In the context of the major risks regarding increasing poverty and social exclusion, Romania continued with passive mitigation measures. Therefore, in Romania, it would be necessary to increase the priorities of public policies on diminishing and attenuating the high inequalities regarding the distribution of incomes and the social effects of polarization, which create wide inequality and hierarchy regarding social relationships. In Romania, the COVID-19 pandemic emphasized the differences between classes and their social status and aggravated the impact of economic and social inequalities in all spheres of society. The changes brought on by the pandemic triggered complex and multidimensional crises (medical, health, social, political, economic, energetic, food, moral, human, etc.) and impose now much more in Romania, as well as at global level, to move from the classical paradigm of economic growth to a more controlled, democratic economic growth process. This process should be based on active, friendly, and inclusive social policies [17].

This chapter aims to specify the main factors and causes of inequalities in Romania, which affected the marginalized and vulnerable people to reduce inequalities in income and wealth, and to look for solutions of maintaining the individual and collective well-being. It explains why in this period the most affected were the vulnerable groups in all societies and especially the groups at risk of poverty and social exclusion [7].

The effects of some social pathologies and behaviours generated by the context of the pandemic crisis have rapidly emerged. The functioning of the cultural life models in a hostile environment led to the overturning of some moral values in the social action. The damaging effects triggered by loneliness and the state of forced isolation severely affected the behavioural balance and the affective-emotional stability of the individual. Disorders were highlighted in the public physical and mental health, by multiplied deviant behaviours and aggressiveness phenomena, increased criminality,

and organized crime, as direct and immediate effects on the stability of the social and human system. On this background, a swift increase was recorded in stress, anxiety, and severe depression, associated often with suicide, even among the youths. If, over the pandemic, the health state and the medical system have monopolized almost entirely the concerns of the decision factors, we do not notice the same for individual behavioural disorders that aggravated. These were a main factor generating a severe crisis of human identity. Specialized answers to the deep human crisis that should have accompanied permanently the deviations that occurred at the level of individual behaviours by systematic professionalized therapies were lacking completely from support public policies.

16.1.1 Methodology

From the methodological perspective, the study used:

- Comparative European statistics for data over the pandemic period.
- National statistics provided by the authority for managing the pandemic.
- Data delivered by public opinion surveys during the pandemic.
- Data and scientific reports delivered by IQLR (Institute Research for Quality of life) of the Romanian Academy.
- IQLR (Institute Research for Quality of life) data from comparative research and analyses in Romania.

Secondary analyses are used from data aggregated by institutions of profile at national, European, and global level. To these are added the evaluation of social policies during the transition. In fact, the inefficiency of social policies in transition led to the exacerbation of social and economic issues during the pandemic (see the study by Elena Zamfir, "Poverty and Socioeconomic Inequalities: Challenges for Social Policies in Post-December Romania" (Romanian) in the *Quality of Life Research* journal no. 3/2021).

Of course, after just 2 years of pandemic, all these coordinates emerge now only as normative proposals for future directions of research. They are just simple general opportunities of research. Certainly, in time, they will be doubled down by evaluations and monitoring beginning from the social and actual human facts that generated them, from the image of the society in its dynamics.

16.2 Literature Review

16.2.1 Deontological Requirements in Analysing the COVID-19 Pandemic Crisis

Motto: *Ideological distancing, political detachment, and neutrality of the researcher in evaluating the Covid 19 crisis period is a necessary imperative just like the physical distancing of the individuals for avoiding the disease.* (Elena Zamfir)

In the context of problematic, social, economic, political, moral, and human complexity generated by the COVID-19 pandemic crisis, it is imperatively necessary for researchers focused on the risks of this stage to have a moral imperative as part of professional deontology. This is formulated by me as "motto" that should accompany social reality research and evaluation during the pandemic crisis.

Why is such a deontological requirement necessary now? Because the type of analysis and of communicating launched and driven by the "social media" in the public space by all mass-media means and online did not comply with the deontological norms of the profession. A superfluous communication about COVID and the disease was done by various social actors and not by experts. The analysis of the complex issues generated by the COVID crisis was irresponsible, oversimplified, inconsistently argued, often completely incorrect, and even contradictory. At times, it even played a misleading role for the wide public. On the background of some unknowns about the virus and the disease, public debates generated a confused, incoherent information space with obvious manipulative emphasis for the population. Therefore, the messages sent about COVID became very quickly much less credible. At the same time, at the core of the discussions about the virus and disease were placed also various horror scenarios, of the most varied and shocking kind. As a rule, they were based on conspiracy theories, populated with fake news and frightening stories, of the strangest kind. It seemed almost as if they were part of a nightmarish world already built before in the mind of some sick people of the world in their wish of destroying the values of modern civilization and the peacefulness and stability of human communities. Most times, the sent messages were filtered by various ideologies. They were attributed politically to a select group of magnates who lead the world from the shadows. All this information thrown in the open without any moral responsibility induced into the population states of panic, fear, and distrust in the authorities of the state. They became disorienting and manipulative for a part of the population but even less credible on the other hand. Immediate effects emerged as well in the institutional disorganization and in unbalancing individual behaviour. Without being doubled down by persuasive information, they misguided not only the untrained public but, sometimes, even analysts, researchers, and politicians as well. All in all, in Romania, public information and awareness of the population regarding the danger of the new virus was a failure from the beginning and potently ideologized. This fact led to an obvious authority crisis of the decision factors responsible for managing the pandemic. The place of efficient dialogue of the government with the experts and scientific personalities in the field was taken by a "cold, dry" ideologized monolog of the politicians lacking theoretical-rational consistency. The completely disorganized and chaotic room for public discussions about the disease and protection against it was much too less controlled by experts in the field and was left at the latitude of the political decision-makers. As a rule, singular voices of the experts were heard as lonely in public debates, and they were covered by the vocal/noisy presentations of the politicians regarding restrictions and regulations of the authorities. They excluded any understanding of the issues based on normal, constructive dialogue. An aspect is worth mentioning in context: in a normal dialogue, focused on virus and disease, we

would have expected that the proper, documented argument comes from experts and scholars and not to emerge as part of the political democracy. Scientific decisions and determining the scientific truth are not achieved by the vote of the many, like mass participative democracy, as in the case of political democracy. They are subject to academic democracy because of expert's agreement by consensus of the professional-scientific elites. In political democracies, the many decide, and in academic-scientific democracies, decision-making is the responsibility of the elites in the field. Another interesting aspect emerged as well in the communication of the messages linked to the risks and emergencies in the pandemic. It is the one that highlighted the inexistence of a culture of communication in the public space. It was noticed that in the 32 years of transition, the culture of communication as the core goal of the December Revolution emerged in the public space as the "perfect political art of monolog". A culture of constructive and efficient dialogue, which is so necessary during the pandemic lacked and is still lacking. Therefore, also the understanding by the population of the pandemic risks and of the emergency measures pursued a completely unnatural, contradictory path. It was developed chaotically, and by happenstance, without severe control by the management authorities of the pandemic crisis. The finality was far off the desired outcome. Emergencies had priority, and often unjustified constraints for the population without being doubled down with convincing arguments. As a rule, the pandemic restrictions communicated by the political stakeholders and decision-makers were not supported by credible scientific rationality. The lack of transparent decisions for the lockdown periods and for the ones of severe restrictions led to the discrediting of measures taken by governmental agents and of their communication manner.

16.2.2 Romania by the Beginning of COVID-19: Mitigation by Policies

A pattern is visible in Romania at the beginning of the crisis. In the first phase, action was taken exclusively for the protection of the state of health, for monitoring/treating the disease, and for slowing down/minimizing the death count by as much as possible. The faulty management was adjusted on the go for some hospital institutions. It is true that health social policies, financed poorly over the 32 years of transition and very hesitant in covering with quality and preventive medical services, were the ones that drew attention right at the beginning of the crisis. The health and sanitary systems were placed at the centre of the great discontent and of the harshest critiques. Unlike other EU countries, in Romania, health was chronically underfinanced and very disproportionate; specifically, access to medical services was not equal to all members of society. The lack of specialized personnel in the field and the low numbers of family physicians, old medical infrastructure, and faulty/irresponsible management emphasized the vulnerability of the health system. The structural deficiencies of the health system emerged in the forefront and were aggravated by the COVID-19 outbreak [9, 19]. The resilience of a health system that was faced

with the pandemic crisis highlighted huge disparities between age groups, socio-professional categories, between regions, between the rural and the urban areas, etc. It is known that during the transition, in Romania, very low interest was shown for preventive health services. The entire health system suffered because of high instability at ministerial level, of rushed social policies, often taken under pressure of emergencies. In the absence of ministerial accountability, the incoherence of the proposals and changes to the system could not be substantiated. Over the entire transition period, the disease of the health systems aggravated continuously. To this were added the huge social issues of chronic underdevelopment of the social assistance system. It had a visible fall regarding social support services, lacking basic community services that are so necessary in times of emergency [8, 14].

Nevertheless, by the beginning of the pandemic, the medical state of Romania seemed far better than in the other EU countries. *On April 15, 2020 (Coronavirus Map, Wikipedia data), it was announced that Romania registered a number of 7216 COVID-19 infections, as compared with Spain 177,664 and Germany 132,529, and the number of deaths per one million persons was by 375 in Romania, against Spain with 3799 and Germany 1538*. We are still lacking sufficient arguments for a very clear explanation to support this favourable situation in Romania by the beginning of the medical crisis, as compared with the other European countries. One thing seems to be obvious now, without pretending to give a completely substantiated answer. In Romania, by the beginning of the pandemic, fewer tests were performed than in the western European countries. To this was added also the quick, unprecedented mobilization of the experts from the health system for diminishing the risk of infection. Certainly, their heroic example will remain remarkable for the next generations.

Interesting, by the beginning of the pandemic, a survey at the national level launched by IRES showed that the trust of Romanians in the institutions involved in managing the COVID-19 crisis was as follows: the Army 84%, Ministry of Health 57%, and Ministry of Interior 58%; trust regarding measures approved by the government for managing the crisis was by over two-thirds. In turn, only 26% of the population have a positive view of the government.

Also, in the first year of the pandemic, the reaction of the population to the protection measures shows increasing popular support:

- Sixty-seven per cent of Romanians comply with all indications of staying at home, and shares are on increase: 52% (16–17 March), 59% (21–24 March).
- Sixty-four per cent use masks.
- Forty-four per cent use gloves.
- Fifty per cent comply with the 2-meter physical distance from the others.

It is true that Romania benefitted also from the example/experience of the other European countries that were severely affected by the coronavirus. Unfortunately, just after only 8 months, by the end of August 2020, as result of the increase in the number of tests, Romania was placed on the first positions within the EU regarding COVID infections and the number of daily deaths, exceeding by far France, Italy, and Spain. This situation might be explained also based on the waves of returns in

Romania of those working abroad in the West. If, up to the outbreak of the pandemic, the West seemed very attractive for the opportunities of achieving financial gains, after travel was closed because of the new restrictive regulations for travel, this opportunity of labour migration vanishes as well.

16.2.3 Ongoing Effects of the COVID-19 Crisis in Romania

Immediate, social, and human effects of the crisis emerged rapidly also: major changes in interpersonal relationships, in value orientation and lifestyle, in satisfaction with life, in the quality of family life, in work time and leisure time organization, etc. These phenomena were accompanied, as well, by an accelerated increase of social inequities and of severe poverty. We are assisting the emergence of an increasingly more polarized society and the rapid marginalization of the vulnerable groups [3, 6]. In the history of the transition, the social-economic impact of the pandemic crisis, expanded to important spheres of the social system, brought about severe damage at economic, human, moral, and cultural level, which are hard to recover in time. Their consequences are visible in the massive drop in individual welfare, in the satisfaction with life of the population, in the increasing of the excluded social group, and especially in the numbers of children in extreme poverty [2, 15]. Over time were added, as well, behavioural deviances and delinquency, behavioural imbalance in the public space and in the family, anxiety states, uncertainty, severe depression, fears for the future, and especially worsening in some illnesses. The mistrust of the population increased rapidly regarding the institutions of the state, in the government, and in the development directions of the country, etc. The effects of these damaging processes were measured in real time by national surveys by subjective indicators and value orientations. Unfortunately, their aggregation at the individual and collective level highlighted and deepened a human crisis with direct effects on the quality of life. At the same time, the inefficiency of the mitigation social policies was highlighted again on the background of the painful recession period to follow. In fact, the deep human crisis because of the sudden changes in lifestyle during the pandemic will be a long-lasting one that will affect with certainty the stability and balance of the social system as a whole.

At the same time, the pandemic crisis has pushed us from the very beginning to one paradox, hard to accept and bear for our lifestyle. Due to the rapid spread of the disease, physical distancing and human isolation were imposed despite the fact that "man is par excellence, a social being". And again, we remember A. Maslow's pyramid in humanistic psychology. Human development, self-actualization, and improvement are achieved only in a context of accentuated relational and social comparison. This perspective, as well as the sociological and anthropological one, emphasizes the social modelling of human existence. The individual appears with multiple possibilities for self-actualization. However, it evolves based on the guidelines offered by the community culture and the social context of which it is part. The individual data has an active role only in the selection of the cultural models of life

that correspond to their own aspirations, in their differentiated takeover; human being is only the support of the development of socio-cultural forms [12, 13]. In their existence, human beings appear as a cultural product, as a result of direct contact with social reality and others. The human personality, the cultural anthropology has argued at length, is not an individual product but a collective one of the existing culture.

Unfortunately, even the extended family was kept away by physical distancing, isolation, and limiting direct contact. Emotionally affective relationships with extended family and friends have become increasingly pale, few, and emotionally blurred. This behaviour and manner of externalization with the other was predominantly under rational control. The satisfaction and joy of direct "face-to-face" encounters with a strong emotional charge have been gradually replaced by the "colder" online communication at a distance.

The multiple and severe restrictions imposed by the pandemic, it is true, may sometimes rightly, or perhaps sometimes, unjustifiably exaggerated, have accentuated a deep human crisis over time. This has had serious effects on behavioural balance and public mental health. Unfortunately, the emergence and installation of a human crisis in all its complexity, with its harsh effects on the social environment, have been totally underestimated or even ignored by policymakers throughout the pandemic. However, the socio-human sciences have repeatedly emphasized the difficult process and the difficulty of restoring human mental and behavioural normalcy. The economy usually recovers much faster than the standard of living and human balance. That is why long periods of austerity are combined with great sacrifices of generations over time, which can last for years. However, they generate major disorders in human behavioural balance. From this point of view, it can be said that it is much easier to revive the economy after the crisis than to treat the individual's mental and behavioural disorders in order to return it to normal.

Unfortunately, both government, political decision factors, and social stakeholders were much too less focused during the whole transition on maintaining a sound and civilized communication and relational social and human environment. The presence of values and moral norms was increasingly lower in the public space. The degradation of the relational and coexistence social and human environment was a constant of the pandemic. The lack of concerns explicitly targeting this component of life was also the main reason triggering a deep crisis of human alienation. It aggravated over time because of the disinterest shown by governmental decision factors for the individual and his daily style of life. Consequently, the multiple social sectoral risks accumulated over the period of the pandemic, as well as the poor management in diminishing them, led to considerable increases of population's mistrust in the government and its strategies for turning around the disastrous post-COVID effects. Here were added as bearing an important weight also the apocalyptic conspiracy theories of the most bizarre kind.

In Romania, a survey realized by CURS in April 2020 indicated the fears of the Romanians: 89% fear that they will get the infection; 74% consider that after the epidemic, a major economic crisis will follow; 65% fear that someone close will catch the infection; 57% fear that the wage will decrease; 51% fear that they will lose

their job; 37% fear that they will not be able to care for the close family because they are far; 24% fear someone in the family might lose their job; 19% fear that they are not protected against the coronavirus on the job; 18% worry of the stress of staying at home; and * 11% fear that the children cannot go to school.

The major fears generated by restrictions and the effects of the crisis are determined at individual- and collective-level frustration, tiredness, depressions, relational and mental instability, etc. with negative impact on the quality of life.

On the background of major concerns regarding the normal life and health of the population, sociologists, political analysts, and statisticians delivered national and international statistical data of the opinion surveys that recorded the changes occurring in the state of mind of the population during the COVID crisis. The options of the Romanians for the development direction of the country and the trust/mistrust in state's institutions, political personalities, the government, and those managing the COVID-19 crisis highlight important changes in the lifestyle over the 2 years of the pandemic. These were correlated with the fear of the unknown, fear of illness, and dramatic decrease in the living standard. A survey, launched by IRES on 13 January 2021, shows that seven out of ten Romanians believed that the direction in which Romania is headed is wrong, eight out of ten Romanians believed that the year 2020 was a bad year for Romania, and two-thirds of Romanians are pessimistic about the recovery of the economy after the disastrous effects of the pandemic. One out of two Romanians believed that it is possible for Romania to be hit by a third COVID-19 wave in 2021, which would be far more dangerous than the previous ones. Only one-third of the Romanians believed that Romania would succeed in achieving the proposed vaccination target. Also, a survey launched by Avangarde in November 2021 shows that over 80% of Romanians consider Romania to be heading in the wrong direction. In the same time, the shares regarding the trust of the Romanians in the political parties and their ability to help in recovering after the disaster triggered by the pandemic changed: PSD increases to 40%, PNL decreases to 17%, AUR reaches 15%, and USR loses two percentages at drops to 11%.

In fact, the opinion surveys provide a complex image about the state of mind of the population under the conditions of the current risks.

But we are now at the end of the year 2021, and we notice that Romania also underwent the fourth wave of the pandemic with many losses, high costs, and new risks and that a possible fifth wave is expected. Certainly, this wave will also have a negative impact on the quality of life. The forecasts for a better future are decreasing. On the background of a much more negative state of mind of the population, the lacking transparency in the decisions of the governing authorities regarding the halting of the effects of the pandemic and the incoherence in communicating the actual evolution of the disease by the governmental political factors led to mass discontent and to open conflicts/revolts in the street.

The opinion surveys provide a complex image about the state of mind of the population under the conditions of the current risks. It is interesting that all research provides converging data about the increasing concerns of Romanians. These concerns were manifested by protests, popular upheavals, street movements against the political authorities, and against the ones managing the crisis. Unfortunately,

street agglomeration because of revolts/discontent was followed by periods of significant increases in the numbers of infections and deaths. The direct face-off of the pro-vaccine groups and anti-vaccine groups regarding the protection measures against the new danger affected the vaccination process severely. From this point of view, Romania fell behind when compared to other European countries. The swift expansion of the infection was visible especially in the case of vulnerable groups, particularly in the case of the ones in extreme poverty and the old age.

16.3 Analysis/Results Interpretation

16.3.1 Amassed Crises in the COVID-19 Pandemic: Changes in the Quality-of-Life Profile

The COVID-19 pandemic crisis broke out as an atypical crisis of the health system expanding rapidly in the entire society, with visible changes in the quality of life. Gradually, it turned into a complex crisis of proportions that affected not only the health system but also the entire fibre of the society, with multiple ramifications in all its major fields. Hence, the future solutions for recovering the disaster generated would have to begin by harmonizing the priorities from each sector touched by the crisis, however, from the perspective of an integrating vision. We refer in the context to an accumulation of sectoral-type crises that affected the main fields of social and human system, such as the national economy, political governance system, and patterns of the welfare state, educational system, employment system, migration, energy, food, human being identity with a great impact on individual's alienation from the own essence, cultural values and norms and of the civilization's identity, moral values and norms, interpersonal relationships, family and of family relations, national and identity values, etc.

Unfortunately, the thorough analysis of the pandemic, not only of the health system, proved to be limited, without an all-encompassing vision regarding the health state of the Romanians. The health policies thus oriented were not providing enough coverage of the multiple needs of the ill persons. More urgent needs of the population, related to chronic diseases and severe health risks, other than the ones generated by COVID-19, remained therefore unaddressed. Failing to treat these diseases in a timely manner caused a rapid degradation of the health state and was often finalized with deaths. Moreover, next to the health system, many other important fields of the society such as education, social assistance, employment, migration, culture, etc. were in turn endangered. Perhaps, therefore, the governing authorities – using sectoral mitigation policies regarding the COVID-19 crisis – which is completely unusual because of the multiple effects, should have imagined an integrated and unitary complex package of active measures for all key fields of the society from the very beginning. These, doubled down by responsible actions of change and recovery, should have covered timely, to equal extent, the losses incurred by all important socio-economic sectors of the social system. It was

required right from the beginning of the pandemic that an integrated, holistic-type vision for the normal functioning of all social fields in their interdependence and complementariness is to be enforced. The innovation of a coherent, sustainable, all-encompassing strategy for the entire social system should have considered the functions and roles of each particular field in the structuring and functioning of the whole [11].

Naturally, at the beginning, demands were made that priority be given to maintaining the actions for urgent and forceful intervention for preventing and reducing the risks of the infection. At the same time, however, rebuilding/safeguarding the socio-economic and moral balance of the Romanian society for avoiding the deepening of an inevitable system structural crisis should have also considered the social issues that have remained unsolved during the transition and that have accrued in time. Even now, after 32 years of transition, we still have an inefficient underdeveloped economy, dominated by disorganization and flawed management. The GDP, a synthetic indicator, places Romania's economy among the last positions within the EU.

It is well known that in the evolution of society, economic crises have produced massive decreases in living standards. At the same time, the periods of austerity have left deep traces in the worsening of the social status of the population with visible changes in value orientations, in the level of expectations and satisfaction with life. It should be noted, however, that not all the population has equally borne in the past, nor do I think it will equally bear in the future the social cost of crises and periods of austerity. In the history of mankind, the unequal distribution of sacrifices during periods of economic crisis and austerity reinforces the requirement/necessity of involving the state and its public institutions in the responsible management of active measures of assistance and protection for highly vulnerable categories and groups. Marginalized groups remain the most at risk, dependent on social assistance and with no chance of immediate recovery, especially children. In the conditions of the pandemic crisis, the process of marginalization and social exclusion is expanding and becoming more and more pressing for large vulnerable categories. The social situation of the country is getting worse by deepening poverty and extending it to the group of children and youth.

Statistical analyses show that in Romania, the at-risk-of-poverty rates are very high in the most vulnerable groups, for example, families with children [1].

In Romania, the most affected age groups in terms of financial vulnerability are children, followed by young people: in 2020, 30% of children, respectively, 28% of young people, were at risk of poverty (Chart 16.1).

Also, the risk of poverty among children and young people was higher than the risk of poverty among the entire population for the entire period 2009–2020, culminating in 2014 among children and 2015 among young people [4, 5]. Compared to the EU-27, Romania has in 2019 the highest risk of poverty among children under 18, with a rate of 30.8%, 1.6 times higher than the EU average of 19.4%.

Poverty-generating structures and severe poverty are still maintained. No adequate mechanisms have been found to block the establishment of a generational culture of learned poverty and disability/impotence. It is no coincidence that special

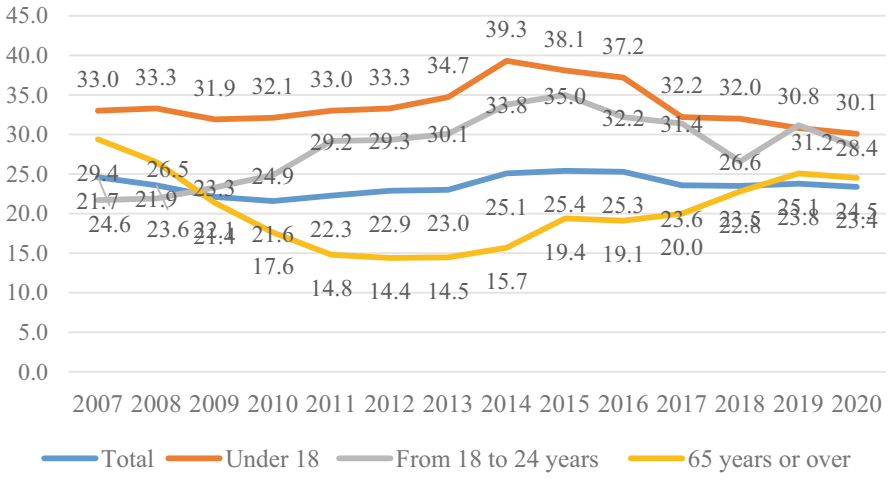

Chart 16.1 Romania: Poverty risk by age groups, 2007–2020. (Source: Eurostat, ilc_li02)

attention is paid to the current European social policy guidelines but also to the EU's recommendations to member countries, in the process of combating social exclusion. Poverty has spread to Romania and remains worrying for vulnerable individuals, groups, and communities [1, 2, 10]. The level of poverty, however measured, including the EU methodology, reaches the threshold of 35% of the country's population. The culture of poverty seems to gain increasingly roots in Romania, being associated also with phenomena of organized crime of some criminal groups, which is visible sometimes even among the young generation. Unfortunately, a new lifestyle is being installed based on the acceptance and internalization of a "culture of poverty and learning disability" for a growing category of people at high risk of marginalization [10].

Also, official statistical data lead to the conclusion that Romania is and has turned into a poor country. Exiting poverty remains also a priority objective for the future of the post-transition and the post-pandemic phase [18, 19].

Education might be regarded as well as hampered by the transition [5, 20]. It is in a state of chronic distress because of underfinancing. Underfinancing maintained the school at survival level and at a low quality of the educational process. To this was added the confusion of frequent attempts to reform. The school system is affected negatively also by the lack of social support for disadvantaged children. The crisis of the rural schools augmented the polarization of school performances. The low attention paid to social support for children and families with children is probably the main reason for decreasing school participation and demotivation for attending school [18, 19].

In Romania, more than in other European countries, the low level of education of parents is an important factor in relating to/with producing and increasing the risk of poverty among children.

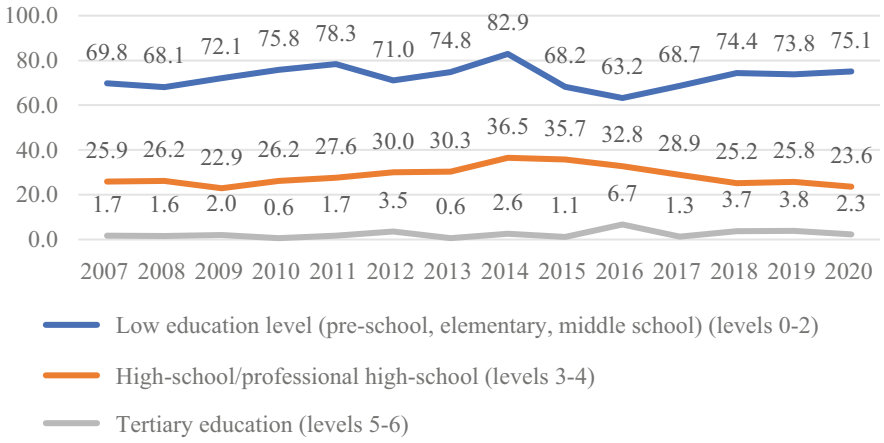

Chart 16.2 At-risk-of-poverty rate for children by educational attainment level of their parents. (Source: Eurostat, ilc_li60)

Statistics show that in Romania, 3 out of 4 children with parents with a low level of education were at risk of poverty in 2020, compared to only 2 out of 100 children with parents with a high level of education (university and post-university). Very large differences between the risk of poverty among children with parents with a low level of education and the risk of poverty among children with parents with a high level of education have persisted in the last ten years (2010–2020), with an increase of polarization in 2013–2014. Parent education in Romania has a greater impact on children's well-being than in other EU countries (Chart 16.2).

Paradoxically, in Romania, during the transition, the state became increasingly more detached from the severe social issues of the population, by diminishing visibly its social protection and assistance functions [4, 5]. Our state, small according to European standards, has, nevertheless, areas that are excessively grown because of inefficiency [10, 16].

COVID-19 crises were perhaps more emphatic in emphasizing the unsolved issues of the past. To these issues were added several other new specific issues of the pandemic crisis. Unfortunately, answers and solutions for these sectors were neglected by governmental authorities and postponed for another phase. Their negative impact on the quality of life was, however, predictable even right from the beginning. In fact, the loss of jobs, diminishment of incomes, economic and moral disaggregation, precarious education of the children and youths, damaging effects of separating from the family and forced isolation, aggravation of chronic diseases, etc. were worrying phenomena expecting, all, a swift answer at the level of governmental policies. Failing to address timely these basic needs for a decent living standard and the stability of the behavioural balance generated at subjective level (individual and collective) frustration, discontent, and deep dissatisfactions. These were shown initially under the form of open street conflicts.

16.3.2 What Will the Future Profile of the Quality of Life Look Like? We Currently Have More Questions Than Answers

The new profile of the quality of life outlined by its objective and subjective dimensions brings about an avalanche of questions that are raised in the face of the research in both COVID and post-COVID phase. We begin from the obsessive question that remains unanswered currently:

- How different will the future social-economic development model be, against the current one and the one designed up to now? This general question leads us to other questions with particularly distinct ramifications regarding structure, orientation, priorities, and problematic emphasis of the new profile of the quality of life changed by the pandemic.
- How will these visible changes impact the new institutional structures, methods used for re-launching the post-pandemic national economy, political leadership structures, role of the welfare state, lifestyle, interpersonal relationships and in the family ones, moral values and norms, etc.? Around this question, many others can be raised, just as legitimate. In fact, currently, we have more questions than possible answers.
- Will a new model for the quality of life emerge, with new content by theoretical redefinition and practical opening, or will it remain as it was launched by theoreticians or scientists but also agreed on by those in the decisional sphere of politics during the 1960s?[1]

[1] Strange. "If we return to the history of the emergence of the concept of quality of life, at both theoretical level and of practical action, it still makes us ponder even today. The emergence, launch and popularity of the quality of life as a distinct concept, with theoretic significance, but also with practical action possibilities coincided in 1967 with the emergence of a report about a serious sea incident with extremely uncomfortable effects on the life of the individual in western media. A huge oil carrier had sunk near the French coasts. A wave of oil carried by the ocean invaded the beaches and destroyed vast land surfaces by polluting everything around, destroying the landscape and marine life and by sending tens and thousands unhappy people home from holidays. Faced with such danger, the people were disarmed. It was hard to answer/act immediately to this devastating event. It was one of the instances in which industrial development manifested its unwanted, disagreeable sides. Something had gone out of control. In that summer, heated debates occurred at the level of the public authorities, politicians, journalists, media people, ecologists regarding the discontent and concerns related to the respective accident/ecological disaster. The quality of life then became an extremely popular concept, which was rapidly taken over in both the academic research environment, and in the practical concerns of the political decision factors. Quality of life quickly turned into an extremely all-encompassing/covering concept for all dimensions of human life, accepted by scientific, technological, and engineering researches, etc., and also in the practical-actional fields. It was driven, at the same time, by the development of some tools, techniques, and possibilities of measuring and evaluating the quality of life. It should be mentioned, in the context, that it brought back and translated the old and eternal issue of happiness in modern acception. Even if there was non direct link between the two events mentioned above (the accident and the popularity of the term quality of life), a post-factum association, this proves that moments of risk,

- What impact will these changes have on the new generations in their value orientation, at the level of aspirations and in their satisfaction with life?
- How will the population adjust to the rapid changes imposed by the new conditions of the information society and by the new technologies much more emphasized in the pandemic period?
- To what extent will the increase in the quality of life be linked with sustainable changes focused on individual welfare and satisfaction with life? What role will solidarity play in the life of the community and in its projects of community development?
- Will solidarity be an illusion/a hope expected by the community or an efficient symbol of shared action?
- What will a new model of education and shaping human sensibility, of cognitive rationality, or economic efficiency look like?
- How will all these changes be internalized at a behavioural level?
- Will the changes – in time – be stabilized into a new model for the quality of life, which will consist of the losses and gains of the values of modern civilization, for the economy, and for the individual?

And the list of questions remains open, etc.
Of course, all these questions will be better outlined and clarified over time:

- When the reality of the facts will be visible and decipherable for the researcher.
- When the causes for the pandemic outbreak will be clarified.
- When verified data and new and credible statistics about the evolution of the infection will be delivered.
- When the actual costs of the incurred losses and the disaster generated by the pandemic will be calculated.
- When the professional and moral responsibility of the political decision-makers and of those managing the all-comprising, multiple COVID-19 crises will be evaluated.

It is known that wisdom/rationality in the correct analysis of social history "clears" over time this happens when the social reality "settles down" and when it becomes decipherable for research, as Hegelian philosophy correctly stated, "Minerva's owl takes flight at dusk".

At the same time, at global, regional, and national levels, the basic difficulties of social development such as the physical limits of the planet and its limited natural resources, the growth of the elderly population, the demographic decline, impoverishment, constant limitation of jobs, fixation/deepening of persistent poverty, the increase of income and wealth on the one hand versus a massive poverty process on

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of extended danger, accidents of any kind, shake our balance and direct us to thinking again and again about the twisted effects of modern civilization. At any time, they might turn against the human if not controlled timely, and if not used responsibly. Once again, the ethic of social action is a constant imperative of using modern technologies. They were discovered by humans and should be used only to the benefit of the human" (Zamfir, E [12, pp. 27–28]).

the other, etc. can no longer be ignored. All the aforementioned aspects are part of a complex of factors and conditions that will guide future research of the COVID and post-COVID stage.

16.4 Replacing Conclusions: COVID-19 Relief Starting Points

In the economic sphere, the identification of problems during the pandemic highlights aspects of an economy blocked by multiple restrictions: booming unemployment, rising job losses, the presence of a growing segment of unemployed population correlated with labour migration, sharp declining incomes, etc.

An analysis of the costs of the pandemic and the identification of possible solutions to return to normalcy has increasingly nationally and globally mobilized the interest of policymakers, financiers, scientists, economists, sociologists, political scientists, etc. A new paradigm of economic growth was also imagined [3, 6]. This was also doubled by a new vision of the relationship between material well-being/standard of living and serious social problems of communities. Individual well-being and satisfaction with life thus become part of a socially inclusive economic growth. It tends to become more responsive to community issues and the dissemination of its results in the community. We then find these changes in lifestyle, life satisfaction, interpersonal relationships, family life, neighbourhood relationships, work, etc.

During the 2 years of the pandemic, important changes were highlighted in the public paradigm, collective understanding of the quality of life at the level of structure, orientation, priority, problematic accents, etc.

Although some scientific predictions are made about what the future quality of life model will look like, it remains uncertain, little outlined in current research. The vision of automatic trust in a "better" gives rise to a major underlying concern. The risks of the future become an area of great interest for policymakers but also for specialists.

Exiting the transition phase can be achieved only by promoting a sustainable program for the social-economic development of the country.

It is true, in Romania, during the 2 years of the pandemic, the multiple disorders felt at the level of the social system as an articulated whole were over-accrued and emphasized the severe social issues unsolved during the transition. In fact, the general balance of the society as a structured and functional system and its sustainable development depend on the particular state of evolution of the specific social sectors/fields.

In fact, all basic sectors of the society were severely affected by the pandemic. Therefore, the post-crisis strategies/measures must relate to the development of the social system in its entirety, by maintaining, however, the priorities of each social sector/field. From this perspective, cooperation between the political governmental authorities and the non-governmental ones at national, regional, community, and local level becomes a necessity. Constant concern for crystallizing and

implementing a culture of cooperation, solidarity, and building "together" should govern the process of recovery in Romania in the post-COVID period. Social solidarity must be imposed as a presence of support policies for vulnerable groups.

This presupposes the unity of all political and decisional forces but also of the social stakeholders based on a national consensus.

Also, there should have been changes in the moral sphere as an important dimension of quality of life.

The responsible proposal of some strategies for rebuilding the country in the post-COVID period will need to have as basis sectoral social policies in their unity and interdependency. Opening them to sustainable and balanced development of the social and human system in its entirety is the guarantee for rebuilding normality.

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Chapter 17
Special Employment Centers: The Spanish Response to the Insertion of People with Functional Diversity and Its Impact on the Social Economy

Manuel Escourido Calvo, Félix Puime Guillén, Lucía Fernandez Rumbo, and Raquel Fernández González

Abstract People with functional diversity constitute a vulnerable group that suffers the consequences of exclusion, which leads to the limitation of their freedoms and rights and to the impediment of their full personal development. Consequently, it is the duty of public administrations to guarantee specific measures that contribute to the full realization of the right to social inclusion. Especially, in the Spanish labor field, special employment centers play a key role due to their great effectiveness. For all of the above reasons and based on the need to contribute to the creation of a fairer and more inclusive society, the advances that have taken place and the different policies and measures implemented with respect to this issue have been widely analyzed by the academia. However, the main objective of this work is to demonstrate that public investment in these centers will bring a positive social return that not only results in greater well-being for people with functional diversity but will also benefit the economy as a whole. To this end, a novel approach will be proposed through the case study of COGAMI (Galician Confederation of People with Disabilities) as an example of reconciling economic, social, and environmental development with the integration of people with functional disabilities. Moreover, in order to offer an approach based on the cost-benefit analysis as well as an integrated assessment of the economic and social values of the organization, both the ISV (Integrated Social Value) and the SROI (Social Return on Investment) methodologies will be used.

Keywords Social economy · Labor insertion · Special employment center

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17.1 Introduction

Social integration is a fundamental right for all individuals, which reflects the urgency for public administrations to develop policies and measures to facilitate its fulfilment. However, people with disabilities not only have the right to be employed, but also many are prepared for it. Therefore, the deprivation of access to the labor market causes physical and psychological damage to this group, which will have to face the consequences of marginalization and poverty, facing unemployment rates well above the average of the general population. According to data extracted from the INE [8], in 2019, 6.2% of the Spanish population of working age (i.e., between 16 and 64 years old) had a disability certificate, which translates into a total of 1,876,900 people. However, of this 6.2%, only 1.56% were recruited. Thus, 65.98% are considered inactive in the labor market, while the activity rate of the group stands at 34.6%, which, in comparison with that of the rest of the population (77.7%), is quite low. On the other hand, the possibility of adapting to the world of work favors full personal development, since opportunities would be offered universally, with no room for discrimination and, therefore, contributing to equality of conditions.

Under these circumstances, it is worth highlighting the figure of special employment centers, which are especially relevant in terms of the search for opportunities for regular participation in market operations through the performance of productive activities, thus ensuring employment and its corresponding remuneration to people with functional diversity. Sheltered employment centers have their origin in France, in the sixteenth century, and have experienced their international expansion throughout the eighteenth century. After World War II, the number of these centers increased enormously, and in Europe, there were around 350,000 people taking part in them [9].

Special employment centers in Spain emerged with Law 13/1982, of April 7, 1982, on the Social Integration of the Disabled (LISMI), which marked a turning point in terms of labor integration policies for people with functional diversity in the field of ordinary employment [11]. According to Article 43.1 of Royal Legislative Decree 1/2013, they are defined as:

> Those whose main purpose is to perform a productive activity of goods or services, participating regularly in market operations, and are intended to ensure gainful employment for people with disabilities; at the same time, they are a means of inclusion of the greatest number of these people in the ordinary employment regime. (Royal Legislative Decree 1/2013, 2013: 95653)

These centers can be created directly by the public administrations or by means of the collaboration of these with another organism. In addition, they may also emerge from entities, both natural and legal persons, as well as communities of goods with legal capacity and that can act with the purpose of being entrepreneurs. On the other hand, they may have a public or private nature and may or may not have non-profit-making intentions. Their registration and qualification will take place in the Registry of Centers of the State Public Employment Service (SPEE) or in the Registry of Centers of the corresponding Regional Administrations, if applicable [18]. Regarding

its staff, it must be made up of at least 70% of disabled persons with a disability of at least 33% [11]. Until the beginning of the economic crisis in 2008, its influence has been increasing, reaching a total of 2202 centers in Spain in 2019 [20]. In fact, sheltered employment is considered one of the most effective tools for the labor insertion of people with functional diversity in Spain, helping this group to find a job, as well as providing educational support and facilitating their access to the labor market [7].

The vast majority of Special Employment Centers are part of the social economy and are characterized by the fact that their activities are mainly in the service sector, regardless of their legal status. As for the industrial sector, they also stand out for their focus on handicraft and manufacturing activities [9].

In order for these centers to have the possibility of effectively fulfilling this social function, public administrations must contribute through economic compensations that facilitate their viability and through the control systems considered pertinent, as established by the Article 44 of Royal Legislative Decree 1/2013. Likewise, it is also determined that, in order to receive such compensations, special employment centers must be nonprofit, in addition to being of public utility and complying with the condition of indispensability. According to Escourido and Puime [6], among the main public aid received by these centers, we can highlight the following:

Subsidies that contribute to the financing of those projects that generate employment, such as the creation or expansion of special employment centers, and that are destined to an improvement in technical efficiency, financing of interest on loans used to finance the project, and investment in fixed assets.

Aids for job maintenance, among which we can include a 100% rebate for each temporary and permanent contract of the company's Social Security contribution, aid to facilitate adaptation to the job and technical assistance, or aid to balance and contribute to the financial reorganization of special employment centers, among others.

Aid for professional activity support units, defined as those multi-professional teams that collaborate in overcoming obstacles in the process of incorporation and permanence in a job by people with disabilities.

However, the main objective of this work is to demonstrate that public investment in these centers will bring a positive social return that not only results in greater well-being for people with functional diversity but will also benefit the economy as a whole. To this end, a novel approach will be proposed through the case study of COGAMI (Galician Confederation of People with Disabilities) as an example of reconciling economic, social, and environmental development with the integration of people with functional disabilities.

It is due to this growing prominence of special employment centers as a measure of labor insertion that this chapter aims to demonstrate the positive social return derived from greater public investment in them, which will result in a wider range of job opportunities and greater independence for people with functional diversity, favoring their effective personal development. To this end, through the particular study of the case of COGAMI (Galician Confederation of People with Disabilities), the aim is to determine how these centers constitute a clear example of integration and how their activity has a positive impact in social and economic terms.

COGAMI (Galician Confederation of People with Disabilities) is a public non-profit organization made up of 55 associations of people with disabilities in Galicia region, in which more than the 90% of the people involved in its activity has functional diversity. This organization offers services to people with disabilities, either directly or by supporting member organizations in various fields, such as the prevention of dependency, the promotion of autonomy, and the elimination of physical and mental barriers, as well as improving accessibility, training, sport, and leisure [6].

Furthermore, we must emphasize the work that constant communication carries out in order to contribute to the improvement of the "visibility" of people with functional diversity, as well as to guarantee institutional presence of the group. On the other hand, it also has four daycare centers with public places and a staff of 1108 volunteers who provide support to people with disabilities and their families in order to meet their needs.

In 2020, it has contributed to employment training by launching 13 face-to-face and 9 online courses, adapted to the pandemic situation, resulting in a total of 301 people trained and a 35% job placement rate. Thanks to its employment guidance service, 1705 people have been able to find a job since 1996, when it was launched.

This confederation is not only the founder of the parent company of the commercial group Galega de Economía Social but is also responsible for the management of two other centers (Combina Social S. L. and Activa Social ETT S. L.), whose economic sphere of action is in the environmental, textile, graphic arts, distribution, food, consultancy, and transport sectors. As a result, more than 600 people were employed, 90% of them people with functional diversity.

According to its webpage, COGAMI is participating in 11 social economy business initiatives that are mainly focused on the environmental, food, graphics, textile, transport, and distribution sectors [4]:

- Coregal: it focuses on the transport and environmental management of waste, as well as selective collection, document destruction, and the rental of various means and collectors. It is considered the largest social economy enterprise belonging to COGAMI, with more than 150 employees, 90% of whom are disabled.
- Dixardín: it is focused on the design, construction, and maintenance of green spaces. It also works in the restoration and reforestation of natural spaces and in the maintenance and care of leisure spaces, as well as ponds, natural pools, and vertical gardens. It participates in activities related to training and environmental awareness and corporate landscaping. It is made up of 37 workers, 78% of whom are disabled.
- Trameve: it is based on the sale of second-hand car parts and on the valuation and collection by crane of damaged or out-of-use vehicles, as well as their dismantling. In addition, it is also dedicated to the purchase/sale of vehicles. Its staff is made up of ten workers, 90% of whom are disabled.
- Alentae: this social economy company was born with the COVID-19 pandemic and is based on the production and distribution of surgical masks. It relies on five automated production lines that can produce up to 13 million surgical masks per month.
- Grafinco: It is a special employment center whose main activity is design and offset printing. Its staff has grown to 12 people, 83.33% of whom are disabled.

- Accede social: it is dedicated to adapted transport, a demanded activity in COGAMI, facilitating its accessibility to people with disabilities, covering all the necessary routes in rural areas. It currently has 16 minibuses and a staff of 60 people, 100% of whom are disabled.
- Hornos Lamastelle: focusing its activity on pastries and Galician empanadas, this social enterprise has been implemented in Switzerland. It employs 75 people, 93% of whom are disabled.
- Integratex: it is a project in collaboration with INDITEX, which today has 20 employees, 90% of whom are disabled. It is focused on the textile sector, being its main activity the sale of clothing, footwear, and accessories.
- Galega de Economía Social: it was born in 2003 to provide advisory and consultancy services to the special employment centers that belong to the Group. Its staff is made up of 410 people, 90% of whom are disabled.
- Combina Social: it offers opportunities for companies to outsource auxiliary services, such as cleaning and maintenance, warehouse management and logistics activities, auxiliary services to companies, and social and health services. It is made up of 170 people, 93% of whom are disabled.
- Activa Social, E. T. T.: it was created with the aim of providing temporary hiring solutions to companies in Galicia that wish to hire people with disabilities. It has 35 employees, 89% of which are disabled.

17.2 Literature Review

The study of social enterprise has been a widely addressed subject by a large number of authors. In Spain, many articles have focused their attention on this aspect, particularly on the study of special employment centers, which have been of interest in order to contextualize the current situation of the issues mentioned in this chapter. Likewise, for this article, various bibliographical sources have been selected to analyze the importance of the social return of these organizations, using the SROI and ISV methodologies, both individually and comparatively.

In accordance with the study related to social enterprise, particularly with special employment centers, mentioning aspects such as their evolution and importance, the articles by Escourido and Puime [6], Gelashvili et al. [7], Jordán de Urríes and Verdugo Alonso [9], and Milán and Milán [11] can be highlighted. Furthermore, with regard to this area, it is also worth highlighting the importance of Spanish legislation, which also recognizes the great importance of these associations and establishes the principles by which they should be governed. In this field, mention should be made of the Royal Legislative Decree 1/2013, 2013: 95653, as well as the document published by the State Public Employment Service on special employment centers [18].

Additionally, as the results obtained in this article are focused on the Galician association COGAMI, data obtained from its website and its activity report for the past year 2020 have also been used [4, 5].

Finally, in relation to the methodology used, there are authors who defend the SROI as the measure used in their studies to determine the social impact of the social enterprise [12, 15]. On the other hand, others use the ISV methodology for the same purpose [3]. However, other studies opt for a comparison of the two [1, 2, 17].

For this reason, this article focuses on determining both SROI and ISV as methods for measuring the social impact of the case study, and in order to carry out a brief description of the methodologies used, the studies of Lingane and Olsen [10], Olsen and Galimidi [13], Roux [16], and Trapero-Bertrán [19] have been taken into account for the calculation of SROI. On the other hand, for the description of the ISV methodology, the study by Retolaza et al. [14] has been considered.

17.3 Methodology

The emergence of social enterprises requires the establishment of measures of performance in order to prove their effectiveness regarding its contribution to social, economic, and environmental causes. However, social enterprises may find difficulties in assessing their outcomes in such way that reflects all of the key elements of their functioning. For this purpose, several approaches have been utilized to facilitate the measurement of their performance, among which we can remark the SROI, due to its role in the understanding, management, and reporting of the created economic and environmental value [12].

For decades, the use of economic and cost-benefit or cost-effectiveness models when determining the economic impact of social enterprises was especially relevant. SROI methodology is one of these techniques but characterized by several differences. First, it is a practical management tool used in regular decision-making. Second, this method allows the maximization of social and financial benefits by managers [10]. In addition, not only does it take into consideration quantitative aspects of an organization but also qualitative ones, enabling the achievement of previously unknown results. Therefore, the benefits derived from its use are diverse. Among them, we should also consider that it is a method that helps the identification of the objectives of an organization and its stakeholders to facilitate its social value maximization, as well as the establishment of a dialogue with the stakeholders with the aim of engaging them into this value creation process. As a consequence, the professional image of the organization may be improved, contributing to the entry of social investment in the funding of the different projects that are being developed [16].

Social impacts according to the SROI methodology are developed with respect to the impact value chain, containing several stages and defined by Olsen and Galimidi [13] as:

(a) Inputs: they determine the required resources in order to perform an activity and consider monetary contributions, personnel, locals, and the team.
(b) Activities: they are the tasks carried out by an organization.
(c) Results: they contain the measurable activity products of the organization.
(d) Outcomes: they are referred to as the changes which occurred in the social systems and the side effects of the organization, either intended or unintended.
(e) Impacts: they consider the results that are directly attributable to the organization, which require to study the changes by exclusively considering everything that was created by the own organization, but not by external agents.

(f) Goal alignment: it has to do with the modification of the goals or the activities in order to achieve the impact that is desired.

The SROI is an analysis based on the understanding, measurement, and communication of the social, environmental, and economic values created by an organization. This methodology extends the concept of business value with aim being the reduction of social inequalities and environmental damage [16].

According to Rotheroe and Richards [15] SROI measures the value of the benefits or impacts created in relation to their relative costs, as it is shown in the following formula:

$$\text{SROI} = \text{Net Present Value of Benefits}/\text{Net Present Value of Investment} \quad (17.1)$$

From a different perspective, the main idea behind this calculation is related to the use of the available resources in order to generate the greatest impact in the achievement of the objectives. In this regard, the more that can be achieved with the same resources, the higher the value of the SROI will be [16].

In accordance with Trapero-Bertrán [19], we can distinguish two different types of SROI referred to the moment in which the analysis is done. On the one hand, the retrospective SROI is calculated with historical data and with results that had been previously obtained. It is normally developed by consolidated enterprises. On the other hand, the prospective (forward-looking) SROI is based on future predictions of the value created, assuming that the activities of the organization provoke the desired results. It is mainly performed by new or emerging enterprises.

The result obtained from the SROI is a ratio of monetized social value [15]. The principle of monetization assigns a monetary value as a proxy of the social value under study. Although this does not exactly reflect the whole value, the use of monetary approximations to reflect the social value is considered effective due to several reasons. First, it enables an easier alignment between the financial and value management results. Second, it facilitates the communication between the stakeholders and those who prefer the quantitative over the qualitative analysis. Third, it communicates the values that have been included and those that have not. Additionally, it allows the performance of sensitivity analyses that display the most important assumptions, and finally, it contributes to the determination of the sources of value. Notwithstanding, the existence of qualitative information about the project or the organization is crucial for the complementarity of the principle of monetization [16].

Notwithstanding, despite the advantages derived from the SROI analysis, several limitations can be considered when interpreting the results obtained. On the one hand, the SROI methodology can be useful while analyzing future investment projects (ex ante). However, it is not the most appropriate analysis when the objective resides in calculating the value generated in the past by an activity in continuity nor when there is not free availability in the use of resources (ex post). From the perspective of the utility generated, the SROI analysis can be helpful in terms of deciding about an investment, but it can be less useful when improving the

managerial processes related to the optimization in the value creation and distribution processes, as it does not consider the necessary ratios or indicators for such purpose [17].

The SROI methodology aims to measure the return on the investment in a social project, which in the case of special employment centers will be the socio-labor integration of people with functional diversity. As a consequence, the studies carried out with the SROI are mainly focused on the social object of special employment centers, and therefore, they are not considering the market and non-market value generated for all of the interest groups, as it is excluding the impact on stakeholders that are not directly involved to the social object of the center [2].

Consequently, it is necessary to use a different methodology focused on capturing the market and non-market value generated by the economic activity as well as the social activity of an organization, integrating both values into a single concept of value generation and considering the interest of all the stakeholders. Therefore, the analysis of the ISV (which expresses, in monetary terms, the global value generated by an organization, considering both economic and social results) is also required.

According to Ayuso et al. [3], the interest that resides in this social accounting model has to do with two aspects: first of all, due to its multi-stakeholders' perspective, as it considers all the perceptions of the different interest groups and, second, due to the possibility of assigning a monetary value to the social impact, therefore integrating it with the economic value generated by an organization. All of these aspects contribute to the generation of a more complete vision of the generated value, which is the ISV.

According to Retolaza et al. [14], this social accounting system resides on the polyhedral model that resides in four main assumptions:

(a) Accounting resides on an action research process in which the organization is responsible of identifying the value it generates.
(b) The stakeholders theory, which allows the understanding of the organizations as a whole with social responsibilities toward its stakeholders.
(c) A phenomenological perspective: the value variables are defined by the interest groups for being the ones who perceive the value generated.
(d) Fuzzy logic: a value is placed on the basis of proxies, but not in terms of economic transactions.

In addition, according to San José et al. [17], social accounting integrates three values of a diverse nature, implying that the data are obtained from three different sources, being the ISV the sum of the first two:

(a) Market value: it is the value generated though the economic activity of the organization, reflected in its transactional relationships and captured by accounting indicators, through which it is transposed into social accounting.
(b) Non-market value: it is the specific social value generated by the organization in non-market transactions and that requires to be monetized through a qualitative and a quantitative analysis. The qualitative one is based on identifying the stakeholders though a stakeholders' map and on determining the variables of value through a process of consultation with the stakeholders' representatives, while the quantitative one is focused on the monetization of the value perceived though indicators linked to financial proxies [3].

(c) Emotional value: it is a corrective factor of the ISV, and it is characterized by its subjective nature, which implies that it can only be obtained from questionnaires based on a representative sample.

Regarding the impact value chain, unlike the SROI methodology, the approach of the ISV analysis is mainly based on the inputs that are directly attributable to the organization and that provide value in the timeframe of reference, while the SROI analysis was focused on the determination of the most relevant changes experienced by the main affected stakeholders [3]. The activities are not evaluated, but those outcomes are directly assessed as dimensions of value perceived by stakeholders and which coincide with social impacts. This is why the analysis focuses exclusively on the organization's performance. Afterward, outputs are identified, as only those that have been transformed into outcomes/impacts are relevant [1]. By doing this, the ISV avoids the efforts derived from the SROI methodology resulting from the collection on primary data and from the development of a series of assumptions that isolate the effects provoked by the activity under analysis.

17.4 Analysis/Results Interpretation

The results obtained through the social accounting methodology for COGAMI applied to the 2020 financial year are shown in Tables 17.1 and 17.2.

As it is observable, the social market value, which includes the value distributed to the workers (net salaries) and to the public administrations (social security contributions, income tax, VAT, and other taxes paid) and the economic value distributed and retained in the organization itself (economic result and amortizations), amounts to 8,363,023.39€.

The non-market or specific social value accounts for 6,067,643.26€, representing the value distributed among the organization's stakeholders, and that contains the total amount of variables identified in the qualitative analysis and monetized in the quantitative one though with several financial proxies such as the benefits provided to the families, the environmental impact, or the avoided costs to public administrations for the services provided, among others.

Table 17.1 Main values of the social accounting

Market social value	8,363,023.39 €
Non-market social value	6,067,643.26 €
Socio-emotional value	19,038,550.80 €

Source: Own elaboration with data from COGAMI [5]

Table 17.2 ISV for COGAMI

ISV (market social value + non-market social value)	14,430,387.65 €

Source: Own elaboration with data from COGAMI [5]

Therefore, the ISV, resulting from the sum of both the market and non-market or specific social values and subtracting any duplicate values, results in an amount of 14,430,387.65€.

Finally, the analysis derived from the economic return obtained by the public administrations resulting from tax revenues, both direct and indirect, economic activity, and savings in social benefits will be carried out. The data provided by COGAMI [5] shows that each euro used to perform its activities is transformed into 1.70€ for the environment in which the activity is developed. Likewise, for each euro invested by the public administrations, a social return of 3.94€ is generated.

Consequently, due to the results obtained through all these data presented, the validation of the initial hypothesis that special employment centers are generators of social value is demonstrated.

17.5 Conclusions

Labor integration is a key element in contributing to minimize the risk of social exclusion of people with disabilities. In Spain, the figure of the special employment centers is remarkable, due to their great efficiency in terms of the number of people with diversity hired. Additionally, these organizations allow the compatibility of economic viability with the creation of jobs for people with disabilities and a better integration into the ordinary labor market.

As for the results obtained from their activity, in addition to focusing on the return derived to the main beneficiaries or funding bodies of these institutions, it is necessary to consider the overall value generated and distributed by special employment centers. This is why the complementary use of the SROI and ISV methodologies is essential in order to measure, from a different perspective, the social contribution of their activities. Considering and applying the abovementioned to the case study under analysis, it can be seen how both approaches reflect a positive social impact of its activity.

Among the practical implications that could be highlighted according to the results obtained, it is worth mentioning, firstly, the great work of these centers in favoring the labor integration of people with functional diversity, improving their independence and their levels of participation in the productive fabric of the economy. Moreover, on this basis, special employment centers will not only contribute positively to the personal and psychosocial development of people with functional diversity, but their influence will also have a positive impact on the economy as a whole. Furthermore, investment in the development of special employment centers will generate a favorable social and economic return, so that the implementation of this methodology of socio-labor integration by other EU Member States could result in an increase in the welfare of disabled people in all member countries as well as in greater development and economic growth.

Notwithstanding, further research on the subject should analyze the ISV from a deeper perspective. It is crucial to consider its limitations in terms of the necessary data for the monetization of its variables, as well as the relationship of the organization under study with the intangible variables, derived from the generation of socioemotional value.

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Chapter 18
Geospatial Characteristics of Unemployment for the Period 2010–2020 in the South-West Oltenia Development Region, Romania

Adelina Neniu, Sorin Avram, and Carmen Gheorghe

Abstract This chapter aims to analyse the dynamics of unemployment in the South-West Oltenia Region, through comparative approaches at the level of the counties and localities, for the period 2010–2020, and the factors that influenced the level of this indicator. In the current economic context generated by the COVID-19 pandemic, which has affected the activity of many companies and has even led to a restructuring of the labour force, the unemployment rate recorded in Romania is 3.4% in 2020, and the region with the highest rate is South-West Oltenia, with 5.5% (NIS/National Institute of Statistics. Tempo online database. Accessed at http://statistici.insse.ro:8077/tempo-online/ in December 2021, 2021), being one of the weakest regions in the country in economic terms. In the analytical approach, the statistical data used are sourced from the National Institute of Statistics and have been used to create databases in GIS and Excel and will be represented through cartograms and charts. The Pearson coefficient was also used to determine whether there is a correlation between the level of gross domestic product and the unemployment rate within the region. Analysing the dynamics of the unemployment rate, in the period 2010–2020, at the level of South-West Oltenia Region, a significant decrease (about 4 percentage points) was observed, both due to the stabilization of the economy after the 2009 crisis and to the development of new branches in the tertiary sector. Within the study area, discrepancies between the region's counties were highlighted, with Dolj and Mehedinti counties having the highest

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unemployment rate due to the accentuation of the demographic aging phenomenon, the decrease in the young population and the low level of education of the population. The present study can make a significant contribution to the literature because three statistical indicators of unemployment (unemployment rate, number of unemployed and their proportion in labour resources) are analysed in correlation with other variables such as GDP, education level of the population, the structure of the total and employed population by age group and economic activity.

Keywords South-West Oltenia Region · GIS · Pearson coefficient · Economic development · Unemployment · Demographic aging

18.1 Introduction

The unemployment rate is a macroeconomic variable considered an important sensor of the economic situation of a country and the structure of its working population [17, 41, 43]. The unemployment rate has been on an upward trend in Romania, but also in Europe, being influenced by the economic crises that occurred over time: the economic crisis of 2008, the Euro debt crisis [7] and the economic crisis generated by the COVID-19 pandemic [10]. In recent decades, the number of people under 40 years of age has declined, simultaneously with a falling birth rate, which has affected labour force quotas [31]. The high unemployment rate is a decisive factor in the migration decision of the Romanian population, being one of the "negative conditions of the labour market" ([37], p. 233). Unemployment causes negative effects on the population, both at the individual level, problems within the family, low standard of living, increased level of dropout in education, emigration, low birth rate, psychological problems or low level of experience; from a social point of view, the cost of unemployment, labour conflicts or increased crime rate [36]; and on the labour market, restriction of the number of hours worked, the desire to work part-time, or the decrease of "social contributions of employees" ([29], p.9).

Based on these ideas, the present study focuses on the analysis of unemployment about the economic situation of the South-West Oltenia Region, with special attention to the factors that negatively influence this indicator. The importance of this study derives precisely from the fact that it analyses a region that has a difficult economic situation, with a predisposition to a significant accentuation of the phenomenon of demographic aging and with labour force problems.

18.2 Literature Review

The unemployment rate is expressed as the proportion of the unemployed in the active population, and according to Law no. 76/2002, the unemployed are persons capable of work (aged at least 15 years) who simultaneously fulfil the following conditions: they are unemployed, looking for a job and available to start work in the next period if they find a job.

In Romania, between 1990 and 2020, the unemployment rate fluctuated widely due to "changes in the national economy" [19, p. 164]. Since 1990, the unemployment rate has been on an upward trend due to the change in the economic system in 1989, which led to numerous bankruptcies of industrial companies [22, 35, 43] and the start of extensive economic restructuring processes, with the unemployment rate rising to 11.8% (1999), as well as the transformations induced by the transition to a market economy [6, 19]. Since 2000, the national economy has experienced rapid growth and relative stabilization, but many difficulties due to various factors have remained [36]. The economic crisis of 2008 manifested itself in a decrease in employment and an increase in the unemployment rate [13], with approximately 700,000 jobs being lost between 2009 and 2011, mostly in the industrial and construction sectors and predominantly to unskilled workers [6, 31].

Some authors argue that the high unemployment rate reflects instability in the labour market and the fact that the country's economy is underdeveloped [10], necessitating the development of strategies to propose measures to reduce the level of this indicator, adapted to the country's current economic situation [3, 17]. The specific literature in this field shows that there is an inverse proportional relationship between the unemployment rate and the size of gross domestic product (GDP); in this context, the South-West Oltenia Region has the highest unemployment rate and the lowest value of the gross domestic product [13]. In counties with high employment, the unemployment rate is low, while in counties with low employment, the unemployment rate is increasing [37].

In the current context, the COVID-19 pandemic has had a major negative effect on Romania's economy, and the analysis of the unemployment rate has become a fundamental process because the pandemic also has a negative impact on the labour force in all fields of activity [5, 10]. The COVID-19 pandemic has led to an increase in the unemployment rate and a decrease in the size of the working population because of the temporary closure or restriction of certain categories of economic activities in most sectors of activity: industry, HoReCa, trade, construction, etc. [5].

Researchers who have analysed unemployment have also taken into account other variables to deepen their understanding of this economic phenomenon. Romanian researchers have analysed the link between the unemployment rate in Romania and inflation using the Pearson coefficient [19] and the Phillips curve [14, 19], and to analyse the economic performance, Herman [19] used the misery index showing that between the two indicators, there cannot be a strong relationship; the relationship between unemployment and the underground economy using the Toda-Yamamoto approach [8] or the ARDL model and the CUSUM and CUSUMSQ tests [9]. Also, in the literature is analyzed the link between unemployment and non-performing loans using the Pearson coefficient, with authors Iuga and Lazea [23] showing that there is a close relationship between them (if the unemployment rate increases, non-performing loans increase too); the correlation between unemployment and GDP; the relationship between unemployment and real GDP growth using Okun's law, showing that increasing values of gross domestic product are correlated with low values of the unemployment rate [12].

The Box-Jenkins methodology is used to determine credible forecasts in numerous studies both worldwide [15, 28] and in Romania [4, 10, 11, 39]. Other researchers around the world have used various techniques for unemployment rate analysis, such as autoregressive threshold, autoregressive (TAR) models [18, 26], logistic smooth transition autoregressive (LSTAR) model [42] and autoregressive, GARCH, SETAR, or neural network models [25, 34]. In Romania, for unemployment rate forecasting, the Bloomfield exponential spectral model, ARMA model [16], Hodrick-Prescott filter [38, 40], Holt-Winters exponential smoothing technique, Monte Carlo simulations [38], Kalman filtering methods and VAR models [40] were used.

18.3 Study Area

The present study was carried out for the South-West Oltenia Development Region, which consists of 5 counties, Dolj, Olt, Mehedinți, Gorj and Vâlcea (Fig. 18.1), 11 municipalities, 29 cities and 408 communes [1], with different levels of economic development and therefore varying unemployment rates. The region had an area of 29,211 km^2 in 2014 [30], being the region with the smallest area in the country

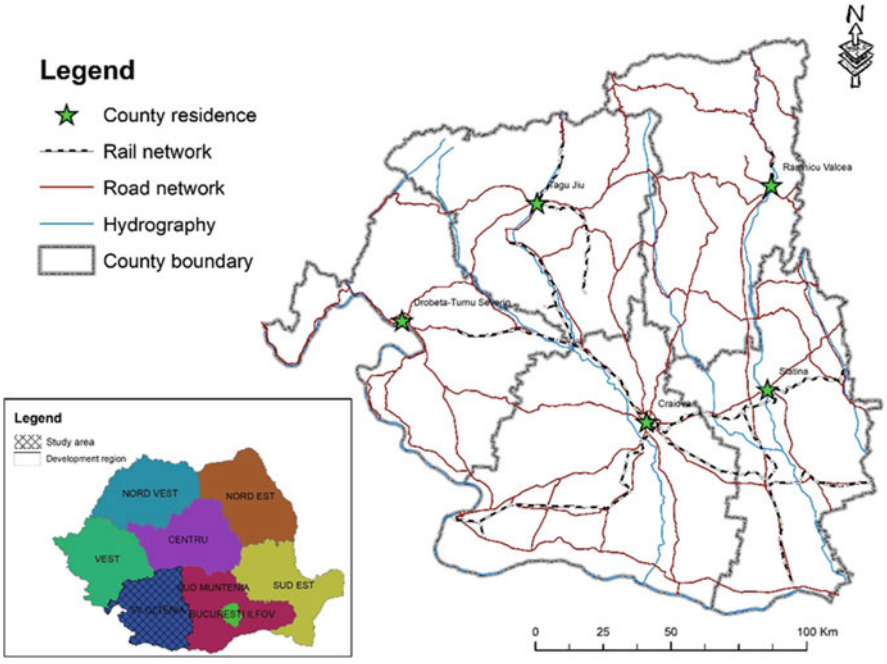

Fig. 18.1 Location of South-West Oltenia region in Romania. (Source: data processing [44])

(excluding the Bucharest-Ilfov Region) and a population of 2,146,177 inhabitants in 2020 [30]. The geographical location of the region is favourable for economic development, but it is placed within the regions that have low economic activity and a low contribution to Romania's GDP, which is also one of the reasons for selecting this area for analysis.

18.4 Methodology

This paper analyses the relationship between the size of GDP (RON) and the unemployment rate in the South-West Oltenia Development Region, using the Pearson correlation coefficient for two time periods, 2010–2014 and 2015–2019. As demonstrated by other Romanian authors [12, 13], there is a high, inversely proportional correlation between the unemployment rate and the level of gross domestic product, i.e. low GDP causes an increase in unemployment, which is also characteristic for the South-West Oltenia Region.

The Pearson correlation coefficient between the unemployment rate and the level of gross domestic product is calculated according to the following equation:

$$r = \frac{n(\Sigma xy) - (\Sigma x)(\Sigma y)}{\sqrt{\left[n\Sigma x^2 - (\Sigma x)^2\right]\left[n\Sigma y^2 - (\Sigma y)^2\right]}}$$

According to Nettleton [32], Pearson coefficient values can range from −1 to 1, where −1 indicates a significant negative relationship (x increases and y decreases), 1 represents a significant positive relationship (a direct relationship where x and y increase), and 0 indicates no relationship.

The high values of the unemployment rate in the South-West Oltenia Region and its dynamics in the period 2010–2020 require a detailed analysis of certain indicators that have a direct influence on it, such as the economic situation, education level, age and gender structure of the population. The current study also aimed to make a comparative analysis of the growth rates in the period 2010–2020 for two other statistical indicators, namely, the proportion of unemployed and the number of unemployed in the administrative-territorial units of the South-West Oltenia Region. The statistical data provided by the National Institute of Statistics (Tempo online) on the unemployment rate, the proportion of unemployed and the number of unemployed were used for the creation of GIS databases, with various cartographic processing in ArcGIS 10.5 and graphical processing in Microsoft Office Excel 2007. Vector data on the boundary of the South-West Oltenia Development Region, the counties and the component administrative-territorial units were also used.

18.5 Results and Discussions

18.5.1 Regional and County Analyses

South-West Oltenia Region is characterized by low economic activity, with a gross domestic product of 81,735 million lei, having the lowest regional GDP and representing 7.7% of Romania's GDP (2019), as well as by the highest unemployment rate among the eight administrative-territorial regions of Romania, namely, 5.2% (2019).

The Pearson correlation coefficient calculated between the unemployment rate and the level of the gross domestic product of the South-West Oltenia Region for the periods 2010–2014 and 2015–2019 shows a negative relationship between the two variables (Table 18.1). Therefore, the increase in the unemployment rate is influenced by the decrease in the level of gross domestic product, and there is an inverse proportional relationship between these variables. Table 18.1 shows the values for the T-test that show a large difference between the two periods, and the P-value for the 2010–2014 interval reflects a non-significant result as it exceeds 0.05, while the second period has a significant result, the value being below 0.05.

In 2019, the main economic activity in the region was agriculture, which, together with forestry and fishing, employed 30% of the total employed population, followed by the service sector with 26.7%, industry (20.9%) and trade (13.3%). The low gross domestic product of the region highlights a low level of economic development, causing problems in the workforce: low labour resources (1193,4 thousand), low active population (825,9 thousand people in 2019) and high unemployment rate.

In counties with a low gross domestic product, the unemployment rate is high, as is the case of Mehedinti County (Fig. 18.2), which has the lowest contribution to the region's GDP (7684,8 million lei in 2019) and the highest unemployment rate (6.8% in 2019), the main cause being the decrease in the active population (15–64 years old) and the low level of education (only 6112 university and pre-university graduates in 2019). Dolj county has a different situation in the context of the highest GDP among the region's counties (26449,9 million lei) and the highest unemployment rate (6.7%) in 2019, against the background of an increasing demographic aging phenomenon, a drastic decrease in the young population (its migration to other cities in the country or Europe) and the fact that the county's main economic activity is agriculture.

Unemployment is also influenced by the low level of education, taking into account that only 49,928 inhabitants of the region (2019) are graduates of pre-university education (41,986 inhabitants with pre-university education, of

Table 18.1 Pearson correlation coefficient

Period	Coefficient (r)	n	T statistics	DF	P value
2010–2015	−0.04704	5	−0.081567	3	0.940543
2015–2019	−0.98918	5	−11.6782	3	0.001352

Source: Authors' processing

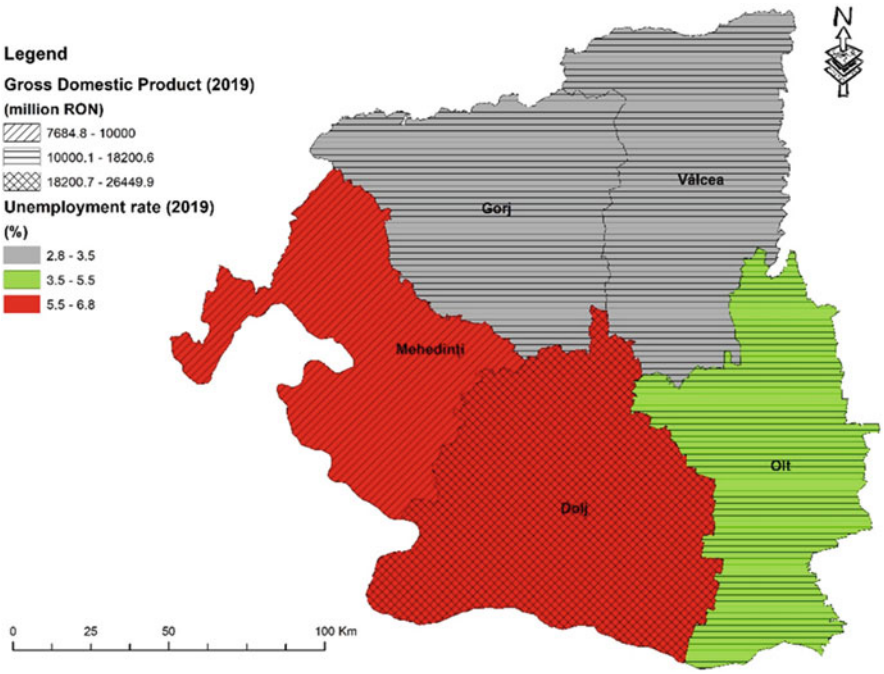

Fig. 18.2 Gross domestic product and unemployment rate by counties of the South-West Oltenia Region (2019). (Source: data processing [30, 44])

which 17,405 with secondary education, 18,973 with secondary education and 5608 with post-secondary education) or university education (7942 inhabitants have higher education). Unemployment is lower among the population with university education, with 1171 unemployed in 2019, compared to 43,024 unemployed with secondary education, of which 31,671 with primary, secondary and vocational education and 10,182 with secondary and post-secondary education.

Other principal factors are the structure of the population by age group and by gender. The South-West Oltenia Region is characterized by the predominance of the female population, the most obvious difference being in the elderly population, with 71,543 inhabitants (the female population was 229,910 and the male population 158,367 in 2019). It was found that the unemployment rate in 2019 was higher for the male population (5.4%) than for the female population (5%) because many of the jobs specific for men have been dismantled (industry), and the development of some services has led to the creation of new jobs involving activities specific to the female population. Between 2010 and 2019, there was a significant decrease in the young population (with 107,376 people), particularly in the 15–29 age group, and an amplification of the phenomenon of demographic aging (an increase of 24,270 elderly people), which led to an increase in the unemployment rate in the region.

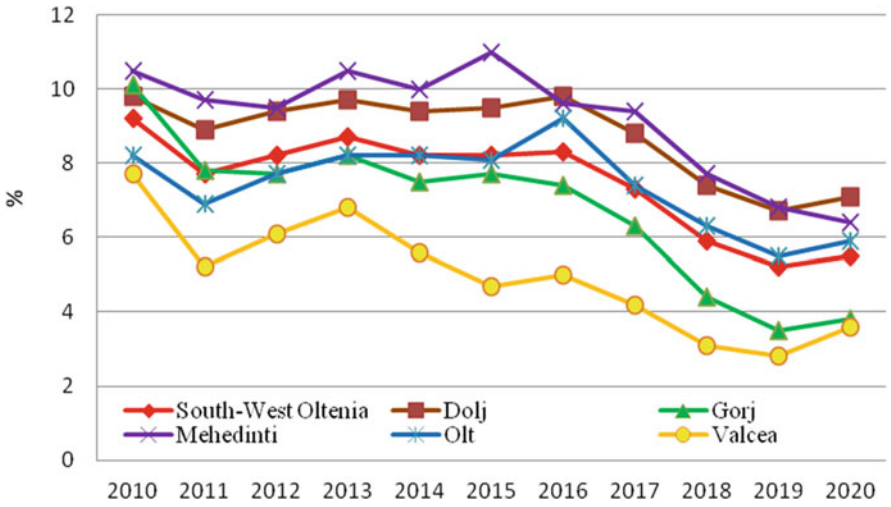

Fig. 18.3 Evolution of the unemployment rate in South-West Oltenia Region and its component counties, in the period 2010–2020. (Source: data processing [30])

Over the period 2010–2020, the unemployment rate at the regional level and in the five counties showed a sinuous dynamic, with an overall downward trend (Fig. 18.3). The unemployment rate in the South-West Oltenia Region recorded a decrease of 3.7 percentage points in the mentioned period, and for the component counties of the region, the largest decrease occurred in Gorj due to the economic stabilization after the 2009 crisis, the increase in unemployment benefits, the participation of the unemployed in vocational training courses (accounting, human resources, foreign languages, etc.) or the subsidization of jobs by placing the formerly unemployed on the labour market. The outbreak of the COVID-19 pandemic in March 2020 affected all sectors of activity and caused economic difficulties for many businesses in the region, context reflected in the employed population which fell by 2800 and the unemployment rate rose to 5.5%.

18.5.2 Analyses at NUTS 3 Territorial Administrative Unit Level

At the level of the administrative-territorial units that compose the counties of the South-West Oltenia Region, there are obvious differences in terms of the growth rate between 2010 and 2020 between the two indicators used, namely, the number of unemployed and the share of unemployed in the active population (Fig. 18.4). The unemployed rate is an indicator that is based on the number of unemployed in relation with the active population. The largest decreases in the share of the

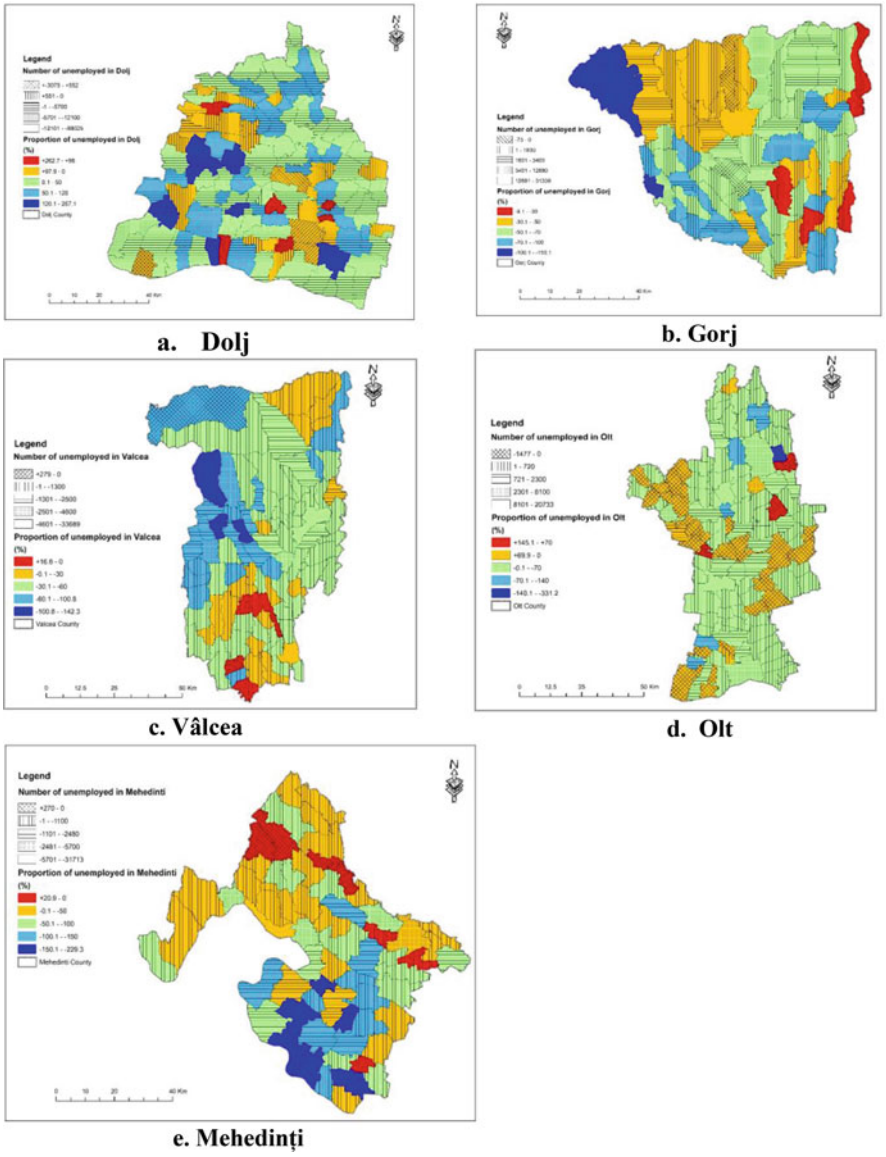

Fig. 18.4 Evolution of the number of unemployed (persons) and percentage change in the proportion of unemployed in labour resources (percentage points), in the counties and municipalities of the South-West Oltenia Region, in the period 2010–2020. (Source: data processing [30])

unemployed do not always coincide with the largest decreases in the number of unemployed.

In Dolj county, there are significant differences between the evolution of the number of unemployed and the proportion of unemployed in the labour resources, as the largest increase in the two indicators between 2010 and 2020 is recorded in different localities (Fig. 18.4a).

Within Dolj County, almost all localities recorded decreases in the number of unemployed and their proportion in the labour resources (most of them recorded a decrease of up to 88,025 unemployed, i.e. over than 40 percentage points), and very few localities recorded increases in both indicators (26 localities for the number of unemployed and 28 localities for the proportion of unemployed). The localities with a significant decrease in the proportion of unemployed are Orodel, Sadova and Sălcuța (more than 182 percentage points), due to an increase in the active population (mainly in the 40–49 age category) and a decrease in the elderly population (mainly in the 70–79 age category). Localities with large decreases in the number of unemployed are Băilești (9809 persons) and Craiova (88,025 unemployed), being urban poles where the economic development has increased, raising the number of jobs and on the background of the granting of subsidies to companies and institutions for the employment of the unemployed, but also in Sadova (recorded a higher number of unemployed than in Băilești, 12,082 unemployed). Catane has registered the highest increase in the number of unemployed between 2010 and 2010 (3075 unemployed) and their proportion (262.8 percentage points) because it is a rural locality where the demographic aging is increasing (the population in the category over 80 years old is slightly increasing), the active population is decreasing (in the categories 20–24 years old and 35–39 years old), the level of education of the population is very low and the main activity is agriculture, sector that contributes to informal economy.

Gorj is the only county that recorded decreases in both the number of unemployed and their proportion in the labour supply between 2010 and 2020, with most of the municipalities recording decreases of more than 4.1 percentage points (Fig. 18.4b). The municipalities of Padeș and Cătunele recorded the largest decreases in the proportion of unemployed (over 100 percentage points) due to their proximity to the urban poles of the county (Tismana, Rovinari, Târgu Jiu) and increases in the number of employable population.

In the case of the unemployed in Gorj, the largest decrease occurred in Târgu Jiu (with 31,339 unemployed) as a result of the orientation of the economy toward other economic sectors, although the city is facing demographic aging (an increase of 4733 elderly people) and an accelerated decrease in the active population (with 9616 people in the 15–39 age category), the level of education of the population is relatively high (the number of graduates with higher education increased with 850 people and those with post-secondary education with 267 people between 2010 and 2019).

In most localities of Vâlcea county, there were decreases in the number of unemployed and their proportion in the labour resources during the period under analysis, with only 3 localities recording increases of up to 279 unemployed and

5 localities with increases of up to 16.6 percentage points (Fig. 18.4c). A significant increase in the proportion of unemployed was registered in Mitrofani and Diculești and in the number of unemployed in Voineasa, Diculești, Glăvile and Mitrofani due to their location at a great distance from the major cities of the county, the fact that the population is characterized by a low level of education (less than 100 graduates) and a trend of demographic aging. The municipality of Râmnicu Valcea recorded the most significant decrease in the number of unemployed (33,689 people), being a city in which the service sector has developed (in particular, the tourism sector, which attracts the population to work in this field) and the level of education of the population is relatively high.

In Olt county, only one locality has recorded a significant decrease in the share of unemployed between 2010 and 2020 (Fig. 18.4d), namely, Optași-Măgura (331.2 percentage points) due to the proximity of two cities (Scornicești and Potcoava) that have influenced the economic development of the commune; the main economic activity is agriculture, along with industry and services. However, Optași-Măgura is experiencing a decrease in population. In terms of the number of unemployed, Slatina recorded a decrease of 20,733 persons, due to the high level of education of the population (high number of graduates especially in secondary and post-secondary education) and the economic profile of the town, which is dominated by the service sector and industry. Regarding the growth of the two indicators, more than 25 localities fall into this category, registering values of up to 145.1 percentage points and 1477 unemployed, these being rural areas (e.g. Sârbii-Măgura, Osica de Jos, Movileni) with an aging population, located at relatively large distances from the major urban poles of the county.

Compared to Olt county, in Mehedinți county, there are a smaller number of localities where there have been increases in the two indicators (more than nine localities) between 2010 and 2020, such as Branișstea, Voloiac and Livezile, the main reason being the low level of economic development of the county but also the reduction of jobs; the overlapping of the north-western localities over the disadvantaged mountain area, which prevents the development of certain activities (according to [33] of 10 May); the decrease of the active population; and the increase of the elderly population (Fig. 18.4e). However, there are also some communes where the proportion of unemployed in the labour resources has decreased by more than 177 percentage points, such as Obârșia de Câmp, Cujmir, Gruia and Corlățel located in the south-east of Mehedinți County, near the city of Vânju Mare, which has had an impact on the level of development of neighbouring communes. A significant decrease in the number of unemployed persons occurred in Drobeta-Turnu Severin (31,713 persons) and Orșova (5700 persons), as these cities have developed in terms of tourism, with the establishment of numerous accommodation development, which has led to an increase in the demand for staff to work in this sector.

18.5.3 *Comparative Rural-Urban and Urban Locality Analyses*

The unemployment situation in the cities of the South-West Oltenia Region reflects decreases in both the number of unemployed and their proportion between 2010 and 2020 (Fig. 18.5). This is due to a higher degree of economic development compared to rural localities, the existence of vacancies in various fields (industry, including textiles and clothing, construction, tourism, education, health, other public and private institutions) and better-paid jobs, subsidies granted to enterprises for placing the unemployed on the labour market and their participation in vocational training courses. The most important decreases in the proportion of unemployed occurred in Târgu Cărbunești, Horezu and Berbești, by more than 74 percentage points; the number of unemployed had the largest decreases in the county seats of the South-West Oltenia Region, namely, Slatina, Drobeta-Turnu Severin, Târgu Jiu, Râmnicu Vâlcea and Craiova (decreases between 20,733 and 88,025).

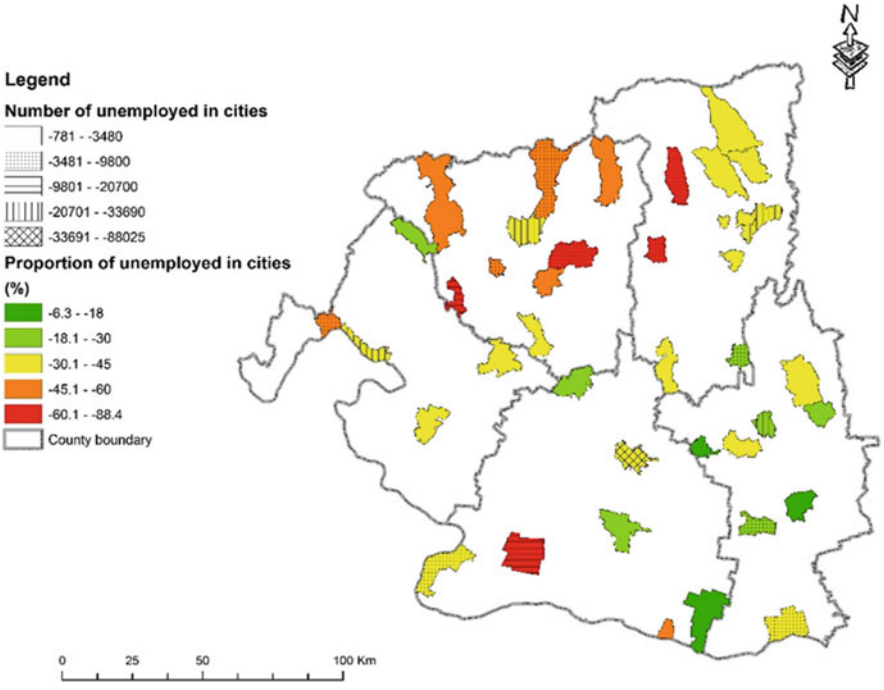

Fig. 18.5 Absolute change in the number of unemployed (persons) and relative change in the proportion of unemployed in the labour resources (percentage points), in the cities of the South-West Oltenia Region, in the interval 2010–2020. (Source: data processing [30])

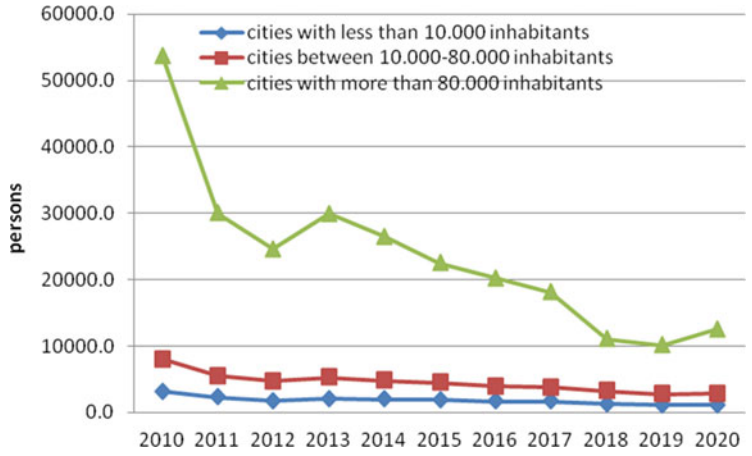

Fig. 18.6 The average number of unemployed by city category in South-West Oltenia Region, in the period 2010–2020. (Source: data processing [30])

The average number of unemployed in the three categories of cities by population shows a sharp downward slope in the period 2010–2020 for cities with more than 80,000 inhabitants (with more than 41,099 unemployed) (Fig. 18.6). It shows a high average number of unemployed at the beginning of the period under analysis, but compared to the total human resources in large cities, the number of unemployed is low. Within this category are included the county seats of the region, the highest number of unemployed being registered in the municipality of Craiova.

Cities with less than 10,000 inhabitants recorded a reduced average number of unemployed over the period analysed, dropping from around 3150 unemployed (2010) to less than 2000 unemployed in 2020. Within this category of cities, Baia de Aramă stands out from the others by the high number of unemployed (with more than 3000 unemployed in whole period).

18.6 Conclusions

Unemployment is an important indicator because it is an important sensor of a region's level of economic development. In this context, in South-West Oltenia Region, it was noted that there is a significant inverse correlation between the level of gross domestic product and the unemployment rate, this relationship being more significant for the period 2015–2019, according to the Pearson coefficient. Unemployment is high in counties and localities where the elderly population is increasing, economic activity is mainly based on agriculture, the level of education and skills of the population is low and the working population is decreasing due to its migration to other parts of Romania or other Western European countries, which offer employment opportunities and substantially higher incomes.

As the analyses carried out in the course of this study have shown, unemployment can be reduced by promoting a variety of measures by different national, regional or local actors.

From the perspective of the effectiveness of the measures applied, in the case of the area analysed, it is worth highlighting the organization and increased participation of labour resources and the unemployed, in particular, in specialized courses for the acquisition of professional skills and abilities under the aegis of various public institutions (National Agency for Employment) or private institutions (e-learning educational platforms such as Upriserz, eduKiwi, DallesGo, EduWeb, Skillab), aimed both at increasing the level of education of the population of the South-West Oltenia Region and also as the main means of sustainable development, complementary to the introduction of a system to support the unemployed who wish to set up their own company (financial advice and various tax incentives for setting up a company).

The present study can contribute significantly to the enrichment of the scientific literature specific to the field in Romania, carrying out comparative analyses on unemployment between the counties of the South-West Oltenia Region and its component localities, its dynamics, the economic characteristics of the counties and component localities and the socio-demographic ones with direct influence on this indicator.

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Chapter 19
Urban Village: A Trend Accentuated by the COVID-19 Pandemic – Analysis of the Bucharest-Ilfov Region

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Abstract Internal migration is a complex phenomenon that can have a greater effect on society than immigration and emigration. Starting from 1997, this phenomenon was constantly growing in Romania, and the pandemic context of the last 2 years has accelerated this internal population movement. People change their residence for various reasons, but for an important part of them, moving to the village is not an option but a necessity. The intensification of the process of internal migration from urban to rural areas has both positive and negative effects. Among the positive effects, we specify repopulation of rural areas due to the phenomenon of internal population movement and birth rate increase and increase in the volume of investment by absorbing European funds and the number of jobs, reducing unemployment and expanding inhabited areas by building new housing. At the same time, the COVID-19 pandemic has influenced certain aspects of the quality of life and the way we work or interact. In this context, most sectors have been forced to become compatible with distance connectivity, especially the education and labor market sectors. The present study aims to outline an image of this migration trend from city to village, focusing on the analysis of the Bucharest-Ilfov region, which, due to the current level of development, can provide a projection of the analyzed phenomenon.

Keywords Rural · Urban · Internal movement · Population · Bucharest-Ilfov · COVID-19

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19.1 Introduction

The population of a country can be influenced, in addition to birth and mortality, by the migratory movement of the population consisting of internal and external migration. Professor Dumitru Sandu states that "migration is an essential component of development processes" [9], which, through its various forms, produces numerous demographic, economic, social, cultural, and environmental influences.

Although internal migration is less addressed in researchers' studies compared to external migration, it is often considered a necessary mechanism for adjusting regional economic shocks [3].

Internal migration is, in fact, a consequence of rural-urban or urban-rural movement (analyzing new trends, population movement occuring from city to village) and migration at the level of a population. This type of migration causes major changes in local communities that are due to demographic change and more.

People usually migrate when they are forced by circumstances. For the vast majority, moving to the village is not an option, but rather a necessity (e.g., the income earned is enough to cover rural expenses, or they have to live with elderly relatives).

According to a study, about 75% of the EU population chose to live in an urban area, benefiting from educational, medical, or cultural services [2]. Although cities are considered engines of the economy, people choose to move to rural areas to improve their quality of life, by using more space per person, and to get rid of pollution and congested traffic, among other things.

Due to the COVID-19 pandemic, most sectors have been forced to adopt a way of distance communication, with a special attention for education and the labor market. Given this aspect, the pandemic crisis may be a first step toward increasing the level of digitalization in rural areas.

Migrating from cities to rural areas is not only an economic decision but also a social one. The reasons for this movement can be different and vary greatly between people making such a choice.

19.2 Literature Review

Approximately 100,000 Romanians move annually from large cities to villages, with over 20% more than those who choose to migrate from village to city [8]. In a study published by the WHO, by 2050, over 50% of Romanians will live in the village. This will accelerate the development of basic infrastructure and educational and social infrastructure in rural areas through both investment and the absorption of European funds. Within the change of domicile in Romania, flows from urban to rural increased from 10.1% in 1991 by over 23%, reaching 33.8% in 2000 [11].

The National Rural Development Program (NRDP) provided non-refundable funds from the European Union and the Romanian Government for the economic

and social development of rural areas in Romania between 2014 and 2020. The sub-measure 7.2 refers to the creation and modernization of basic infrastructure in small scale with the help of investments. This sub-measure can help reduce social and economic decline trends, halting rural depopulation by reducing rural-urban disparities and improving living standards in rural areas. Wastewater and, respectively, through the creation and modernization of the educational infrastructure [7]. At the same time, we consider that in the context of this study, the sub-measure to which we refer may contribute to the accentuation of the migration trend of the population from urban to rural areas.

19.3 Analysis and Results Interpretation

19.3.1 Migration from City to Village: A Trend Accentuated by the COVID-19 Pandemic

The trend of internal migration, with a large volume of movement from rural to urban areas, seems to be replaced by the movement of the population from urban to rural areas. Long-term migration from the city to the village is becoming more frequent. In recent decades, there has been an increase in migration flows, as people moved from large urban areas to smaller suburbs or rural communities.

If, in the context of external migration, the economic effects of poverty have been reduced by temporary or permanent emigration abroad, internal migration by moving from the village to the city has provided a solution to improve these conditions through employment and quality education opportunities, while the movement of people from urban to rural areas contributes to lower monthly costs and also to the development of those areas.

The flows of internal migration between the environments of residence reveal a major change in the dynamics of migration in Romania. According to the NIS data, rural-to-urban and urban-to-urban flows predominated in the early 1990s, but since 1997, most population movements have taken place from urban to rural areas. Further, we will analyze two significant flows of the studied period: from urban to rural and from rural to urban (Fig. 19.1).

In the graph that describes the evolution of the structure of internal migration flows determined by the change of domicile from urban to rural and vice versa, from 1996, we identified a positive evolution of changes of domicile from urban to rural, well above the values of the other flow analyzed. With the increase in the number of changes of residence from urban to rural areas, the demand for housing also increased (Fig. 19.2).

Also, in the case of this indicator, we identified the influence of the transformation of some communes into cities. As it can be seen, the number of homes in rural areas is constantly growing, which justifies the demand in this segment of housing and at the same time the level of purchasing power. The number of existing dwellings at the

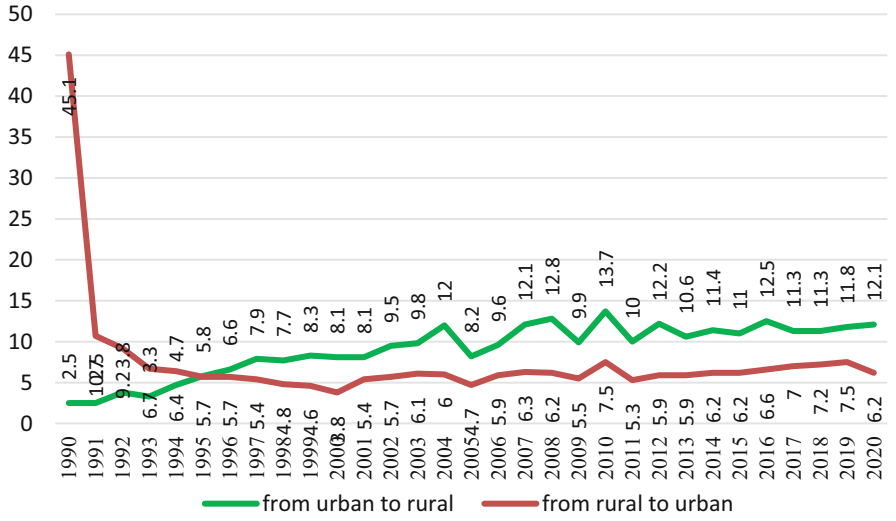

Fig. 19.1 The structure of internal migration flows determined by the change of domicile (Rates per 1000 inhabitants). (Source: INS data, TEMPO_POP311A_8_11_2021)

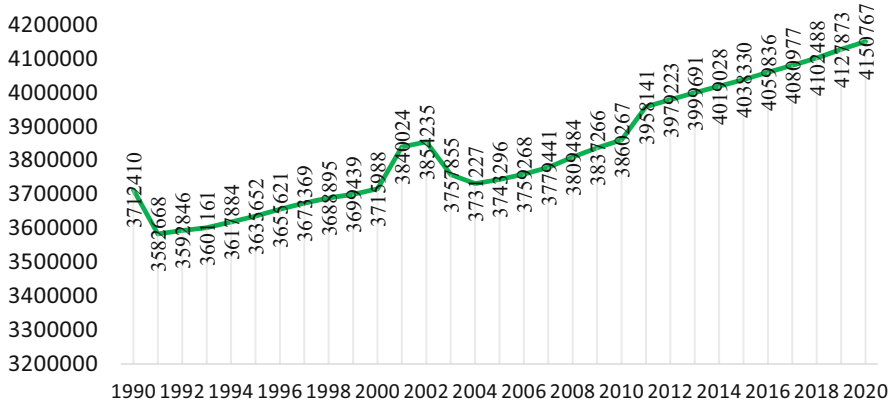

Fig. 19.2 Dwellings existing at the end of the year in rural areas in Romania (number). (Source: INS data, TEMPO_LOC101A_1_11_2021)

end of the year in rural areas, both in Romania and in the Bucharest-Ilfov Region, registered successive increases in the period 2005–2020. Given the evolution of the number of rural dwellings, we can consider that these values are not only due to the internal movement of the population but also to Romanian emigrants who returned to the country, choosing to live in a rural area, where they often open small business.

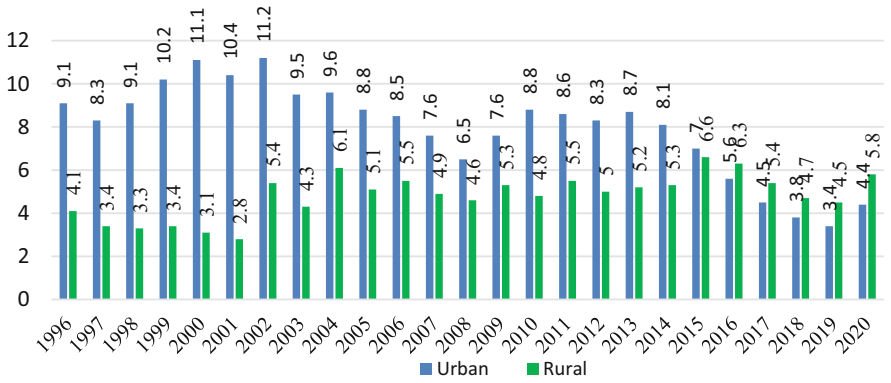

Fig. 19.3 ILO unemployment rate by area of residence in Romania (%). (Source: INS data, TEMPO_AMG157E_16_11_2021)

Although the population and the number of rural dwellings have increased, in this context, it is important to analyze the indicator that reflects the evolution of the unemployment rate (Fig. 19.3).

Between 1996 and 2015, the unemployment rate (ILO) in rural areas had a lower value than in urban areas, but since 2016, the ratio was reversed. At the level of the pandemic year 2020, this rate increased both in urban and rural areas, but in rural areas, the difference compared to the previous year was higher. According to the INS data, the average monthly consumption of food per person in rural areas increased in 2020 compared to the previous year in 24 main foods (beef, pork, cheese and cream, etc.), which may indicate higher purchasing power due to higher-income people recently relocated to rural areas.

19.3.2 Analysis of the Bucharest-Ilfov Region

Of the eight development regions of Romania, the Bucharest-Ilfov region is the only one that registered increases in the resident population during 2012–2021. Thus, the number of residents increased by over 43,800 people compared to 2012.

It is specified in a study that migration flows to Bucharest can be considered tier 1 if they are at least three times higher than tier 2 [10].

In this chapter, we aim to outline an image of this migration trend from city to village, analyzing the Bucharest-Ilfov region, which, due to the level of development, can provide a projection of the analyzed phenomenon (Fig. 19.4).

Although the resident population in Romania, by area of residence, decreased annually until 2020, the rural population registered a slight increase at the beginning of this year (by over 27,000 more people than in the previous year). At the Bucharest-Ilfov region, the rural resident population registered annual increases in the period 2012–2021, while the number of urban population had a different

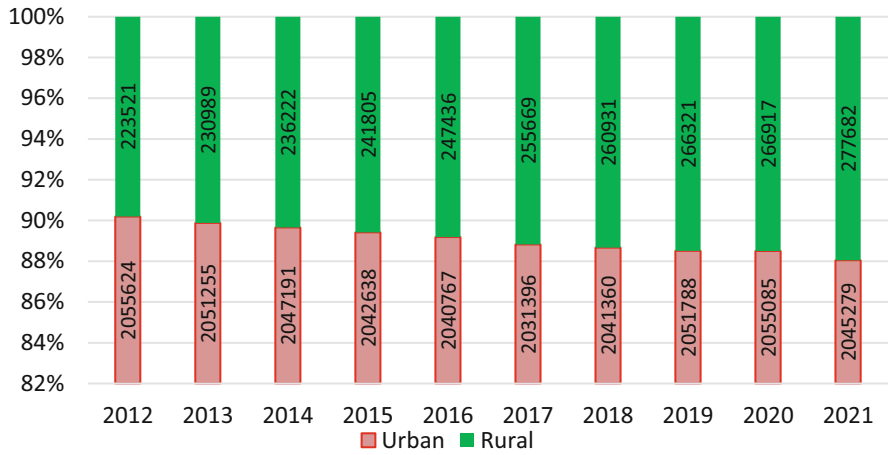

Fig. 19.4 Population resident on January 1 by area of residence: Bucharest-Ilfov region (persons). (Source: INS data, TEMPO_POP105A_12_11_2021)

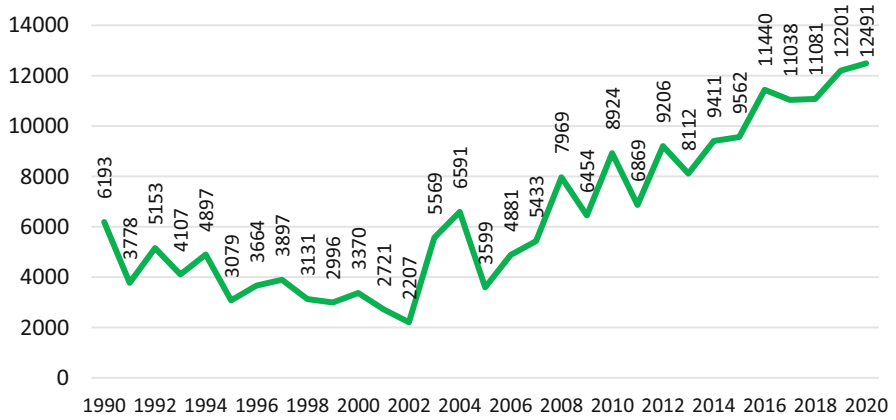

Fig. 19.5 Establishments of domicile in rural areas: Bucharest-Ilfov region (persons). (Source: INS data, TEMPO_POP301B_7_11_2021)

evolution (decreases followed by increases, increases followed by decreases), reaching 2021 to 2.04 million people, with over 10 000 fewer people compared to 2012. It should be noted that many communes in Ilfov County have become cities over time, reducing the rural population. An important aspect is given by the relocation of a part of the population of Bucharest to the communes that have become cities in Ilfov County (Pantelimon, Bragadiru, Voluntari).

Starting with 1995, there is a similar evolution of the number of people who have established their domicile in urban or rural areas; in Romania, however, we cannot conclude the same thing following the analysis of the Bucharest-Ilfov region (Fig. 19.5).

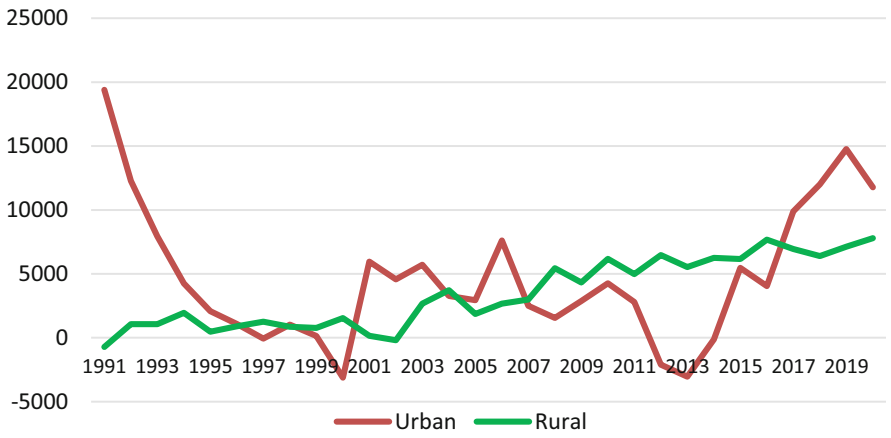

Fig. 19.6 Balance of changes of domicile by area of residence: Bucharest-Ilfov region (persons). (Source: INS data, TEMPO_POP303B_7_11_2021)

The number of people who have established their domicile in the rural area of the Bucharest-Ilfov region has increased consecutively in the last 3 years. Thus, in 2020, the highest number of people who settled in rural areas in the analyzed period (approximately 12,400 people) was registered. The difference between the lowest value (2207 people registered in 2002) and the highest value is over 10,000 people.

Next, we will analyze an important indicator in this study, the balance of changes of residence by residence in the Bucharest-Ilfov region (Fig. 19.6).

The year 1990 was marked by important differences in the balance of changes of domicile by area of residence in the Bucharest-Ilfov Region. The urban environment had a positive balance of over 160,000 people, while the rural environment registered the highest negative balance of the entire analyzed period (20,549 people). During the economic crisis, which affected the entire economy and at the same time the living standard of Romanians, during 2008, the urban environment registered a significant decrease of this balance, while the balance of changes of domicile in rural areas increased by over 2400 people. The same evolution can be observed in the pandemic year 2020, when the rural environment registered the highest value in the last 30 years (7791 people).

A characteristic feature of urban flows is given by the "chain" migration much more accentuated than in rural flows [9].

Considering that the INS data show the increase of the migration trend from the city to the village, we will analyze the evolution of the number of existing dwellings at the end of the year in the rural area at the level of the Bucharest-Ilfov region (Fig. 19.7).

Between 2002 and 2004, we identified at the level of this indicator a significant decrease in the number of rural dwellings in the Bucharest-Ilfov region (of approximately 26,000 dwellings). Since 2005, there has been a marked upward trend in the annual value of this indicator until 2020. Thus, in 2020, there were more than 42,000 more homes than in 2004.

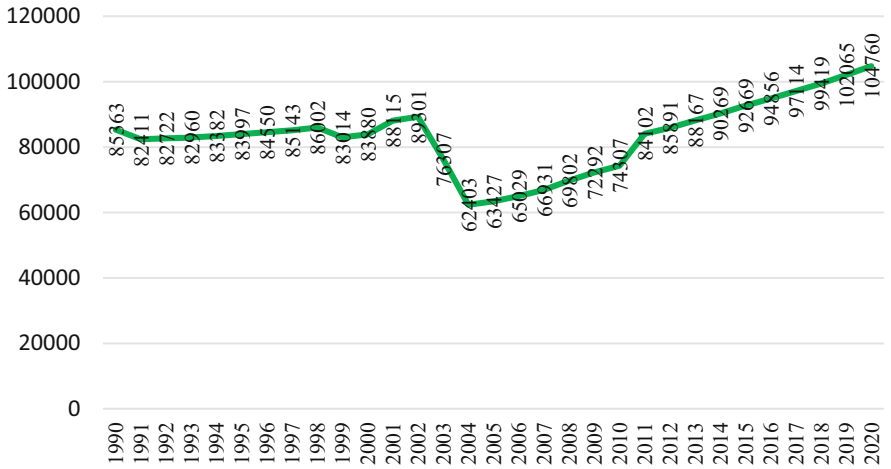

Fig. 19.7 Existing dwellings at the end of the year in rural areas at the level of the Bucharest-Ilfov Region. (Source: INS data, TEMPO_LOC101A_1_11_2021)

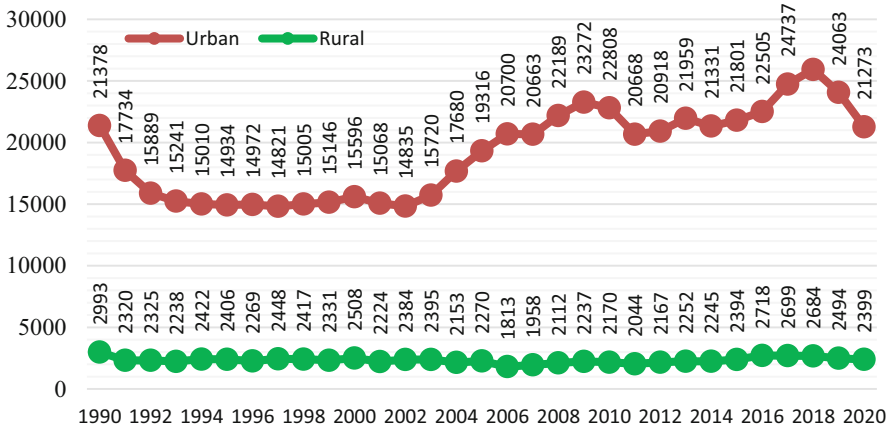

Fig. 19.8 Live births by area of residence: Bucharest-Ilfov region (persons). (Source: INS data, TEMPO_POP201A_6_11_2021)

In general, studies show that as the population in certain countries, regions, or localities increases, so does the number of newborns (Fig. 19.8).

During the period under review, at the national level, the number of births in rural areas was higher than in those in urban areas, but since 2004, the ratio has been reversed. This may be due, among other things, to migration from the village to the city and the depopulation of rural areas. Like the evolution at national level, in the Bucharest-Ilfov region, the number of newborns for the two areas of residence in 2020 decreased (possible decreases caused by the pandemic). Since 2014, the number of live births has increased annually, reaching over 2700 people in rural

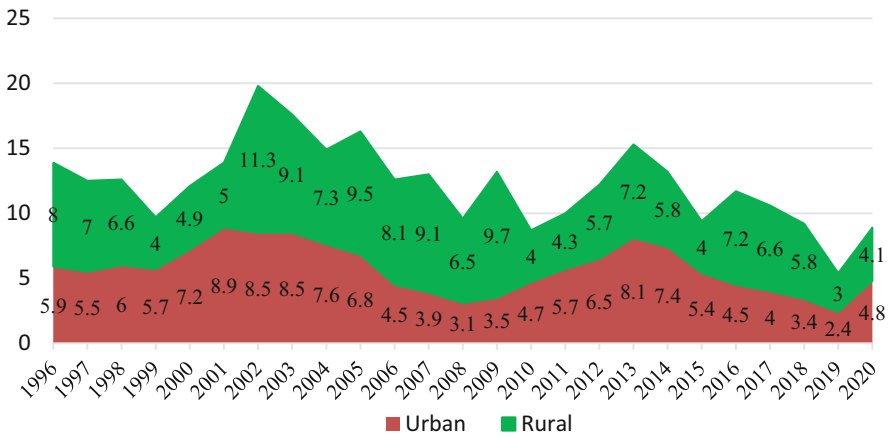

Fig. 19.9 ILO unemployment rate in Bucharest-Ilfov region (%). (Source: INS data, TEMPO_AMG157E_6_12_2021)

areas in 2016. As it can be seen in the graph above, the value of the analyzed indicator for the rural area decreased in 2006, a possible decrease caused by the transformation of some communes (important from the population's point of view) into cities, in the period 2003–2005.

Unemployment is one of the factors that contributed to shaping the economic image of the analyzed region, being measured by the unemployment rate (Fig. 19.9) [6].

Since 2017, the unemployment rate (ILO) in rural areas began to decrease in the Bucharest-Ilfov region, but in 2020, it increased by more than one percentage point compared to the previous year, and it remained at a lower level than the urban rate. At the same time, during the analyzed period (1996–2020), we identified periods of time in which the unemployment rate (ILO) in rural areas was lower compared to that recorded in urban areas (1999–2001 versus 2010–2015, respectively).

19.3.3 Investments in Rural Areas

Rural areas face important challenges, such as a lack of economic opportunities and depopulation. Good infrastructure (e.g., roads, flood prevention systems, water supply systems, irrigation pipelines) helps encourage economic growth and increase the attractiveness of rural areas.

The action plan presented by the European Commission includes policies that support rural areas, "contributing to their balanced, equitable, environmentally friendly and innovative development" [4].

The main measures chosen by Member States in their rural development programs to support infrastructure in the period 2007–2013 were:

- Measure 125: infrastructure related to the adaptation and development of forestry and agriculture.
- Measure 321: basic services for the rural population and for the economy.
- Measure 322: renovation and development of localities/villages.
- Measure 323: conservation and highlighting of rural heritage.

In addition, the EU regulation for the period 2014–2020 largely maintained the legal requirements set out in the 2007–2013 programming period for the operations and measures that were the subject of the audit. Between 2014 and 2020, Member States spent more than € 14.65 billion on infrastructure measures.

In Romania, the possible unsustainability of investments in social and cultural infrastructure financed through the rural development program has been identified, given that once the project is completed, beneficiaries may face barriers to financing-related activities within the local budget.

At the same time, at national level, only one of the five projects that benefited from funding between 1 and 2.4 million euros has reached its goal of connecting 575 users to the new water and sewerage system. About 3 years after their funding, three projects were still far from meeting the target levels: in the case of two water projects, less than 50% of the target number of beneficiaries were connected to the sewerage network, and in the case of the third project, no new jobs were created, although the creation of new jobs is among the objectives set.

The complementarity between the interventions of the different funds is taken into account in the partnership agreements but also in the operational and rural development programs. Romania's partnership agreement includes information on the synergies of the various funds and details on the coordination mechanisms. Also, at the level of individual measures sheets, Romania signaled the potential complementarity and coordination with other funds.

Several countries in the European Union have taken steps to ensure complementarity between funds, for example:

- Romania has created a mechanism aimed at promoting complementarity.
- Italy has developed a framework in which all regional programs promoted by the European Union can work in tandem to achieve common goals [5].

A large part of the 2861 communes that currently form the Romanian rural area faces an inadequate level of basic infrastructure development, which are apparently eligible for the absorption of investment projects. However, the resources encountered in the sector (human and natural) are not evenly distributed among ATUs. Thus, the first step in ensuring the efficient use of funds allocated through PNDR 2014–2020 for this segment is to identify municipalities where infrastructure investments would have the highest levels of effect/effort ratio in terms of socioeconomic development [1].

19.4 Conclusion

In order to reduce the level of social exclusion by reducing the phenomenon of migration from rural to urban areas, it is necessary to identify solutions to increase the opportunities available through public transport systems, so that young people can stay with their families living in peripheral areas, instead of migrating permanently for the chance of a better paid job or for the chance at a quality education, offered by cities. On the other hand, the number, value, and diversity of investments in rural areas can lead to an increase in the number of people who choose to live in a rural area.

We can conclude that the migration from urban to rural areas, both in Romania and in the Bucharest-Ilfov region, can lead to reducing the phenomenon of urban overcrowding, increasing population density in rural areas (trend possibly accentuated by the Covid-19 pandemic), creating new jobs, increasing average monthly total household income, increasing the level of digitization (trend possibly accentuated by the COVID-19 pandemic), lowering the unemployment rate, and lowering the at-risk-of-poverty rate and social exclusion and at the same time investing to improve living standards.

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Chapter 20
Nature-Based Solutions for Green Infrastructure Development

Petru Nicolae, Raluca Nicolae, and Ionela-Alexandra Ion

Abstract In the context of the COVID crisis and the impact that the pandemic is having on the global economy, infrastructure development needs special attention, especially in terms of costs. Given the large areas in which investments related to roads and railways are planned, there is a danger that they will overlap with contaminated or potentially contaminated sites. This overlap would bring additional costs to already expensive infrastructure projects and may affect the work schedule and cause delays. Currently, the contaminated sites have a restrictive regime in terms of their use, and the decontamination process is often invasive and expensive. This paper presents a framework for better management of contaminated sites to tick criteria such as nature-based solutions and land use during remediation, which can streamline the construction of roads and railways and reduce decontamination costs.

Keywords Nature-based solutions · Cost reduction · Decontamination · Land use · Investments · Crisis

20.1 Introduction

Europe's economy is at risk after events related to the COVID-19 crisis, which poses a threat, especially to citizens. Investments in times of crisis focus on key sectors of the economy, but the technological and infrastructure sectors must not be neglected. The uncertainty generated by the pandemic is far from dispelled, and the effects on the world's economies are increasingly difficult to estimate. In Romania, foreign

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direct investment is on the decline in the first part of this year, and domestic investment, although slightly recovering compared to previous years, remains insufficient to keep the economy afloat [1].

The Transport Master Plan is a strategic tool for planning major investments, projects, and other actions, which are significant for transport objectives on a national scale. The General Transport Master Plan of Romania, updated by the Investment Plan 2021–2030, provides for infrastructure works of over 10,000 km, both for the road and the railway network. Implementing the investment itself will be very costly for the authorities, but other related issues can further increase costs [12].

In Romania, economic activities that were not subject to regulations related to pollution prevention have been carried out in the past, leading to the formation of historically contaminated sites. As a result of past and present economic activities, there are now a number of 1682 contaminated/potentially contaminated sites, currently inventoried [4].

Projects proposed by the Transport Master Plan may be restricted and hampered when they will cross contaminated sites. Moreover, there is a risk that the projects will need to be reconfigured and re-routed if the decontamination process would generate an unreasonable or unaffordable process in order to implement the project. All this translates into even higher costs for the authorities, and in addition to the high costs, extra time will be needed to decontaminate the sites, which can cause delays in the work schedule.

This chapter presents a different approach to the problem of contamination to help infrastructure development plans, compares the costs of different decontamination methods, and highlights the advantages of adopting nature-based solutions. Subsequent paragraphs, however, are indented.

20.2 Literature Review

Romania's General Transport Master Plan, updated by the 2021–2030 Investment Plan [12], mentions the need to build 6624.1 km of the road network (highways, expressways, trans-regions, detours) of which 2900.5 km is related to the primary network and 3723.6 km to the secondary network. Regarding the railway network, the plan aims to achieve 3274.8 km of railways related to the primary network and 1228 km related to the secondary network.

In total, the financing need for all transport sectors in Romania over the next decade is EUR 72.77 billion. Of this amount, 34.19 billion euros are dedicated to road infrastructure, 20.63 billion euros are dedicated to railway infrastructure, 10.7 billion euros are dedicated to metro infrastructure, 4.46 billion euros are dedicated to naval infrastructure, and 2.79 billion euros are dedicated to airport infrastructure [12].

There has been observed a recent upward trend in Europe but also in our country, to the interest given to soil management methods for its protection. The principle of sustainability and also conservation is followed. Great attention is paid to the

decontamination of sites, which is a key component in achieving sustainability, that must be addressed at several administrative levels [13].

The National Agency for Environmental Protection carried out between 2008 and 2009 the preliminary national inventory [15] of potentially contaminated/contaminated sites, on the available database. According to Romania's strategy for managing decontaminated sites, the first in the rank of potentially contaminated sites is occupied by the oil extraction branch with a number of 215 out of a total of 395. It is followed by the waste industry with 98, extractive industry with 26, oil industry with 10, and agriculture with 6, and the list goes on.

Regarding contaminated sites, the numbers are much higher; oil extraction industry is also in the first place, this time with 738, out of a total of 1287. There are 178 sites contaminated by the extractive industry, 153 by the waste industry, 61 by the oil industry, 29 by the processes for obtaining metals from ores and other substances, 27 by the processes that deal with the extraction and processing of materials to turn them into products by applying chemical procedures, and 20 by the branch that produces electricity, and the list goes on [4].

Decontamination is considered to be the process by which an area is restored to the conditions before exploitation and is considered completed when the results of the analyses performed for that place fall within the specified norms. Ecology can be very useful in decontamination processes, being able to deliver solutions to speed up the restoration of the areas in question [19, 20]. In view of this, efforts to ensure the conservation and proper functioning of ecosystem services must be supported by the application of ecological knowledge. The selection of the best remediation method to be adopted is challenging since each site is characterized by specific environmental conditions and constraints, such as different physical and chemical properties, temperature, nutrient levels, and microorganism populations.

There are two major recognized methods for decontamination [19, 14], namely, conventional, meaning physical, chemical, or both, and biological, with the help of microorganisms, algae, or plants. They can be applied outside the site or inside the site. The first method, outside the site, is not efficient in the context of circular economy, as it involves physically extracting the contaminated soil and transporting it to another location for treatment, requiring a large resource use and causing future pollution problems. The second method, inside the site, is preferable to be applied because it treats pollution without transporting the soil and without producing additional pollution.

Regarding the differences between conventional and biological treatment methods, studies [19, 14, 2, 7, 9, 3, 18, 17, 10, 16] show that the biological method is the most cost-effective and most environmentally friendly, the disadvantage being related to the longer treatment time until the final decontamination and to the potential risks (man-made or meteorological – freezing, fire).

The biological treatment often uses biochar, natural bacteria, and phytoremediation. In its purest form, biochar or horticultural charcoal is a pyrolyzed organic material. A pyrolysis is a form of thermal decomposition in a low-oxygen environment. Extreme heat with low air flow prevents the material from catching fire. Instead, it is characterized by forming a carbonaceous material.

For cleaning soil and contaminated water, a very good method to use is bioremediation. Bacteria, microbes, and other microorganisms are used to treat sites polluted with petroleum products, pesticides, or solvents. Bioremediation is used to turn contamination into a source of consumption for microorganisms, thus ensuring the restoration of the area.

A common approach to restoring biodiversity in contaminated sites is translocation. This involves bringing from elsewhere the same biotic components and replicating the elements that existed on that site. This method is widely used considering the many successful attempts.

In addition to the above approaches, phytoremediation is also used for decontamination. Here, plants are used to help reduce the concentration of pollutants in the soil or water. This method is used in the case of metal pollution or in the case of organic compounds, most often derived from agriculture. Plants used for bioremediation are not always the ones desired to remain in that place so that after decontamination, these plants can be harvested, and the area can be populated again with the desired ones [3].

Often in phytoremediation, both plants and microbes or bacteria can be used, making a successful integration between methods and ensuring proper decontamination. Roots of plants have the role of suppressing the mobility of pollutants. The most important advantage of phytoremediation is the fact that it is done on-site. In terms of costs, this method is very efficient, and the fact that it is nature based makes it very popular in decontamination solutions [18].

The cost differences between conventional and biological methods are highlighted in cost-effectiveness analysis [2] for three types of approaches in different scenarios: excavation and final soil storage, soil washing, and phytoextraction.

The study by Chen and Haixiao [2] also takes into account the value of the cost-effectiveness ratio (ratio C/E). The conclusions are in favor of phytoextraction treatment, and the results are as follows:

- For excavation and final soil storage, the costs are the highest and are around 500 euros/m^3.
- For soil washing, the costs are 70 euros/m^3 and 200 euros/m^3, depending on the site scale.
- For phytoextraction, the costs are between 10 and 70 levels of contamination, depending on the type of soil and the treated pollutant.

In the current context of global warming, efforts need to be made to reduce the level of CO2 in the atmosphere. The application of nature-based decontamination methods has a positive impact on air quality [8, 11]. Microbes and plants interact, involving the phyllosphere and rhizosphere, transferring pollutants absorbed by the phyllosphere to the soil and metabolizing and sequestrating pollutants.

20.3 Methodology

The aim was to propose key criteria that are necessary for the adaptation of the current decontamination methodology in Romania to the new lines on environmental sustainability, circular economy, and cost reduction for future infrastructure projects.

To get acquainted with the existing situation related to future investments in the infrastructure, it was necessary to go through the official documents and the media sources related to this subject. Reviewing the national legislation in the field of decontamination and establishing its shortcomings went hand in hand with the literature review on site decontamination, to understand the gaps, the methods used, and the advantages and disadvantages of each.

In order to highlight the effectiveness of the proposed suggestions, two tables have been compiled to reflect the cost reduction, conceptual relationships, environmental benefits, and benefits of the current context of climate change.

20.4 Analysis/Results Interpretation

20.4.1 Decontamination Approach in Romania

Soils are under increasing environmental pressure across the globe, and soil contamination is considered a widespread problem causing toxicity to organisms, which is associated with several other imbalances in the soil ecosystem [13]. These effects can be mitigated by developing more sustainable environmentally friendly solutions in all areas of human activities. As a major storehouse for carbon, soils also help regulate emissions of greenhouse gases, which is fundamental for life sustainability [8].

Environmental policies have begun to gain more and more mention of restorations, especially from an ecological point of view. The international convention on biodiversity is a good example in this case. It wants to take care of issues such as restoring ecosystems to ensure the production of critical services. The European Union, which aims to significantly reduce biodiversity loss and ecosystem degradation, is moving in the same direction. In Romania, the methodology [4] for managing potentially contaminated/contaminated sites, is divided into two consecutive phases: inventory and investigation and remedial actions.

For the inventory part, the goal is to identify the potentially contaminated sites. Meanwhile, investigation is done in three steps: the historical investigation, which gathers information about the history of activities carried out on-site; the preliminary investigation, which consists in taking samples to identify the existence and intensity of pollution; and the detailed investigation, which aims to describe the contamination situation and to delimit the pollutants identified in the soil or groundwater, in order to apply remedial actions.

For remedial actions, a detailed risk assessment will be performed depending on the type, nature, and extent of contamination related to current and future use of the site. Based on this assessment, the remedial objectives are set. The remedial action plan defines the minimum requirements and the objectives for the execution of remedial actions. The remedy option selected will comply with the principle of analysis-based management approach risk and cost-benefit analysis. Therefore, (remedial) technique assessments can range from contaminated soil excavations to just fencing the contaminated site. Remedy options can be short term (excavations) or longer term, requiring long-term monitoring and setting temporary remediation targets (e.g., in the case of natural attenuation).

When the remedial values are reached, it will be confirmed by a new investigation called the evaluation of the completion of remedial actions. If the results of this latest investigation indicate a reduction in contamination levels acceptable in terms of risks and use of the site, the site is moved to another category, residual contamination, but not requiring other measures if the destination of the site is not changed and does not affect the receiver, approach based on risk assessment or no contamination.

20.4.2 Barriers Regarding Restoration of Contaminated Sites

Although there are many ways in which decontamination can be done, most methods have high limitations, costs, and risks. Given the large number of sites classified as contaminated or potentially contaminated, a small number of regulatory measures and funding for this type of decontamination is available.

Ecological treatments for decontamination are a relatively new topic, and the availability of scientific data on concrete actions related to good nature-based practical methods to be applied for certain places and types of contamination is quite low.

Currently, in Romania, many treated sites return to the contaminated state since they are in the vicinity of still polluted areas. Another drawback is the fact that contaminated lands are not exploited due to legal restrictions. There is a big need to provide a methodology for the contaminated landowners that will offer them the possibility of safe using the land during the green decontamination process, as well as after its goals have been achieved. Furthermore, an ecological methodology must provide a correct correlation between the type of treatment and pollutant.

20.4.3 A Different Approach and its Benefits

After reviewing decontamination dedicated literature, the national legislation in force, and the different existing decontamination methods, we propose adding the following necessary criteria to the existing methodology:

- Immediate action.
- Decontamination through nature-based solutions.
- Helping the owners of contaminated soils in selecting the best cost-efficient method.
- Creating a guide on nature-based solutions for decontamination: what to apply, when, and how.
- Defining the optimal use of the land during and after decontamination.
- Creating green spaces for wildlife habitats, recreational areas, and development projects.
- The legality of using contaminated land for appropriate activities while they are being restored.

Integrating these criteria, the current Romanian decontamination methodology will take on the challenge of mixing different successfully applied natural solutions to maximize the decontamination rates, as well as the benefits for the environment. Finding the best algorithm for reducing the level of decontamination, without producing additional waste or pollution, will be a challenge.

This framework aims to give the means to reclaim contaminated land and transform it from a burden into an attractive environmental resource for the community, even during the decontamination procedures. This environmentally friendly approach will limit resource consumption and allow for extensive restoration.

Since the decontamination technologies have similar characteristics, regardless of their location on the globe, in order to calculate the cost differences between the nature-based and conventional methods, the costs for both methods were taken from the available analysis [2]. In this analysis, it is shown that a saving of at least 430 euros/m^3 can be made by adopting decontamination based on natural solutions. According to sources [4] (Green [6]), the contaminated land area in Romania is around 98,725 ha, this being the sum of sites contaminated by various industries.

It costs around 500 euros to decontaminate a cubic meter by conventional methods and maximum 70 euros by nature-based solutions [2]. Applying nature-based methods can lead to costs of 70 billion euros, which would mean an economy of 425 billion euros. The calculation can be found in Table 20.1. The data regarding the origin of the contamination were not included in the table, but they can be consulted in the cited source.

The immediate start of the treatment of potentially contaminated and contaminated sites by the proposed methodology can bring huge benefits to the state in exchange for low costs [5], bring abandoned land back to the use of the population, and ensure the good implementation of the planned infrastructure projects.

By applying nature-based remediation techniques, many benefits for the environment emerge in comparison with the existing technologies, as explained in Table 20.2.

Figure 20.1 graphically represents the steps taken to decontaminate a site. It can be observed how the application of the current solution does not allow the lands to be used during the remediation and brings with it additional pollution even if the time for decontamination is shorter. Applying the proposed change, decontamination will

Table 20.1 Money saved if nature-based solutions are chosen for the decontamination

Sources of pollution	*Approximate contaminated area (mil m2)*	*Volume of contaminated soil, for 1 m depth (mil m3)*	*Decontamination costs by conventional methods (mil euros)*	*Decontamination costs by nature-based solutions (mil euros)*	*Savings if nature-based solutions are chosen (mil euros)*
Steelworks, ferrous and non-ferrous metallurgy activities	899.62	899.62	449,810.00	62,973.40	386,836.60
Extractive industry	27.26	27.26	13,630.00	1908.20	11,721.80
Oil industry	26.65	26.65	13,325.00	1865.50	11,459.50
Electricity production activity	17.01	17.01	8505.00	1190.70	7314.30
Industrial landfills	9.55	9.55	4775.00	668.5	4106.50
Landfills for household waste	6.85	6.85	3425.00	479.5	2945.50
Agricultural holdings	0.31	0.31	155	21.7	133.3
Total	***987.25***	***987.25***	***493,625.00***	***69,107.50***	***424,517.50***

Source: Authors' own presentation based on the cited data

Table 20.2 Comparison between current and proposed methodology

Current solutions	Proposed methodology
High cost of remediation	Low cost of remediation
Waste is generated in the process	Little to no waste is generated in the process
High additional pollution	Low additional pollution
Short-term decontamination process	Medium to long-term decontamination process
Carbon emissions production	Carbon emissions reduction/absorption
Use of the land is possible only after the completion of the decontamination process	Use of the land is possible even during the decontamination process
Disruption to the site and surrounding community	Bioremediation creates green spaces for wildlife habitats, recreational areas, and development projects

Source: Authors' own research

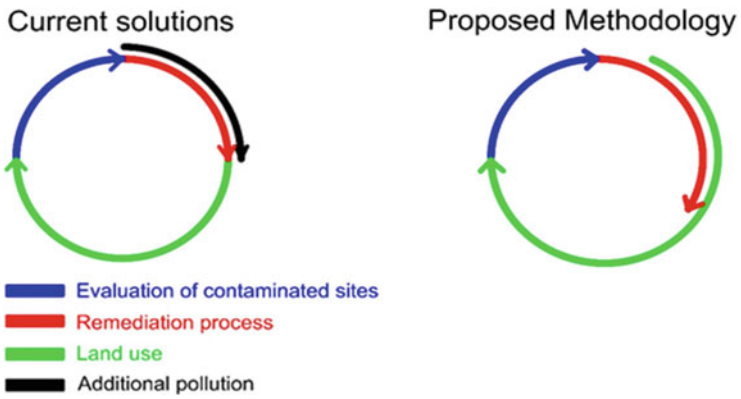

Fig. 20.1 Characteristics of the proposed project vs the existing decontamination approach in Romania. (Source: Authors' own research)

be done with nature-based solutions, and although the time to remediation is longer, the land can have various uses throughout this period.

20.5 Conclusions

The COVID crisis has destabilized the country's economy, and Romania is no exception. Infrastructure plans are necessary but quite expensive, and in addition to the budget allocated for them, there is a big risk that these works will be hampered by overlap with contaminated sites. Their decontamination means additional costs, but it can also mean the delay of the works or the redefinition of the routes.

The current decontamination procedure applied and regulated in Romania restricts the use of the land during the rehabilitation process, and the lack of clear guidelines in this regard further aggravates the situation.

Reviewing best practices and considering the need to restore ecosystems and absorb carbon, we propose some key criteria to be introduced in the current methodology, which have both financial and environmental benefits. There are taken into account important aspects that need to be met to fulfill good practices in the field, such as decontamination with nature-based solutions and state acceptance of land use for appropriate purposes during the remediation process.

Criteria such as immediate action; creating a guide on nature-based solutions for decontamination; defining the optimal use of the land during and after decontamination; creating green spaces for wildlife habitats, recreational areas, and development projects; and the legality of using contaminated land for appropriate activities while they are being restored were considered necessary to be introduced in the Romanian methodology.

The implementation, at a national level, of decontamination through nature-based solutions can bring a cost decrease of at least 425 billion euros. This will also ensure a significant reduction of waste, carbon sequestration, the possibility of using the land during decontamination, and additional green spaces or wildlife habitats.

The challenges for such a task are many, starting from gathering experts to make the action plan to monitoring the decontamination activity of the sites. The time interval related to the decontamination process may seem long, but compared with the fact that the situation of the contaminated sites has been unchanged for years, the time required for remediation no longer seems too big.

Regarding the limits, we mention the fact that no official data belonging to the Romanian state was found about the extent and surface of the contaminated sites, but only related to their number. As a result, media sources were used, and these are not very recent. This is another proof of the fact that the situation of contaminated sites in Romania does not receive the necessary attention. The reality related to the spread of contaminated surfaces can be much more serious.

It would be interesting to find out how nature-based decontamination solutions can be used for carbon sequestration. Addressing this issue in future works would bring more determination in applying these methods to the problem of contaminated sites.

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Chapter 21
Hotel Management in the Twenty-First Century: Opportunities, Threats, and Implications

Vesna Milovanović

Abstract First decades of the twenty-first century are characterized by numerous changes that have significantly affected the hotel industry worldwide, both positively and negatively. The most important changes relate to technology, the sharing economy, ecology, different types of crisis, as well as to the demographic structure. Moreover, the number of competitors increases continually, as well as customers' expectations. Hotel management is thus facing great challenges to succeed in such a dynamic environment. Due to its nature, this industry is very sensitive to the most of changes and relatively inadaptable at the same time. Hotel services cannot be stored for later use, and downsizing in hard times and increasing the capacity in the peak of demand are rather impossible. The quality of strategic management can be considered as a determinant of business sustainability and competitive advantage. The first phase of this process is the analysis of environment to reveal emerging business opportunities and threats, followed by strategy formulation, evaluation, and implementation. Therefore, this chapter strives to comprehensively analyze the context of hotel operations in the third decade of the twenty-first century and to provide implications for managers how to achieve and sustain competitive advantage. In this respect, strategic management and total quality management are seen as a backbone for achieving sustainable competitive advantage in contemporary hotel market. Specific attention is drawn to the concepts of dynamic capability, risk management, accessibility, corporate social responsibility, and supply chain management.

Keywords Hotel · Strategic management · Total quality management

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21.1 Introduction

The hotel industry is a very specific one, characterized by high profit potential and, at the same time, by high investments, fixed costs, and low flexibility in terms of adjusting to demand fluctuations. Therefore, the concept of yield management is proved to be very efficient for supply and demand alignment, as hotel services cannot be stored for later use, neither the scale of service "production" can be fully adjusted to the actual demand. However, there are even greater challenges that the hotel companies are facing nowadays. That is, the twenty-first century has brought about intensive technological development that has opened new frontiers for hotel companies, enabling them to have a greater geographic reach, to improve customer relationship management and service quality, and also to lower costs in the long run, make better decisions, become more responsive, establish close cooperation with partners along a supply chain, etc. On the other hand, the Internet enabled the rise of the sharing economy, connecting accommodation providers with accommodation seekers. This has especially endangered budget hotels, as they build competitive advantage on low prices by providing limited services. Therefore, potential guests choose individual accommodation providers with lower prices and comparable service quality to budget hotels. Apart from the sharing economy, hotels are facing constantly increasing direct competition coming from the appearance of other hotels. Naturally, the quality standards in the industry grow affecting customers' expectations and satisfaction. Such situation demands from hotels to be proactive and seek for quality improvement possibilities on a continual basis. Not only physical environment should be given full attention, but the quality of communication with guests, responsiveness, and flexibility are found to be very strong determinants of guests' satisfaction and loyalty.

Another issue relevant for the hotel industry in the twenty-first century refers to the concept of corporate social responsibility (CSR). Numerous ecological problems, some of these being the consequence of hotel operations, and public increasing interest in this topic put pressure on hotel companies to become more environment-friendly. This means to reduce the negative impact on the environment in terms of resource overuse and pollution. There is a significant room for improvement, such as using renewable energy sources, using technological solutions for energy saving, reducing waste, reusing water and other materials, as well as recycling. There are internationally recognized standards guiding companies toward environmental responsibility, and certificates are given to companies that fulfill the standards' requirements. Apart from diminishing their own negative impact on the environment, hotels can also help by solving the existing problems, which are not a product of their operations. Moreover, social responsibility refers to participation in solving social problems as well. The concept of CSR fosters hotels to be good citizens and help them obtain certain benefits in return, such as lower costs, improved image, differentiation, employee and customer satisfaction, and so on.

Perhaps the most influential factors on the hotel business nowadays are different types of crisis, caused by health, political, natural, and economic issues. First

decades of the twenty-first century are characterized by various health crises, among which the COVID-19 pandemic has proved to be the most influential one in terms of duration and effects on the hotel industry. Next, numerous terrorist attacks, which are common in tourism destinations, also have a negative impact on hotel companies, both in the short and in the long run. In addition, wars significantly negatively impact hotels' occupancy in the affected areas. Natural crises happening in the recent period are to a certain extent the consequence of climate change and therefore could be expected to repeat. These crises arise from different types of disasters, such as extreme temperature, drought, and conflagration, but earthquakes, storms, and other disasters also happen, which affect guests' perception of safety and consequently diminish their desire to visit certain areas. As a result, hotel companies suffer from low demand. Economic crisis usually follows other types of crises, and currently, it is the result of multiple crises, among which the most influential are the COVID-19 pandemic and the war in Ukraine. The commodity prices are constantly increasing, lowering the purchasing power of travelers and thus influencing negatively hotel demand and positively the costs of hotel operations.

Among major trends in the twenty-first century, it is worth mentioning an aspect of a demographic change, which is population aging in many parts of the world. The reason why this trend is important for the hotel industry is that it impacts the guests' preferences, as elderly might prefer or need a customized and/or supplemented service. In order to keep its market position, hotel companies need to adjust the offer, not only to guests' current needs and expectations but also to the future ones as well. This work aims to comprehensively analyze the contemporary business environment in which hotel companies operate and to draw attention to the management concepts that should be given the highest priority in order to survive in a highly dynamic and competitive market.

21.2 Dynamics of the Hotel Environment in the Twenty-First Century

Tourism and the hotel industry have been significantly affected by numerous changes that have occurred since the beginning of the twenty-first century. Technological changes are among the most influential ones in the hotel industry, enabling online reservations, promotion, e-distribution channels, and various solutions for optimizing hotel operations. Artificial intelligence has been used for data analysis and management but also for providing service by robots or enabling self-service and so on [16]. By using the modern technology, hotels provide differentiated and customized service and save costs at the same time. According to Dash et al. [4], expected benefits for hotels could be optimized asset utilization, better demand forecast, and efficient decision-making resulting in lower costs and higher income, improved quality, etc. Technology enables integration of the supply chain members, which is of significant relevance for achieving competitive advantage in a highly

dynamic market. During the COVID-19 pandemic, technology had the leading role in hotel operations for enabling communication and social distancing [23]. Apart from numerous positive impacts of technology on the hotel business, there are some negative effects as well. At the first place, applications that allow online real-time meetings have reduced the need for business travel, especially on large distances. Additionally, technology enabled development of the sharing economy, which is a new type of competition to the limited service hotels.

In the recent two decades, the intensity of competition in the hotel industry worldwide is growing on a continual basis, while the customers are becoming increasingly demanding. As a consequence, there is a pressure on hotel companies to constantly improve quality in order to exceed customers' expectations. Such expectations are not related to service only but also to the hotels' attitude toward society and the natural environment. There has been a growing interest of authorities, non-governmental organizations (NGOs), and individuals in environmental protection, which forces hotels to act as good citizens and preserve the natural environment. There are international standards leading organizations to be environment-friendly, such as ISO 14000, as well as labels distinguishing hotels and destinations that protect the environment, such as Green Globe 21, Green Key, EarthCheck, Green Tourism, and EU Ecolabel. By taking care of the natural environment, hotels contribute to increasing the destination attractiveness, which is a condition for the hotel's sustainable business [7]. Although accessibility is recognized as a quality criterion, the standard hotel services are not sufficiently accessible to the large portion of population who face some kind of disability. Disability is very often connected with aging because elderly face limitations that may refer to mobility, hearing, sight, cognition, and so on. This issue is becoming increasingly relevant, as the global population is aging (Fig. 21.1).

Tourism has been affected by numerous health crises since the beginning of the twenty-first century, such as severe acute respiratory syndrome (SARS) (2003), swine flu (2009), Middle East respiratory syndrome (MERS) (2012), Ebola (2013), Zika (2015), and the COVID-19 pandemic, the last one being the most severe in terms of intensity, duration, geographic reach, and uncertainty [13]. Hotel operations worldwide were significantly damaged, primary due to the travel restrictions, border closures, and transport cancellations. Moreover, people were less motivated to plan in advance and travel, especially on large distances, due to very high uncertainty. Accordingly, the STR [29] finds the year 2020 to be the worst one in the history of the hotel industry. It turned out that most of hotels were not prepared for such low-probability high-impact crisis.

Hotels with sound financial reserves, contingency plans, and diversified service portfolio had a better chance to survive and operate during the pandemic [26, 35]. In the new business context, more successful were hotels with more flexible cancellation policies, higher hygiene standards, social distancing, and effective communication and support toward stakeholders. Although there has been a certain improvement in the international tourists' arrivals in 2021 compared to 2020, the lag with regard to 2019 is still significant (Fig. 21.2). Moreover, in Asia and the Pacific and Middle East, there was a further decrease compared to 2021. The data

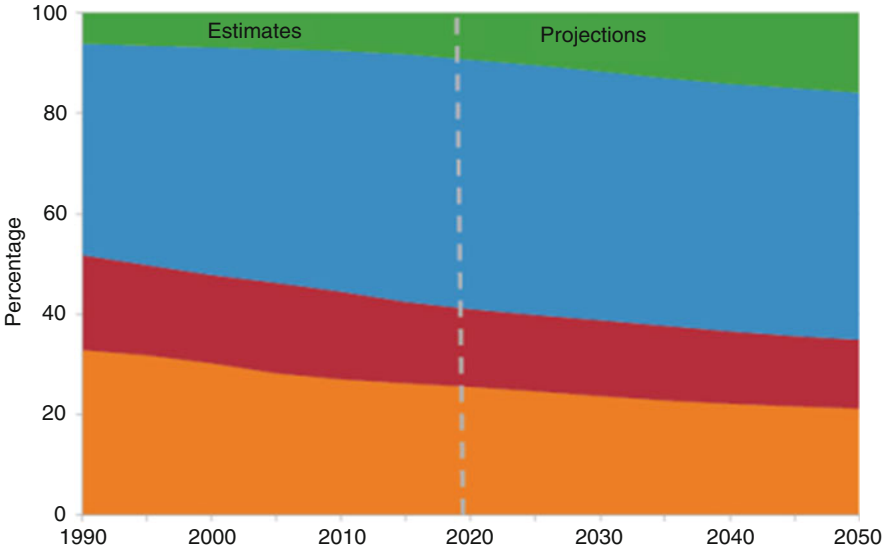

Fig. 21.1 Change in world population age structure. United Nations, Department of Economic and Social Affairs, Population Division (2019). https://www.un.org/en/development/desa/population/publications/pdf/ageing/WorldPopulationAgeing2019-Report.pdf › population › publications – World Population Ageing 2019, last accessed 2022/01/20 [34]

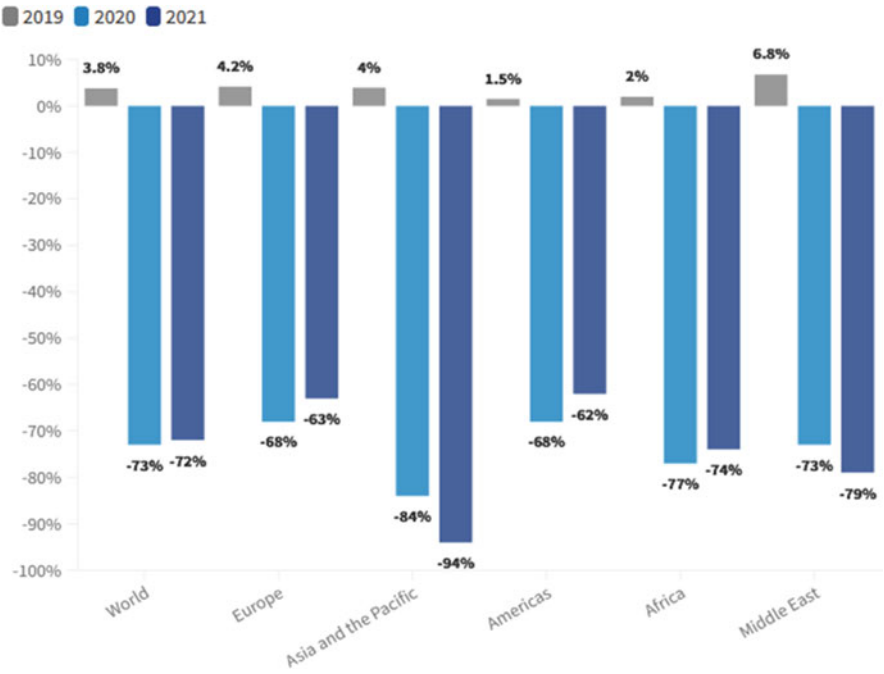

Fig. 21.2 International tourists' arrivals % change from 2019 through 2021. World Tourism Organization (UNWTO). https://www.unwto.org/news/tourism-grows-4-in-2021-but-remains-far-below-pre-pandemic-levels, last accessed 2022/02/09 [36]

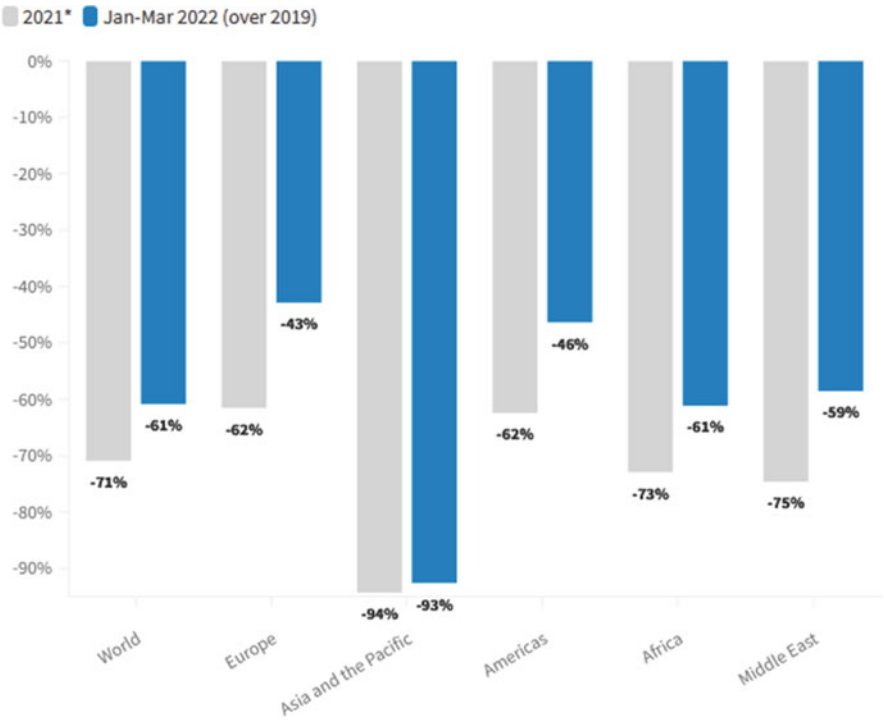

Fig. 21.3 Slow and uneven recovery of international tourists' arrivals. World Tourism Organization (UNWTO). https://www.unwto.org/news/tourism-grows-4-in-2021-but-remains-far-below-pre-pandemic-levels, last accessed 2022/06/30 [36]

show a progress in 2022; however, the pre-pandemic level is still far to reach (Fig. 21.3).

The beginning of the third decade of the twenty-first century can be marked as very challenging, as there are combined effects of health crisis and political instability, producing economic and social problems. According to CoStar [2], the Russia's invasion of Ukraine is the most significant military conflict in Europe since the Second World War. Some kind of events, especially natural disasters and wars, causes a sharp decline in hotels' occupancy in the affected region but impacts positively on hotels in other regions where the population immigrates to. Not only Ukrainian hotels face problems but also the Russian ones, as well as those in tourism destinations that have been popular among Russian population, as there are travel bans for Russian airplanes across many countries. The economic effects of this particular event overflow beyond Ukrainian borders and affect many other countries in the region and worldwide, causing inflation and shortages of certain commodities, as well as high level of uncertainty. As a consequence, buying power of population decreases, together with spending due to uncertainty, what negatively affects demand for tourism and hotel services.

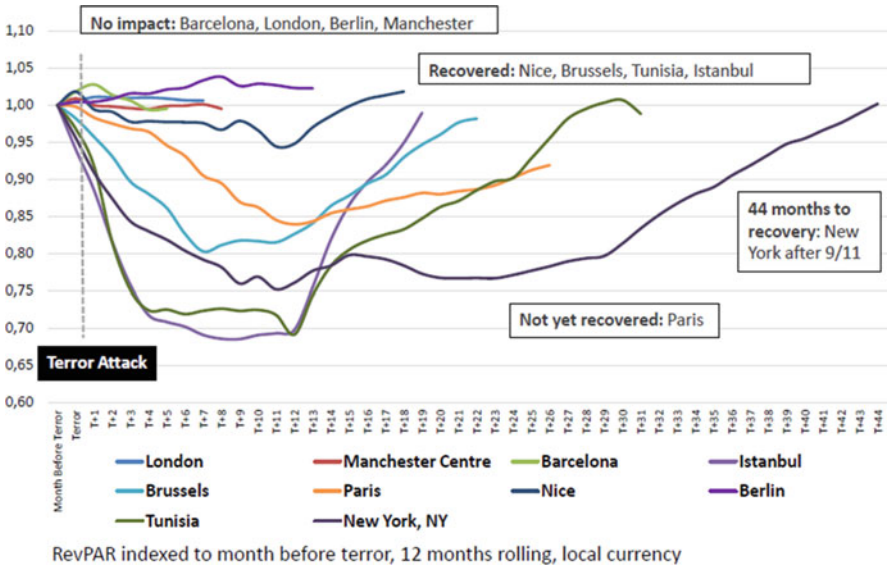

Fig. 21.4 Terrorism impact on the hotels' RevPAR. (STR [30])

Another issue affecting the hotel industry is terrorist attacks, which have been intensifying in Europe in the second decade of the twenty-first century. According to Henderson et al. [12], tourism destinations and hotels are found to be attractive targets for terrorist attacks. These usually have an immediate and significant impact on the tourist arrivals and the hotels' occupancy, as well as extended impact that may be long-lasting. Figure 21.4 illustrates the impact of terrorism on the hotels' revenue per available room (RevPAR). It is noticeable that while there was almost none or small impact of certain attacks, others have produced significant and long-lasting negative impact on the hotels' RevPAR.

21.3 Implications for the Hotel Management

The importance of strategic management in contemporary hotel business context results from the fact that it helps a company to operate successfully in a dynamic and complex environment. Strategic management process begins with analysis of the environment, followed by formulation of a strategy as an essential planning decision, strategy evaluation, and implementation [6, pp. xiii, xvi, 9]. Äs a result of this process, companies develop a dynamic capability, which refers to attention focused on changes in the environment, identification of market opportunities and threats, and accordingly to coordination, learning, integration, reallocation, and use of available resources for survival in a changing environment. By choosing approaches that value contingency and flexibility, companies create market value through

appropriate business strategies and interactions with the environment and, consequently, achieve competitive advantage. In other words, having valuable resources is not a guarantee of sustainable business in a dynamic environment, but only companies that respond to changes in the external environment by integrating and coordinating resources can be the real winners [31]. Since dynamic capability is the ability of a company to adapt and change along with a changing environment, it allows companies to maintain a competitive advantage. A company cannot translate the collected information into a competitive advantage without system coordination, cross-functional integration, organizational learning, and transformation mechanisms [25]. Hsu [14] considers that market orientation, total quality management, and organizational learning are the drivers of dynamic capabilities of hotel companies, which enable the acquisition and maintenance of competitive advantage in a changing environment.

The International Organization for Standardization has developed a group of standards, ISO 9000, to lead companies toward improving quality of business and performance. According to ISO 9001:2015, implementation of quality management system (QMS) in an organization is a strategic decision because it can help improve business performance on a continual basis in an increasingly dynamic and complex environment [15]. The standards support market orientation, process approach, risk-based thinking, continual improvement, and relationship management within and outside the company. As recent years have brought many unexpected events, including severe and long-lasting pandemic, war, terrorism attacks, as well as natural catastrophes, risk management is gaining importance. Also, fast changes and shocks impose a need for closer cooperation among partners within the supply chain. Moreover, in globalized and highly dynamic marketplace, participants in a competitive race are the whole supply chains, rather than individual companies. Supply chain management (SCM) represents an integration and synchronization of activities and processes among supply chain members [24], related to forecasting, planning, and logistics. Its purpose is to maximize the value added for the end users, as a result of improved speed, responsiveness, flexibility, and cost efficiency. This is a way to achieve market success, the benefits of which are collected by all supply chain participants. Transfer of information along the entire supply chain, integration, and cooperation among the participants in the supply chain help to build the dynamic capacity of the company. According to Tellioglu [32], hotel service quality and costs are the key drivers of competitiveness nowadays, and the importance of the SCM is reflected in its effects on both of them. As González-Torres et al. [8] assert, supply chain members' integration in tourism leads to improvement in organizational capacity to deal with changes and better performance.

Quality is a certain dynamic state or continuous change that takes place on products, processes, members of the organization, and the environment [28, p. 58]. As society becomes more economically advanced, culturally more mature, and more educated, societal demands for quality services increase. Consequently, a growing number of service companies initiate the implementation of total quality management (TQM). This concept has gained global acceptance as a business philosophy that often brings a fundamental transformation of organizational culture. Camisón

[1] perceives TQM as the basic management technology for laying the foundations of the competitiveness of companies in the field of tourism, at a time when the turbulent business environment and customer demands for excellence require a growing management capacity. Maoto [20] claims that hotels that have adopted the TQM philosophy achieve higher sales growth and capacity utilization compared to hotels that have not adopted it.

Accessible tourism is gaining importance as a source of innovation and competitive advantage in a dynamic business environment. Improving accessibility as a quality criterion is a business opportunity for the hotel industry, as people with some kind of disability represent a significant market share. Tutuncu [33] asserts that elderly and disabled population is an economically significant and steadily growing market segment, which should be seriously considered by the tourism industry. Increasing the accessibility of services to a larger number of people promotes social responsibility, which is highly valued by society today. According to Darcy [3], the cost of accessibility is small compared to the future benefits that can be realized in the medium and long term. As the image of the hotel depends on the emotional experience of its guests, such differentiation strategies have a positive impact on the tourist experience, which is often positively reflected in the attraction of new market segments [27]. The global trend of population aging can be perceived as an emerging opportunity for the hotel industry, where hotels can approach this growing market segment by providing senior-friendly products and services [18].

The modern notion of quality transcends the boundaries of products and services and encompasses the company's relationship to its internal and external environment. That is, the issue of quality in the company has expanded from the focus on product quality to include the quality of services, internal processes, supply chains, as well as the quality of impact on society and the environment. Corporate social responsibility (CSR) can be seen as a natural continuation of quality assurance in the company, representing the company's desire to protect the environment and help solve problems in the community [10, 21]. Hotel chains, as drivers of innovation in the hotel industry, are leaders in the field of quality management and CSR. These hotels have implemented various programs to reduce waste and the use of resources, to recycle, and to support society through education and other activities. Hotel managers highlight many benefits of these initiatives, such as long-term cost reduction, improved work atmosphere, and strengthening the image and loyalty of employees, guests, and business partners [22]. The strategy of social responsibility creates value and is sustainable only when it is harmonized with the business model of the company [19]. Strategic social responsibility implies the selection of those social responsibility strategies that will bring the largest value to the company. In this regard, after identifying problems in the environment and the company's ability to contribute to their solution, it is necessary to evaluate potential strategies of social responsibility and select those that will create the greatest value for the company, which ensures the sustainability of socially responsible company orientation. Lee et al. [17] show that the image of green hotels contributes to the intention of guests to visit the hotel again, to spread positive word of mouth, as well as to pay a premium price. Han et al. [9] assert that hotels that protect the environment attract not only

visitors who are actively involved in environmental activities but also the general population. Heikkurinen [11] states that the image of environmental responsibility improves the perception of the key hotel's stakeholders so that the hotel becomes a more attractive place to work, cooperate, and stay. Although the hotel industry is not among those that initially attracted public attention given the degree to which they pollute the environment, there is a growing trend of public attention regarding the consequences of hotel operations and the social responsibility strategies they apply [5].

21.4 Conclusion

Among the most influential phenomena on the hotel industry by the beginning of the twenty-first century, the following could be named: rapid technological development, the rise of the sharing economy, increasing concern for the planet and the natural environment, aging population, as well as natural, health, political, and economic crises. The contemporary hotel business environment is characterized as a highly dynamic and unpredictable one, imposing numerous challenges to the hotel managers. Moreover, the hotel market consists of continually rising competition intensity, together with customers' expectations.

This chapter provides a comprehensive analysis of the contemporary hotel business environment and suggests concepts that should be given a high priority by hotel managers in order to ensure business survival and development. The task of strategic management is to light a way for a company toward success by strategy as a guiding idea. Vigilant monitoring and anticipation of changes in the environment are of paramount importance to be prepared to timely respond to those changes. Development of dynamic capability enables hotels to respond quickly to the emerging changes. Contemporary environment demands strong risk management to identify risks and develop contingency plans. Integration with key partners along the supply chain enables development of agility as a combination of flexibility and responsiveness. In such a demanding market and dynamically changing environment, a single company cannot compete on its own, but as a grummet of a supply chain. The outcome of an effective supply chain management should be the achievement of competitive advantage for every member of the supply chain. Such approach enables hotel companies to become agile and respond quickly to the changes in its environment.

Under the umbrella of strategic management, attention should be paid to the concept of total quality management, which refers not only to ensuring the quality of services but also the quality and sustainability of business. Quality is seen as the extent to which products and services satisfy guests' expectations. Having in mind that expectations are subject to change, hotels need to develop strong market orientation and adjust to the change in customers' preferences, which may also emerge from the trend of population aging. Corporate social responsibility is gaining importance along with the rise of public concern for environmental problems,

including climate change, excessive usage of resources, and pollution. Hotels are expected to diminish their negative impact on the natural environment and take initiative to solve existing problems, which may be related to both the natural and the social environment. Such approach is known to be useful for hotel companies in terms of lowering costs and improving the image and stakeholder satisfaction, leading to higher demand and profitability.

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Chapter 22
Digital Divide and Employment: From Job Disruption to Reskilling Workers for the Future World of Work

Razvan Vasile

Abstract Digitization profoundly changes the world of work and redefines it. Digitization at the workplace is a reality of the last decade, and the pandemic accelerated the pace of employment reform, causing greater flexibility of the active life model, but also increased vulnerabilities. Digitization statistics capture, through new indicators developed by Eurostat, the incidence of information and communications technology (ICT) services and products on jobs – skills, work intensity, risks, tasks and responsibilities, working conditions, remuneration, and professional career. Starting from the digital intensity in companies and the adaptation of the workforce in the pandemic, we analyzed the gaps between EU countries and companies' size. We highlighted the companies' digital reform status in the pre-pandemic and the changes made during the pandemic on the labor force, in order to outline the employment model and the content of jobs, as directions for the continuation of the post-pandemic digital transformation. The results obtained indicate significant and growing gaps between countries regarding the dynamics of changes and the achievement of expected results, as well as the different degree of readiness of the business environment and of individuals to respond to the challenges of the irreversible digital transformation of work, to strengthen the new post-pandemic employment model. Also, the results confirm that the concerns for digital performance, as a resilience factor of the company during the pandemic, were a priority not only for large companies but also for SMEs, including those that had a low level of digital intensity and from the lower-performing countries. As the pattern of changes, companies, during the pandemic period, had as their main orientation the adaptation through digitalization to the limitations of the measures for carrying out the activities imposed by COVID-19, with a preponderance on ensuring the skills for their own employees and less for increasing the share of employees with ICT specialization, which indicates that the adjustments were minimal and aimed at ensuring the conditions for remote work. The speed of digital evolution was facilitated by the level of economic development expressed by gross domestic product

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(GDP)/capita in PPS and the level of digital reform before the pandemic as strong advantages for building post-pandemic economic resilience. Based on the results obtained, recommendations were made for policy measures at company level to ensure a resilient employment model and close the performance gaps in the digital transition of work.

Keywords Digital intensity · Employment · Post-pandemic resilience

22.1 Introduction

The implications of remote work are not only on the model of communication and interaction with the employer but also on the management of work in different locations – the household becoming a workplace, business travel, working outside the classic 8-h work schedule in the first part of the day, etc. – which means adequate facilities for digitized work, associated costs, externalities on family life, work-life balance, etc.

The world of work is changing: (a) from job destruction and the need for workforce reskilling to the emergence of new professions and the need for transversal skills ("soft" skills); (b) from predominantly permanent and full-time jobs, to a reconfiguration of employment models centered on human needs and not exclusively on production and monetary profit (i.e. the expansion of flexible, atypical jobs that meet the objectives of sustainable economic development and resilience), but which also induce adverse effects such as vulnerability in employment; (c) from one single job and a well-defined career throughout the working life to multiple jobs, with increased instability and unpredictability in workers' career paths. Diversification of forms of employment and change of jobs attract insecurity and irregularity of earnings throughout working life; (d) new forms of labor market segmentation emerge, associated with digitization, with specific measures and policies for digital divide, digital disruption, and digital inclusion; (e) the motivation to enter and stay on the labor market is changing. In fact, it is the paradigm shift regarding how and where we work and, subsidiarily, the emergence of new, atypical activities and jobs where work motivation and associated professional career models are much more attractive to young people.

Although there are numerous studies that analyze the labor market, in its various aspects, in association with the digital transformation or the digital economy, which can provide us with the main directions and components that change the pattern of employment and the pattern of work in general, we have not identified studies that address the impact of digitization starting from the indicators newly calculated by Eurostat, at individual and enterprise level (Eurostat, Internet use at work/in enterprises).

In this chapter, we start from the analysis of the specialized literature by highlighting the interest for the multidimensional analysis of the changes on the labor market generated by digitization; then we move on to the statistical analysis of the indicators that reflect new aspects of the incidence of digital transformation at the individual

and the company level, with the presentation of the comparative situation between EU member countries. The "Results and Comments" section will also highlight the policy response through medium- and long-term measures to redefine the human capital development strategy and the management of its use on the labor market.

22.2 Literature Review

The changes in society generated by digital technologies extend to everyone, from companies and individuals/households to public institutions and other categories of market agents. The digital transformation of companies (technologies assisted by intelligent organizational coordination systems, as well as of the managerial processes in general), also requires the digitization of jobs as such and digital skills for the workforce. Moreover, the digital transformation of technological/managerial processes changes the requirements and conditions of exercising professions, and digital tools are redefining the fundamentals of activities associated with specific professional activities. Therefore, any company that digitizes itself from the perspective of the object of activity and the products and services made for clients must also consider the investment in the adequacy of its own workforce, but not only through knowledge and skills (which become a component of work supply, as a product of education and previous experience) but also through forms of employment, working conditions, and work organization (as factors for productivity and for individual and team performance).

The impact of the digital economy on the transformation of work at the company level can be found on at least four levels and requires the acceptance of three stages of company transformation. Starting from Kim et al.'s [16] concept of digital economy transformation at the firm level, we developed a model of the influence of work transformation at the firm level, differentiated according to working conditions, work organization, work performance, and reward/payment of work (Table 22.1).

The effects of digitization adjust both labor market mechanisms and the labor force at the firm level, at least from two perspectives:

(a) From the labor market side, several effects are already visible and can be listed as follows: the work content is redefined, the forms of employment and contractual relations are more vulnerable, and the fundamentals of the quality of the job are changing. At the same time, the mechanisms that influence labor market segmentation are fundamentally changing, both from the perspective of labor force categories and the impact on economic and social inclusion. The forms of segmentation are varied, from the classic segmentation of professions/jobs to more recent forms related to the effects of pandemic restrictions or digital inclusion. The specialized literature [22] analyzes the asymmetric effects on the labor market of the COVID-19 crisis – essential professions vs non-essential professions, but also the digital transformation of post-pandemic jobs. The

Table 22.1 The impact of the digital economy on work at the company level

Components of work at the firm level	Digital transformation at firm level [16]		
	Digitization – late 1960s	Digitalization (after 1994)	Digital transformation (after 2010)
Working conditions	Computer skills	Mobility-interconnectivity (digital skills and Internet skills)	Hybrid work; communication platforms (Zoom, Skype, Google Meet); high-quality digital infrastructure
Work organization	Improving efficiency, structural optimization of job duties, saving time for the work tasks	Shifting from routine work to non-routine cognitive work, digital work ecosystem	Technology-oriented jobs, goal-based work
Work performance	Work productivity increases	The added value in work is measured – quantity, quality, and efficiency; the costs associated with work are optimized	The professional performances are optimized; solving problems, holistic approach
Reward/payment of work	On results/outcomes, Taylorist model	Job performance task solving and decision optimization	Salary and non-salary benefits package

Source: Author contribution based on specialized literature

segmentation of the labor market according to these two attributes not only deepens discrimination – on multiple criteria – but also reconfigures the demand for labor and skills, profoundly changing the need for professional training and soft skills.

(b) The digital transformation and the incorporation of new technologies in the business environment substantially change the model of the use of labor force, the emphasis is on human capital, and the intangible components of the labor factor become predominant [7], from at least the following perspectives:

- The share of routine work decreases significantly; it is replaced by digitization or automation processes, the workforce moving from executing operations to supervision, monitoring, or database processing with the help of programs developed as ICT applications. In this case, a number of jobs disappear and are replaced by those of monitoring, supervision, etc. Lately, in such workplaces, the contribution of artificial intelligence for decision-making optimization is increasing, and management systems suitable for these activities are being developed [4–6] – for example, systems of total quality management (TQM) control, or Lean Six Sigma-type methods [3, 25], communication platforms with beneficiaries/customers, automatic control systems of processing processes, etc.
- Increases the share of creative activities/jobs, in which the role of human capital is to use knowledge and skills to carry out activities based on initiative, responsibility, innovation, problem solving, etc. The work content of these jobs is enriched with specific components of digital transformation, requiring permanent investments in support technology from the sphere of information and communications technology (ICT) products and services [12].
- There are new jobs specific to the digital economy in the ICT sector, or which provide digital support for the modernization of logistics processes in companies or public or private authorities, database processing, etc. [23] – system administrator, administrator network operators, data security specialists, big data operators, etc.
- Increases the dynamics of job renewal, based on problem solving and decision optimization, by combining artificial intelligence, multiple querying of databases, and multi-attribute communication.

In recent years, the digital transformation has focused especially on the development of the digital infrastructure of companies and on the digitization of the business' components. Only during the pandemic, was redefined the importance of the remote work. So, it was also reconsidered the importance of the hybrid work, mainly as way of adapting to the employers' requirements, respectively of continuing the activity under conditions of business profitability and efficient use of the labour force. While the efficient use of human capital has become the most significant factor in achieving the goals of the sustainable development strategy and business competitiveness, the deep reform of the labor market is still a topic of relatively peripheral analysis. However, in this context, on the contrary, the discourse of specialists on topics like skills mismatch or digital disruption on the labor market

is increasingly present in studies and analysis reports. Similar, if we refer to the digital and green transition, the issue of the new design of workplaces is more frequently addressed in integrated policies, at least at firm level.

These arguments support the analysis approach that I have selected and further developed, accepting the risk of missing consistent data series in terms of number of observations and time period, but having the advantage of highlighting new aspects of the impact of digitization on the dynamics of the world of work.

22.3 Methodology

In the analysis approach, we started from the premise that the database developed in the last two decades captures only the ICT sector component [24], but nowadays, the digital transition means much more. The digital economy mainly tracked digital products and services – technologies, infrastructure, and data [21]. The European Commission in 2014 stated that the main factors of the digital economy are mobility, network effects, and the use of data, marginalizing the value of human resources and intellectual capital as the driving force of a fully efficient digital economy [8, 14].

The digital economy statistics started from indicators of the ICT sector (indicating only the workforce employed in the sector) and, later, also included digital skills (as a significant statistical variable); recently, it has expanded to users (companies and individuals/households), developing indicators to measure the state of the digital transition in companies and households through effect indicators – the degree of use of digital components, digital intensity, etc. (Eurostat database) or OECD/national-level indicators [17, 21], including input-output tables [1]. In parallel, composite indicators were also developed that highlighted the countries' performances and, implicitly, the gaps in the digital transformation – the digital economy and society index (DESI), ranking digital rights index (RDR) index, digital diplomacy index (DDI), etc. The limit of these indicators is the reporting period, but their informational value provides an important supplement for specialists and especially for decision-makers to substantiate the updating of strategies for the "new normal" of development that we are going through starting from 2022. The pandemic, specifically the years 2020–2021, accelerated the dynamics of the digital transition and/or repositioned the importance of some components in the medium- and long-term approach to sustainable development and resilience of society and the digital economy.

The analysis methods used aim to identify whether the progress in the digital transformation measured by DESI correlates with the level of development of the states (GDP/capita at purchasing power standards (PPS)) or with the performance in education (the average number of years of school), or rather depend on other factors associated with the digital transition of companies (i.e. as a strategic objective for future competitiveness, or related with the limitations imposed by the pandemic).

We chose the digital intensity, an indicator that highlights the situation at the micro level, more precisely of businesses (aside from the financial sector), with 10 or

more employees, and self-employed, as well as indicators of the impact of the Covid-19 crisis on the use of ICT (taking into account the fact that starting from 2020 some of the companies' staff worked from home, having remote access via the Internet).

The research questions are as follows:

H1: Is there a correlation and what is the intensity of the connection between DESI dynamics during the pandemic and the level of development expressed by GDP/capita in PPS and/or performance in education (measured by the average number of years of schooling)?

H2: Is digital intensity in companies significantly influenced by the individuals' skills compatibility with duties and by the use of ICT at work?

H3: Is digital intensity significantly influenced by companies that provide training for developing/upgrading ICT skills of their personnel and by the share of enterprises that employ ICT specialists?

H4: During the pandemic, have the gaps between countries increased from the perspective of digital transition?

22.4 Results and Comments

22.4.1 Statistical Analysis of Selected Indicators and Informational Value for the Purpose of the Analysis

The pandemic crisis has shown that digitization is an important tool for improving the economic resilience of businesses. Investments in ICT and the employment of specialized personnel, including those with the necessary digital skills, represent the vectors of the digital transformation of the business environment, both on the production/services and sales components and also on the operational management, communication relationships, and specific activities (within the company but also with the tax institutions, the banking system, etc.).

The specialized literature and EU reports have highlighted that the pandemic has accelerated the digital transition by at least 5 years both in the segment of individuals and households and for the business environment – companies, banking system, tax authorities, etc. Other experts appreciate that the digital transformation has been interrupted, in the sense that in 2020 and 2021, only forced digital adaptation measures to the pandemic restrictions were operated, and then, with the removal of the restrictions, it returns to the previous state. An investigation carried out in November 2020, "McKinsey Global Survey of executives," [20] indicates (a) the acceleration of digitization at the company level, on the supply flow, by about 3–4 years; online trading platforms and customer communication have developed significantly; (b) the dynamics of technological renewal; that is, the share of digital or digitally activated products in their portfolios has increased/progressed by 7–10 years; (c) the dynamics of adaptation to remote work increased more than

40 times; (d) changes such as remote interaction with customers required investments in data security, which definitively removed some of the pre-crisis blockages to virtual interactions, so it is estimated that they will be maintained post-pandemic (i.e., changes in technology, along with remote working and customer interactions). About one-fourth of the respondents in the mentioned study indicate a decrease in their physical footprints; (e) the change in managers' mentality regarding the benefits of technological innovation associated with digitization, from the simple reduction of costs (which represents the main motivation before the pandemic, in 2017, for approx. One-half of company managers) to maintaining competitiveness (approx. Two-thirds) or business reorganization by incorporating digital technologies (approx. One-fifth) [18].

Another similar study, carried out by Deloitte in 2020, states that digital disruption has facilitated innovation by reducing reluctance in digital transformation. The adaptability through innovation of the companies, associated with the assumption of a greater risk compared to the achievement of the expected results, has redefined the response behavior of the companies, the time and administrative barriers being overcome by both the company managers and the public authorities [15]. As an example, we only mention the reprioritization of investments toward the incorporation of digital technologies, the association of technological innovation with the digitization of production and marketing processes but also of managerial operations and communication between and within companies (with increased digital security), and the training/development of digital skills for own salary or legislative changes to facilitate the expansion of remote work, work from home.

Moreover, if at the household level access to ICT products and services has obviously increased during the pandemic, the same cannot be said at the company level:

(a) At the company level, a series of indicators associated with "forced digitization" have not changed significantly.

Of the EU member states, only six provided digital skills training to their own staff in the first year of the pandemic: Estonia, Lithuania, Malta, Austria, Poland, and Sweden. All these countries (with the exception of Austria) employed more ICT specialists in 2020 than before the pandemic, to which Belgium, France, Cyprus, Hungary, Romania, and Finland are added. In other countries, the values of the mentioned indicators decreased – Bulgaria, Denmark, Ireland, Greece, Luxembourg, and Portugal (Table 22.2).

The differences in behavior in the first year of the pandemic are strongly dependent on the severity of the restrictions, on the incidence of COVID-19 cases, and also on the degree of digitization existing in companies and their openness to remote work and the incorporation of ICT products/services in the activity of companies.

(b) The degree of involvement of individuals in remote work – systematic work from home and the use of ICT at work – is strongly differentiated by country, which shows the different degree of "preparation" for "forced digitalization from the pandemic."

Table 22.2 Companies that provided staff training or updated digital skills and hired ICT specialists in the first year of the pandemic (% of total companies)

	Companies that provided training for ICT skills to their employees		Companies that have hired ICT specialists	
TIME	2019	2020	2019	2020
EU27 (from 2020)	10	10	19	19
Belgium	18	18	28	30
Bulgaria	7	5	20	16
Czechia	11	11	20	18
Denmark	19	18	30	29
Germany	13	12	19	19
Estonia	9	10	15	17
Ireland	14	12	32	30
Greece	9	8	22	19
Spain	9	9	17	17
France	9	8	17	18
Croatia	11	11	19	19
Italy	8	8	16	13
Cyprus	12	12	23	25
Latvia	8	7	20	20
Lithuania	6	7	15	16
Luxembourg	16	13	25	22
Hungary	8	8	26	29
Malta	14	16	27	29
Netherlands	:	15	25	24
Austria	10	11	20	20
Poland	6	8	23	25
Portugal	11	10	21	20
Romania	4	4	10	16
Slovenia	11	11	18	17
Slovakia	9	9	18	17
Finland	15	15	26	28
Sweden	10	11	18	21

Source: Eurostat, enterprises that provided training to develop/upgrade ICT skills of their personnel [ISOC_SKE_ITTN2__custom_2990294]; enterprises that employ ICT specialists [ISOC_SKE_ITSPEN2__custom_2990257] (percent of enterprises in all enterprises, without the financial sector (ten or more employees and self-employed persons)

At the EU level, in 2018, only 4% of individuals currently worked from home, and 14% used the Internet when working from home, with large differences between countries (Table 22.3).

Therefore, there is a strong asymmetry of the states in the course of digitization, depending on the production structure and the performance of the business environment but also on the investments in the digital infrastructure and in the human resource capable of using ICT products/services. In 2018, only Malta and Finland

Table 22.3 Degree of readiness for accelerating digital transition at the company level, pre-pandemic (2018 data)

	A	B	C	D	E
EU27 (from 2020)	4	14	25	10	40
Belgium	5	17	26	11	44
Bulgaria	2	5	16	4	21
Czechia	:	:	35	7	43
Denmark	6	28	32	13	52
Germany	5	15	29	18	54
Estonia	6	22	27	13	48
Ireland	5	11	19	10	34
Greece	4	8	17	4	24
Spain	4	14	22	7	36
France	6	16	27	9	43
Croatia	3	8	20	6	30
Italy	3	9	21	6	33
Cyprus	2	5	27	7	36
Latvia	5	15	30	7	39
Lithuania	3	12	24	9	37
Luxembourg	8	19	29	13	47
Hungary	4	11	24	3	30
Malta	8	20	28	15	48
Netherlands	7	31	41	17	61
Austria	4	16	28	16	49
Poland	4	11	23	6	32
Portugal	4	11	24	8	37
Romania	1	4	11	4	18
Slovenia	6	15	29	7	40
Slovakia	4	13	27	6	35
Finland	8	25	31	10	50

Source: Eurostat, data retrieved on June 28, 2022

Note: No available data for Sweden; A = People who work from home daily or almost every day; B = People who use the Internet for work when they work from home; C = People's skills match well with duties related to the use of computers, software, or applications in the workplace; D = Individuals who have the skills to handle more demanding tasks related to the use of computers, software, or applications at work; E = Individuals who use computers, laptops, smartphones, tablets, other portable devices, or other computerized equipment or machines, such as those used in production lines, transportation, or other workplace services

had twice as many people working from home as usual, compared to the EU average of 4%, the lowest share being in Romania with 1% and Bulgaria with 2%.

Regarding the use of the Internet for activities associated with work at home, at the EU level, the share of people who used the Internet for work in 2018, when they worked from home, was 14%; in Romania, Cyprus, and Bulgaria, the proportion was 4–5%, and more than one-fourth was registered in the Netherlands, Finland, and Denmark.

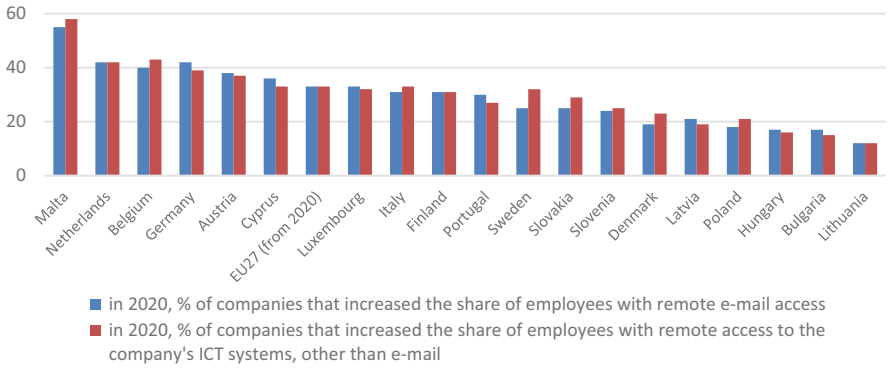

Fig. 22.1 Companies that hired staff to work from home, with access to the Internet or other company-specific systems, in 2020. (Source: Eurostat, Covid-19 Impact on ICT usage [ISOC_E_CVD__custom_3052934])
Note: the share of enterprises in total firms; no data available for Croatia, Czech Republic, Estonia, France, Greece, Ireland, Romania, and Spain

It is noteworthy that only 10% of firms, EU-wide, had the digital skills needed for more demanding tasks related to the use of computers, software, or applications at work, with a variation across countries between 18% in Germany and 3% in Hungary. The gap regarding the use of digital technology components for workplace activity was larger; the share of companies per country was between 61% in the Netherlands and 18% in Romania, with an EU27 average of 40%.

All these data indicate a poor performance in the digital transition for many EU27 states, which justifies different measures to adapt some activities during the pandemic, from temporarily closing the company or switching to remote work to accelerating investments in communication technology and digitized activities, including moving to/developing online commerce.

(c) The adaptation of companies to the conditions imposed by the pandemic crisis meant, not only in supplementary investing in equipment, but also in the hiring of ICT experts and in the training of their own employees, including the acquisition and/or updating of the digital skills necessary for work tasks' performance.

The impact of COVID-19 on the use of ICT in the enterprise, determined only at the level of 2020 and measured by the increase in the share of people employed to work from home, with access to email or other company-specific systems, indicates that on average at the EU27 level (as of 2020), two-thirds of companies have hired staff and expanded working from home (Fig. 22.1).

Once more, the results shows sizable disparities by country, which are influenced not only by the stage of the digital transition implementation at the company level but also by the field of activity, and by the structure of the business environment on sectors and activities.

(d) The digital transition during the pandemic did not only mean adapting to the pandemic restrictions but also the continuation of digitization strategies,

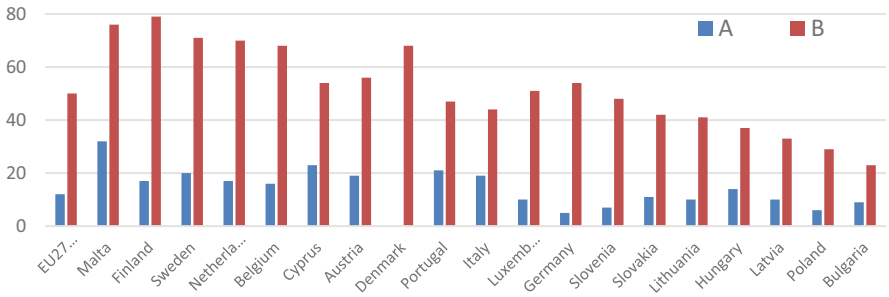

Fig. 22.2 Effects of the COVID restrictions in 2020 measured by: (**a**) the share of companies that have initiated measures to switch to the sale of products online or only to their development and (**b**) that have promoted remote meetings, via Skype, Zoom, MS Teams, etc

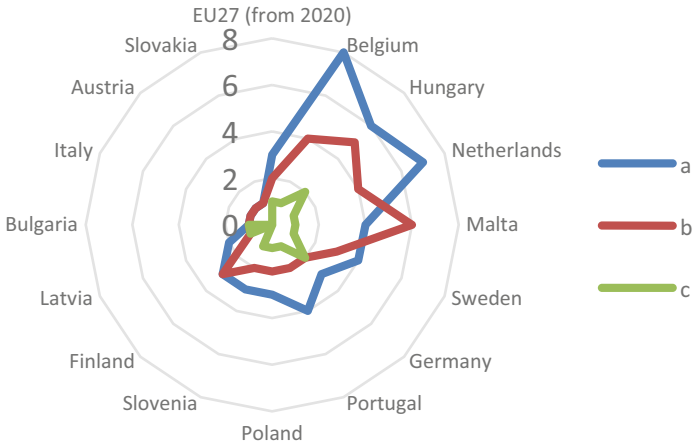

Fig. 22.3 Digitization measures in enterprises without being influenced by the measures imposed during the pandemic. (Source: Based on Eurostat data, Covid-19 Impact on ICT usage [ISOC_E_CVD__custom_3052934])
Note: a = % enterprises with an increase in remote access to the enterprise email system that was not at all due to the Covid-19 pandemic; b = % enterprises with an increase in the percentage of employees who have remote access to enterprise ICT systems other than email that was not at all due to the Covid-19 pandemic; c = % enterprises with an increase in the number of remote meetings held by the enterprise that was not at all due to the Covid-19 pandemic

companies being concerned with the continuation of their own digital reform programs.

In this sense, it should be noted that the companies also promoted digitization measures that are not related to the pandemic crisis (Figs. 22.2 and 22.3). It is found that although the priority was for rapid adaptation to pandemic restrictions, the continuation of the digital transition reform in companies was more intense in

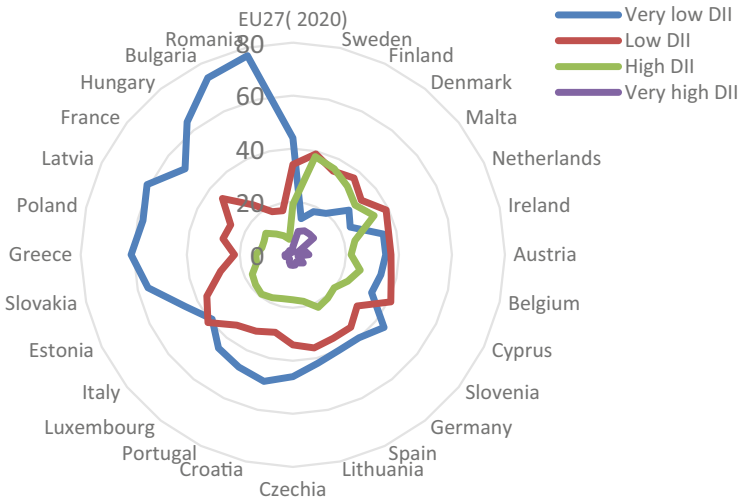

Fig. 22.4 Digital intensity in 2020, by country. (Source: Eurostat data, Digital Intensity [ISOC_E_DII__custom_3052501])

Belgium, Hungary, the Netherlands, and Malta and statistically insignificant in Denmark, Cyprus, Lithuania, and Luxembourg.

Once again, a strong behavioral asymmetry is found across countries and types of measures, with Belgium, Hungary, the Netherlands, and Malta standing out due to the proportion of companies that continued the digital reform, beyond the need to manage the limitations imposed by the pandemic.

Last but not least, a new indicator created by Eurostat emphasizes the digital intensity of companies[1] measured by the structure of companies according to the degree of digitalization, from extremely low/minimal to very high. The available data, only for the year 2020, show us, on average, that 44% of companies have a very low level of digital intensity, one-third have a low level, about one-fifth a high level, and only 3% a very high level (Fig. 22.4).

The differences are significant both according to the size of the company and also according to the fields of activity. A high level of digital intensity is found in large companies (approx. One-fifth) and in the ICT and accommodation services (approx. 10%) branches. The lowest level is found in small firms and in transport, storage, and construction activities. The differences by country are equally significant, with Romania being at an extreme, having the highest share of companies with a very low level of digital intensity (77%) and only 1% of companies with a very high

[1] According to Eurostat, the Digital Intensity Index (DII) is a composite indicator calculated on the basis of data from two surveys, namely, the ICT Use Survey and the Enterprise E-Commerce Survey. It takes into account 12 variables and distinguishes four levels of digital intensity – for details, see https://ec.europa.eu/eurostat/web/products-eurostat-news/-/ddn-20211029-1

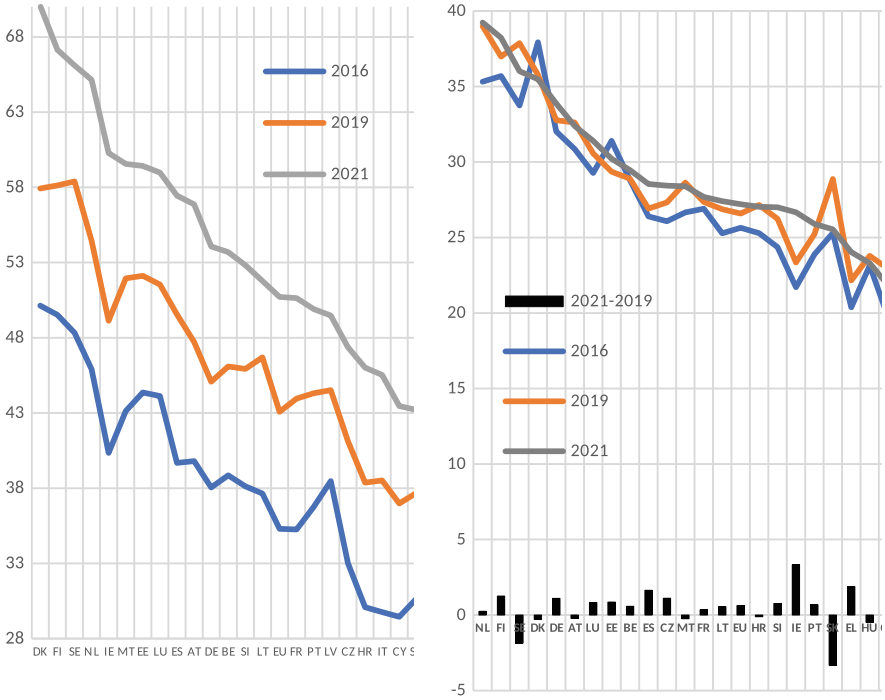

Fig. 22.5 The evolution of the total DESI and the human capital component in the pandemic and the change in the gaps between countries. (Source: Data available at https://digital-agenda-data.eu/datasets/desi/visualizations)

digital intensity and Sweden with a 47% share of companies with high and very high digital intensity. The gaps by country according to the four categories of digital intensity are 63 percentage points for very low, 24 p.p. for low, 32 p.p. for high, and 9 p.p. for very high.

From the analysis of the indicators that reflect the dynamics of the digital transition, the DESI index could not be omitted. Considering the purpose of the analysis in this study, we selected for analysis only those components of DESI directly related to the digitization of the labor market.

Since we only have comparable data from 2016, and the result of the pandemic can be better observed through DESI component indicators, we will now present, on the one hand, the comparative analysis of the evolution and differences by country of the total index and the subcomponent human capital and, on the other hand, how the states reacted in the pandemic, from the perspective of employee training and digital infrastructure development.

From the perspective of the human capital component, it can be seen that the differences by country are about three times, with two poorly performing countries, namely, Romania and Bulgaria, and with 14 countries with performances above the EU27 average, the Netherlands and Finland holding the first places (Fig. 22.5).

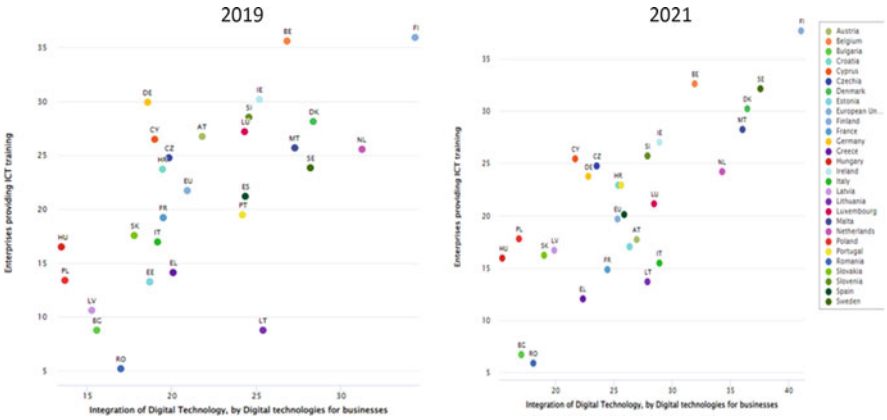

Fig. 22.6 The integration of digital technologies for business in companies and training courses for ICT skills – indicators from the DESI component in the years 2019 and 2021. (Source: EC-Digital Scoreboard, digital-agenda-data.eu)

If, on the EU27 average, the human capital sub-indicator in 2021 had values above those of 2019, we cannot say the same for 11 of the member countries.

The integration of digital technologies requires increasing the effort of companies to train/improve their workforce. For companies, the two years of the pandemic meant the intensification of the introduction of digital technologies and the training of staff for the use of those technologies (Fig. 22.6).

Concerns for digital performance, as a resilience factor of the company during the pandemic, were a priority not only for large companies but also for small and medium-sized enterprises (SMEs), including those that had a low level of digital intensity. According to the EC-Digital Scoreboard, the progress recorded in 2021 compared to 2019 was more intense in the lower-performing countries, which also confirms in this way that the pandemic restrictions have accelerated the digitization of companies (Fig. 22.7).

22.4.2 Research Hypothesis Results and Comments

Dependence of Economic Development on Digital Performance

The average number of years spent in school, which is used to express education level, has a minor impact on The Digital Economy and Society Index (DESI) evolution; it only accounts for roughly 0.1 of the relationship between the indicators. By this, we can conclude that the digitization measures taken during the pandemic targeted basic digital skills, accessible to the population and employees relatively easily, through minimal training, the training provided by companies for the transition to remote work, and the use of ICT products and services being the most common. Digital evolution is facilitated by the level of economic development

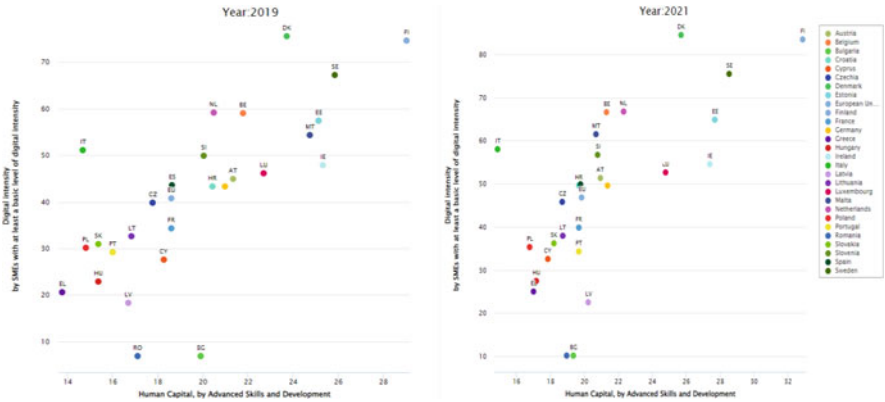

Fig. 22.7 Human capital (with advanced digital skills) and digital intensity of SMEs with at least a basic level of digital intensity, in EU member countries, in 2021 and 2019. (Source: EC-Digital Scoreboard, digital-agenda-data.eu)

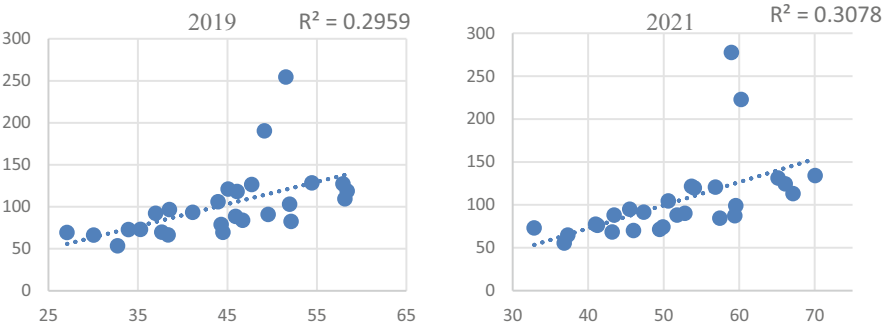

Fig. 22.8 DESI and GDP/capita in 2019 and 2021. (Source: Based on the DESI database and Eurostat)
Note: ox = GDP/capita and oy = DESI

expressed by GDP/capita in PPS. During the pandemic, digital transformation advanced in all countries, as we have already highlighted, mainly on the side of adapting economic activities and customer relations to the limitations imposed by the pandemic, but differently by country, the level of digital development before the pandemic being an advantage for building economic resilience during the COVID-19 crisis. The link between the two variables intensifies in 2021 compared to 2019, and the countries with a significant advance in digital transformation were Denmark, Ireland, and the Netherlands (Fig. 22.8).

Through these results, we can appreciate that the research hypothesis H1 was partially validated, the DESI index being influenced, in the short term, by the level of economic development expressed by GDP/capita in PPS in a proportion of about one-third.

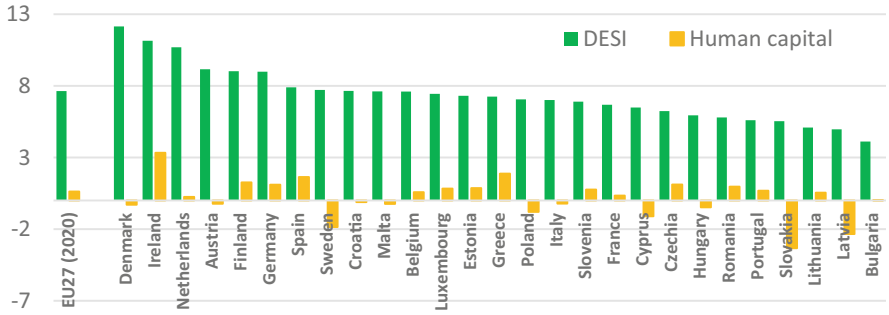

Fig. 22.9 Change in DESI and human capital component in 2021 compared to 2019. (Source: Based on data from https://digital-agenda-data.eu/datasets/desi/visualizations)

The gaps by country from the perspective of the digital transition evolved differently on the DESI component indicators. Overall, on the total DESI index, all countries recorded progress in the pandemic (in 2021 compared to 2019). As for the Human Capital pillar the gaps between EU countries increased very little on total, due to the reduction in the digitization performance of human capital in 11 countries. Therefore, the partial conclusion that digitization during the pandemic was mainly about adaptation is confirmed, with the mention that each country, depending on the previous progress in the digitization of human capital, focused on other elements of digital development (Fig. 22.9).

If in 2019 the best performance in the general DESI indicator was held by Sweden and the weakest by Romania, in 2021, Denmark takes first place, the country that also recorded the highest growth during the pandemic, and the last place remains unchanged. Regarding the human capital component within DESI, both in 2019 and 2021, the best performance is recorded by the Netherlands, and the weakest is held in 2021 by Bulgaria; Romania, ranked last in 2019, is ahead of Bulgaria during the pandemic. Based on the above, we can conclude that hypothesis H4 has been validated.

Digitization at the Company Level During the Pandemic

The digital development of companies was considered as the safety valve for the pandemic period and the sole alternative option to the temporary closure of the activity. For some categories of activities (such as, for example, personal services) the measures to limit the risk of infection were very restrictive, i.e. closure during the lock down period or their fundamental reorganization, by switching, at least temporarily, to a system totally online, (e.g. fitness activities, psychological counseling, etc.). In other activities, it was possible to continue the activity by intensifying the digitalization of the company and innovation in customer relations (restaurants switched to the take-away or home delivery system, supermarkets also partially adopted such services, etc.).

Starting from the premise that digital intensity at the company level means both investments in ICT technology and staff training, we analyzed other two aspects:

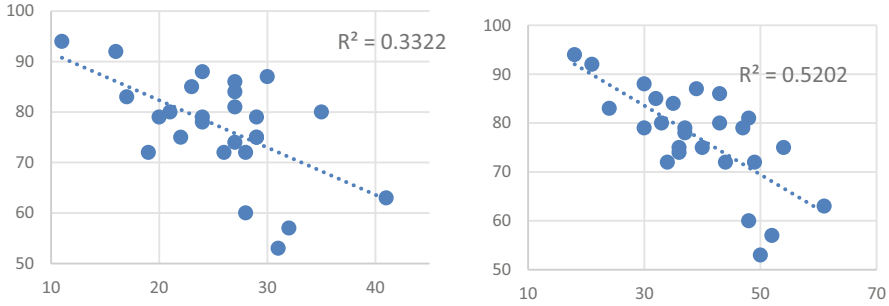

Fig. 22.10 Analysis of the company's digital intensity in correlation with individuals' skills compatibility with duties (**a**) and individuals' use of ICT at work (**b**). (Source: Based on the Eurostat database)

hypotheses H2 and H3. The analysis is only possible at the level of 2020, with no data for a longer period in the Eurostat database and only for a limited number of EU member states, for which data have been reported. In both situations, we took into account the share of companies that have a minimal digital intensity (very low) because we considered that the pandemic affected all companies, and the most vulnerable and also the most numerous were those with reduced digital intensity.

For H2 (the extent to which the level of digital intensity depends on the compatibility of employees" digital skills with the requirements of the workplace and the degree of use of ICT products and services for work) the data analysis only shows us a bilateral dependence on the two components. The multiple regression analysis does not give us relevant data, and in our opinion the main limitation is the lack of data for several observations.

The data analysis only shows us a bilateral dependence on the two components; the multiple regression analysis does not give us relevant data, and in our opinion, the main limitation is the lack of data for several observations. The analysis through simple regressions shows us a separate dependence on the two variables with the digital intensity of the company of about one-third in the case of the compatibility of digital skills with the job demand and one-half in the case of the ICT use at the workplace (Fig. 22.10).

For H3 (the extent to which the digital intensity is significantly influenced by the share of companies that provide training for developing/updating the digital skills of employees and by the share of companies that employ ICT specialists) the results show us, as in the case of H2, only a bilateral dependence on the two components. The analysis based on multiple regression does not provide relevant data, similar due to lack of data for more observations. The results show us, as in the case of H2, only a bilateral dependence on the two components; the analysis based on multiple regression does not provide relevant data due to lack of data for more observations. The analysis through simple regressions shows us a separate dependence on the two variables with the digital intensity of the company of about two-thirds in the case of training own employees to acquire/increase digital skills and only one-fourth with the hiring of new ICT specialists in companies (Fig. 22.11).

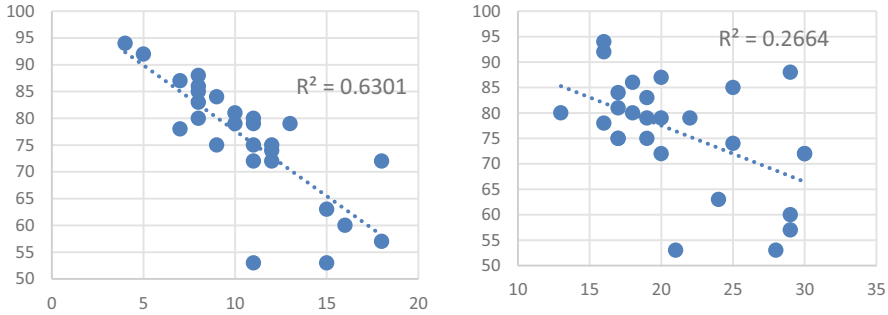

Fig. 22.11 Analysis of the company's digital intensity in correlation with the companies' effort to ensure training courses for their employees to develop/upgrade ICT skills (**a**) and with the share of companies that employ ICT specialists (**b**). (Source: Based on the Eurostat database)

The results of the analysis for hypotheses H2 and H3 confirm the fact that companies, during the pandemic period, had as their main orientation the adaptation through digitalization to the limitations of the measures for carrying out activities imposed by COVID-19, with a preponderance on ensuring the skills for their own employees and less for the increase in the share of employees with ICT specialization, which indicates that the adjustments to ICT development were minimal and targeted to ensure the conditions for remote work, facilitated by ICT technologies. The present analysis will resume after the data for the second year of the pandemic will be available, and we estimate that the intensity of the correlation will increase in the bilateral relationship. At the same time, it is also possible to obtain significant results for the application of multiple correlations, including for a larger number of states.

22.5 Conclusions

Digitization is changing the world of work. The factors stimulating work innovation and the barriers to optimizing professional performance become the challenges of social inclusion and efficiency policies on the labor market, both at the company level and at the national level. Digital transformation has been perceived by most as a form of progress, changing work and life patterns, expanding access to knowledge, developing new skills, redefining the work paradigm, and reconfiguring the structure and prioritization of workforce expectations in terms of active life and balance with personal life.

Digital technologies have already proven that they can be transformative forces of the workplace and industrial relations; they are an opportunity for inclusion on the labor market and to reduce imbalances, but they require computer, digital, and connection skills (computer skills, digital skills, Internet skills) [11]. The disruptive

forces of digital transformation are changing the structure and pattern of employment, emphasizing multiple skills in the workplace and reducing physical workloads (digitization, automation, artificial intelligence (AI)). Workplace content and tasks, as well as criteria and methods for evaluating work productivity and performance, are radically changing [2, 9, 10, 13].

The digitized labor market appears as a post-pandemic normality and reforms the evaluation and remuneration mechanisms, making the labor market more flexible but also more vulnerable. The externalities of digitization on the labor market (both positive and negative) point us to the way to reform the employment model. Digitalization statistics capture, through new indicators, the incidence of ICT services and products on work – skills, work intensity, risks, tasks and responsibilities, working conditions, remuneration, and professional career.

In this chapter, we highlighted the gaps between the EU countries regarding the impact of digitization on the labor market, starting from the analysis of the specialized literature and some relatively recently developed Eurostat indicators on this topic. The results obtained indicate significant and growing gaps between countries regarding the dynamics of changes and the achievement of expected results, as well as the different degree of readiness of the business environment and of individuals to respond to the challenges of the irreversible digital transformation of work, to strengthen the new post-pandemic employment model.

Although the analysis carried out in the present study covers a short period of time and includes partial results regarding the impact of the pandemic on business environment reforms in the digital transition of human capital, a series of recommendations for measures for the post-pandemic period can be stated, in line with EU strategic approach [19], among which we mention:

- The impact of the pandemic makes it necessary to review digitization strategies at company level, capitalizing on the results of forced digital adaptation, in the activities where this is possible. It is obvious that it is not possible to completely return to the pre-pandemic situation and, for some activities, it would not even be effective.
- The pandemic has taught us that, in some cases, digitization reduces costs and saves time both for employees and for customers or other partners of companies, that it makes work easier, that employees have adapted to hybrid work, and that the pandemic itself stimulated the diversification and development of new products and services.
- The reform of the workplace toward decent and efficient work will continue; employees are more open to accepting digitization as a constant of the work content, regardless of the position held and the specific professional.
- The employment model is changing – from the forms of employment to the organization of working time, from the mix of skills required for hybrid work to the emergence of new jobs, as a result of digital disruption associated with the progress of manufacturing technologies or methods of work organization and firm-level management, where AI components assist and streamline both execution and coordination jobs, including top management.

– At the company level, there will be changes in the employment structure, and the requirements of the workplace will involve the continuous training of employees and the adequacy of knowledge and skills, both professional and soft skills, and even more so with digital ones. A solution to increase labor productivity in the short term is the reduction of skills asymmetry in employment through training provided by companies and, in the medium and long term, through better adaptation of the educational curriculum to the needs of the labor market.

We are aware of the limits of the research, but the results obtained managed to capture the gaps between countries and the associated future risks regarding the youth employment rate and their retention in the national labor market, the increase in work performance, and the limits of market competitiveness. Although the results are preliminary, through the information provided in the analysis, I believe that it justifies resuming the research over a longer period, depending on the availability of data. In addition, the present research brings additional arguments to the specialists' opinion according to which a new approach is needed in the analysis of the labor market performances and a reconsideration of some traditional indicators, such as labor productivity, employment risk, work pressure (the phenomenon of burnout, the right to disconnection, pay for performance, etc.), and gender inequality. Additionally, with the extension of database, of the time period, for the analyzed indicators, the reaserch should be resume and developed by highlighting at least: (a) the degree to which digitization improves or does not improve, in the medium and long term, the imbalances on the labor market as well as (b) how digital inclusion facilitates social inclusion through decent employment and support the professional career development.

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Chapter 23
Global Ethics: A Potentially Integrative Paradigm of Sustainable Development for the New Economy

Adriana Grigorescu and Cristina Lincaru

Abstract This chapter aims to offer scholars and practitioners critical arguments on the global ethics as a potentially integrative paradigm of sustainable development for the new economy. The research provides a conceptual and philosophical critical analysis of the new sustainable economy and global ethics and concludes that global ethics is the new conceptual integrative framework for shaping strategies, actions, and analysis. This new conceptual framework has some practical implications allowing researchers, entrepreneurs, and managers to improve the sustainable business perspective. The originality of the chapter proposes a new integrative paradigm of sustainable development for the new economy defined by appropriate and more precise concepts for reasoning in its management with success. The first step to build a global ethics is to communicate the fundamentals in an intelligible and conscious manner at large scale, at multilevel from individual to community, and then to share the perspectives, adopt them, and action accordingly.

Keywords Global ethics · New sustainable economy · Development · Paradigm

23.1 Introduction

23.1.1 Global Shocks Demand Global Development Paradigms

Within the operating economy and society, globalization creates "thirst for ethics." This perspective affects all the elements of the system: the individual, the communities, and countries in which the former activates. The multiplicity of the new global

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shocks has been structured by González [16] in a rich conceptual theoretical handbook, *Values and Ethics for the 21st Century*. The 2012 management demands responses to problems formulated in a distinct, divided, and independent manner, and some of those problems are look-alikes of ethics in a global world; ethics in science and technology; ethics in development, poverty, and environment; ethics in business; and ethics in finance. This conceptual and expressive ethics classification illustrates the importance, the complexity, and the high dynamics of ethics in all domains. González [16] defines the global ethics concerns as *Global Governance and Institutions* [28], *Social Multiculturalism and Secularism* [41], and *Increasing Migratory Flows: Immigration and Citizenship* [5], for the management of which we shall have to provide an ethical response.

The 2009–2010 global economic and financial crisis highlighted the need for globally shared ethics, under the form of common values and standards and not in a specific ethical system [28]. On October 6, 2009, in New York, the Global Ethic Foundation launched the *Manifesto on a Global Economic Ethic* to remind that globalization should be addressed with responsibility and humane responses in order to showcase to all stakeholders the importance for the global economy of global ethics [28].

The 2030 Agenda for Sustainable Development announced since 2015 the new era of transformation harmonized in three core dimensions: economic growth, social inclusion, and environmental protection (United Nations). This document is a globally adopted document with a vision and values shared across 193 countries. The 17 Sustainable Development Goals (SDGs) have 169 targets and 230 indicators and a long-term outline. The critical characteristics of sustainable development are:

- Universality – The goals are proper and applicable to all countries, being the projection of the "World We Want."
- Integration: Considering all the aspects as part without priority or hierarchy, all rights and basic needs being of equal interest and impedes the less enjoying on one in disfavor of other.
- Transformation: Using challenges to transform the entire environment and to create opportunities for the 5Ps (peace, people, planet, prosperity, and partnership) (ILO) [23].

In 2020, during the pandemic global crises, Oldekop et al. [36] concluded that COVID-19 needs a new development paradigm rather global than international, digitalization playing an important role. Also, the difficulties in implementing the measure of environment protection and the climate change issue were mentioned.

Another global range process is the digital transformation and transition to the digital age, accelerated since COVID time. In 2021, Kantar and Bynum [26] announced the emerging ethical theory for the digital age. Digital development requires a consistent development of ethics that are addressing not only the humans but also the applications like robots, cyborgs, or artificial intelligence (AI) apps with more and more humanized characteristics. Other scholars [24] have integrated the global ethics and sustainable development and explained that the supreme aim is to offer to a larger number of earth inhabitants a better and decent live in a friendly

environment. A further disruptive trend is the Progressive Commons. Gmeiner et al. [15] showed that Progressive Commons are addressing the nowadays challenges by reinterpreting the classical values. Even if we iterate all these global shocks one by one, each of them acts simultaneously, and together, they contribute to a radical shift in development paradigms.

23.1.2 Arguments in Favor of a Global Development Paradigm

The complex global evolutions such as the pandemic, the war, the digital transformation, aging, and migration of population request new firm strategies. Since 2008, Oliver and Holzinger signaled the need for a Dynamic Capabilities Framework for firm-level strategies. These must be proactive, defensive, anticipatory, and reactive to be able to efficiently manage the companies.

Hedlund-de Witt [21] explores the worldviews of global sustainable development (GSD) and their significance for designing the local or global approaches, policies, or strategies. The worldviews are systems that are reinterpreting and co-creating the reality on the new values and perspectives. An actual Integrative Worldview Framework (IWF) is increasing reflexivity, creativity, responsibility, and inclusiveness as crucial components for the GSD [21].

The importance of a strong ethical framework is emphasized by Küng [28] by mentioning that in the democratic societies, the ethics are subject to reconfirmation by the majority and are influencing the political responsibility.

In 2020, Barrese et al. [3] found that global platforms such as the United Nations Global Compact (UNGC, launched since 2000) are designed for learning and improvement, especially for under-resourced organizations. Such platforms attract US public companies with low Corporate Social Responsibility (CSR) actions. Authors [19] validate the transparency and opacity as transitory phenomena by case to further the substantive adoption of CSR. Even if the initial reason to join the CSR Global Platforms has an economical backlog, under the social pressure and because of organizational learning, these companies have adopted CSR regulations over time.

Therefore, the main objective of the research is to explore the global ethics and the potentially integrative paradigm of sustainable development for the new economy. The scope of the research is to identify the global shared ethic value paradigm of sustainable development for the new economy. The purpose of this paradigm, as Glauner found in 2019 [14], can be transformed into a in a strategic tool, and to offer, according to Hedlund-de Witt [20], an input to better as a local and global player. This is an input in organizational learning at multilevel, from business to public administration, and not least a tool to better understand the new emergent social values.

Among the reasons of carrying out the research is to contribute to theoretical and applicative dimensions. On the theoretical side, this chapter follows the logic of Glauner [14] and intends to improve the conceptual framework of redesigning

business models. Moreover, the research looks into shaping a framework that allows to improve the comparability of business ethics systems and globally integrate [6, 40].

On the applicative side, the chapter emphasizes some new characteristics of the progressive business model, such as described by O'Higgins and Zsolnai [35], "as ecologically sustainable, future respecting and pro-social enterprise," and some "Implications for Management Theory and Research" as a consequence of Shifting Paradigms for Sustainable Development, starting from Gladwin et al. [13] published in 1995. The originality of this chapter comprises the synthesis of the most recent global values trends in sustainable development for the new economy, a conceptual ethical tool of high importance in the increasing complexity of many forms (economic, social, political, cultural, digital, health, etc.).

23.2 Literature Review

23.2.1 Global Ethics

At this moment, global ethics, even if their tremendous importance is recognized, do not have any Global Integrated System/Framework in the sense of Hedlund-de Witt [21], but only from the perspective of global shared values, moral appeals, or standards. The 2009 New York Manifesto on a Global Economic Ethic is a moral appeal that proposes a global economic ethic, accepted by all cultures and sustained by the practice [28].

Among its values, the Manifesto (i) describes the fundamental principle of business ethics the creation of economic value on the common benefit [28] and (ii) assumes as basic values for global business the mutual advantage, cooperation, and partnership.

On the other side, the Manifesto does not assume a specific ethical system; it is not a legally binding document, and it is not yet globally accepted through norms for actions and decisions and via an ethic of doing business [28]. On September 2, 1993, in Chicago, representatives of more than 125 of the world's religions signed *The Declaration Toward a Global Ethic*. The latter was meant to define a common set of values for people of all nations, races, and faiths, as a response to problems such as wars, environmental destruction, poverty, and inequality [17].

Another important Manifesto reference, in accordance with the 1993 Chicago Declaration Toward a Global Ethic to universal core values and standards, is the 1999 UN Global Compact. Kofi Annan, as a response to the Davos conversations, issued a call for a "Global Compact of shared values and principles" on human rights, labor standards, environmental practices, and anti-corruption (World Economic Forum). The World Economic Forum (WEF) becomes an international organization officially recognized on January 23, 2015. The following are some WEF global actions during 2004–2014: the Forum of Young Global Leaders (YGLs) in 2004; the Resilient Dynamism as the Annual Meeting 2013 theme, emphasizing the importance of restructuring economies and companies so that they grow sustainably and responsibly; and the Forum 2020 strategy launched in 2014 (World Economic Forum).

23.2.2 New Economy: The Economy of Sustainability

In 2022, Langergaard and Rendtorff [29] stated that the New Economies for Sustainability require scrutinizing and rethinking all business activities and practices. Kliksberg mentioned that the nongovernmental organizations and social entrepreneurs reflect the new interest in ethics applied to the economy [16]. Gatto [12] proposes a pluralistic approach of business from the perspective of human and local development. Moreover, Fatemi and Fooladi [8] make a model of sustainable value creation where the value creator does not significantly negatively affect others. Hahn et al. [20] develop a cognitive framing perspective on corporate sustainability as a new paradigm for CSR, while CSR reveals tensions between economic, environmental, and social aspects. Since 2007, Potocan and Mulej [37] proved that ethics is a characteristic of the sustainable enterprise. In the context of global economy, Küng [28] argues that talking about a moral framework of the economic environment is justified.

23.2.3 Sustainable Development and Ethical Aspects

In 2021, Krosofsky [27] stated that "achieving a sustainable lifestyle ends up becoming something of a moral imperative" and concluded that beyond the philosophical challenges, sustainability is an ethical issue. Additionally, Jennings [25] considered that ethical values are important for the sustainability.

To truly integrate all the perspectives of ethics, it is important to understand the ontological orientation of ethical analysis. The latter is determined through the understanding of the orientation, which describes three possible scenarios: the theocentric, the anthropocentric, and the biocentric. Due to time and space constraints, only the last two orientations will be mentioned and developed here [18].

The complexity of the subject is visible when interpreted from an applicable perspective. In the process of implementing the SDGs, Rendtorff [39] proposes progressive business models for economic transformation. Subsequently, Beckmann and Pies [4] offered the support necessary in building the thesis for the private companies willing to take social and environmental responsibility. In 2020, Ford [10] illustrated the ethical dilemmas relating to sustainability that may conflict with sustainable practices.

23.2.4 Global Ethics and Sustainability

Etherington and Bill [7] stated that the effects of globalization had significant influence on the perspectives of the community life. Thus, new problems arose under the form of societal challenges, implicit in various political, institutional,

cultural, and economic options. The latter have been constructed in such a way they would work to counter the negative effects of globalization. The idea of sustainable human development stands as a pillar for the change within the society and the organization, where those two are intertwined in a solidarity economy based on new patterns of consumption and production.

Moreover, Jenkins [24] performed a global ethics review on the major religion models and found out that the theology moral patterns and social practice are pleading for ethics and sustainability.

Bansal and Song [2] showed that sustainability and responsibility are historically different, as the latter is appointed a more normative position by railing against the amorality of business while the former is merely a systems perspective showcasing the business-driven failures in natural systems. Foxon et al. [11] concluded that the most urgent topics that require special attention are sustainability and climate change. The neoclassical economists are focused on the solutions for the existing market, discussing issues such as carbon trading and marginal analysis. In order to bridge the theory with the application, there is a consistent need for actions in terms of business culture, individual behaviors, and complexity of the phenomenon in economy and society to be addressed.

Razafimahefa [38] mentioned that the sustainable development paradigm has become the reference for the observation of development goals. As a result, the 17 SDGs have been constructed, and 232 monitoring indicators were adopted in order to assess the effectiveness of goals throughout different countries.

23.3 Methodology

The study and analysis of global ethics is not an easy task, and in its complexity, it combines axiology, epistemology, ontology, and logic. The current research is based on the integrative framework of Hedlung-de Witt [21] and proposes a content-wise discussion regarding the potential of global ethics to determine sustainable development within the new economy.

In 2018, Novak-Kalyayeva et al. analyzed and synthesized both scientific approaches and the experimental principles of modern state governance while maintaining them connected to the status quo of the human rights, as well as the priorities valued alongside the road toward sustainable development. Moreover, Glauner [14] designed a methodological approach to the conceptual and philosophical analysis of this new sustainable economy by also encompassing the emergent role of global ethics as a concept of potentially integrative paradigm.

In this context, the critical methodology is being used, starting within the context of value-driven and value-oriented research and underlining the necessity of proactiveness in terms of value creation and social justice [32].

23.4 Results and Discussions

Analysis of global ethics as a potentially integrative paradigm of sustainable development for the new economy

Abou-Ali and Abdelfattah [1] applied the integrated paradigm under the form of a quantitative framework with the scope of investigating the connection between the availability of natural resources, economic development and growth, environmental constancy, and institutional authority and quality based on a panel of 62 countries during a period of 17 years, from 1990 to 2007. As a result, the authors have estimated the resource curse hypothesis model and the environmental Kuznets curve model at the same time.

In 2015, Busoi emphasized that without morality, there cannot be any sustainable development. In this light, the major ethical principles within the theory of sustainable development are no longer constrained by the presumption that the "homo oeconomicus" is solely driven by economic rationality. This individual is both the creator and the beneficiary of the potential sustainable development. The generation in which homo oeconomicus performs is the main user of this new framework, although new generations are going to benefit from it, while they will continue to shift the paradigm through humanistic accents, normalizing the necessity for "an interdisciplinary approach to the economic issues" (p. 46). The quality of the human capital and of the social capital will become revolving points for the sustainable development, as the individual turns into a morally intelligent, conscious, and active member of his generation [30, 31].

Other authors [9, 13] propose the applicability of the well-being economy as the framework for the 2030 Agenda, as the shift toward sustain centrism contrary to the conventional ethnocentrism and antithetical ecocentrism considers management as an organizational science. Thus, this approach creates a unified epistemology that reintegrates the humanity with nature and morality with the truth. Ecologically and socially sustainable development reshapes the organizational management as a science. Authors refer to a paradigm focused on the question: "How do we know?" And the answer is an integrated knowledge.

In a 2018 study [33], it has been portrayed how the model of contemporary market economy experiences significant process innovation, while new economic models emerge, based on diverse objectives and implications of existing paradigms. Those are meant to create multiple values and to enrich the economic models with new concepts. Each of the former examples can be described through its indivisible and permanent connections that are established through sustainability and the general well-being of the population.

Moreover, the human rights and the imperatives of sustainable development have created the basis for humanistic potential, which determined changes in the modern paradigm of state administration [34]. Thus, the direction has shifted toward increasing the levels of democracy of power as well as self-organization of society. The latter has been achieved through the implementation of democratic reforms within key areas of the governance and of the functioning of the society. Other researchers

[36] view the global development through the glasses of change and challenge, as the scope of the former implies multiscale analyses, with priority on the global, rather than the regional/local.

In 2021, Razafimahefa discussed that in the EU, the "development levels modulate investment in the three pillars of sustainable development, namely environmental, social and economic." Therefore, the author identifies the East-West differentiation in the European trajectories of sustainable development based on the level of sustainable development and of the territorial disparities.

Considering all the above iterations and based on the contextual analysis of those concepts, the current research has forwarded a model for global ethics (Fig. 23.1).

23.5 Conclusions

The global ethics is a topic of exceptional complexity and importance. Nevertheless, it is widely recognized that the concept of global ethics does not have any globally integrated framework in the sense Hedlund-de Witt proposes. The concept forwards globally shared values, moral appeals, and/or standards.

Stating from the theoretical assumption of sustainability as a conceptual framework that favors the lasting design of viable business models through the employment of task-specific tools and concepts, the global shock acts simultaneously and contributes to the development of a radical shift in the sustain centrism of the integrative paradigm. In reference to the globally assumed 2030 Agenda and 17 SDGs of the United Nations, the authors consider a new business and is management behavior the Purpose-Driven Leader [22]. Taking into account previous experiences, the need for a philosophically integrative paradigm is clearly visible (Fig. 23.1). The approach of this study allows to set aside any business ethics systems, regardless of their income levels [6].

From an applicative side, the research emphasizes the new societal vision of Progressive Commons [15], as it creates functional entities, namely, the Progressive business [35]. Moreover, the management theory and research must fully exploit the philosophical axioms (ontology, epistemology, and axiology with its ethics branch) in a more precise and appropriate manner with the shifting paradigms for sustainable development. The way in which the authors see the world is more and more dynamic, and accordingly, the authors must tune the way in which they investigate the world, collect, or select data in methodologies and in detailed methods.

As a conclusion, the research underlines the need for a dynamic and philosophically updated qualitative research methodology as the basis of the global ethics integrative paradigm.

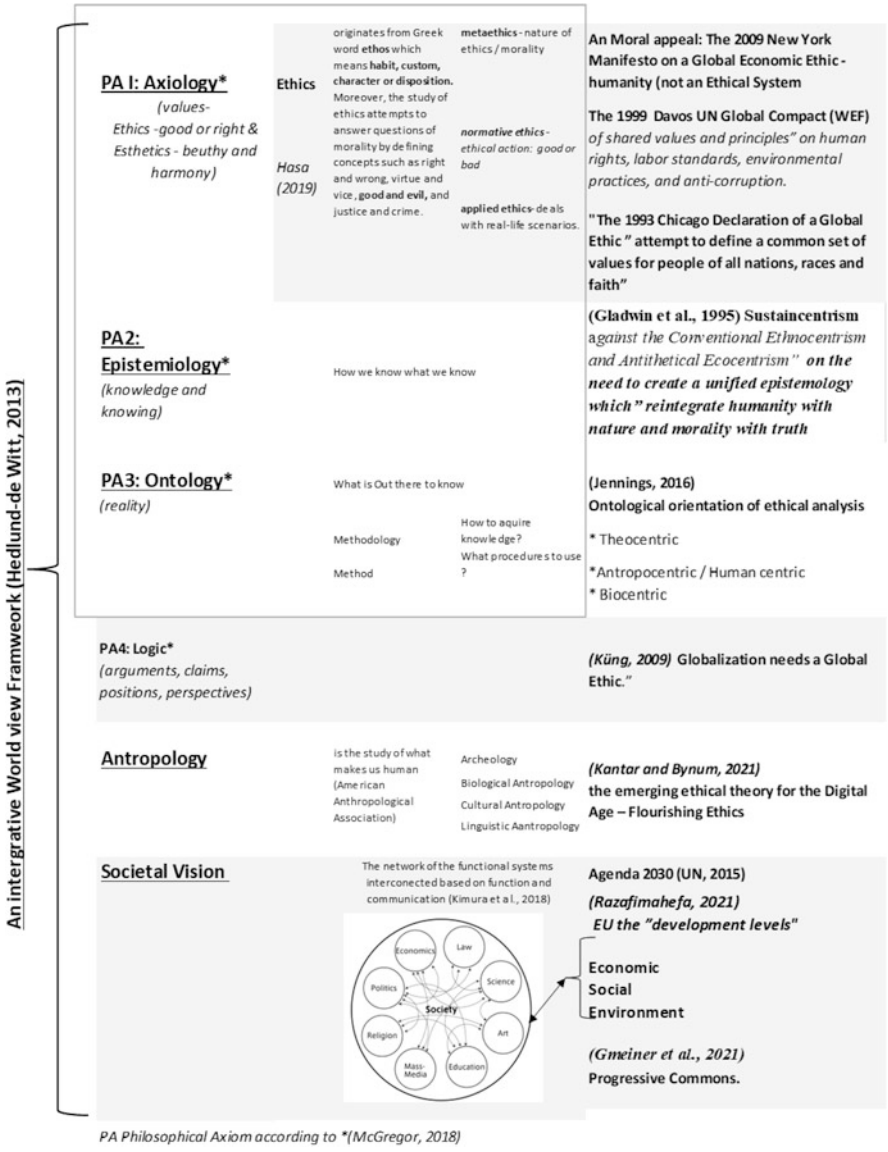

Fig. 23.1 A new integrative paradigm of sustainable development for the new economy. (Source: Authors' synthesis based on references mentioned in the picture)

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Chapter 24
How Resilient Is the Labor Market After a Crisis? A Comparative Analysis of the Effects Generated by the Financial Crisis vs. the COVID-19 Crisis

Valentina Vasile, Raluca Mazilescu, and Marius Surugiu

Abstract The crises of the last decades, regardless of their nature, have influenced the labor market, with delayed and prolonged effects. The impact of the financial crisis of 2008–2009 and the COVID-19 one not only affected the level of employment but also generated major changes in the structure of employment, in the content of jobs, and in the dynamics of labor market reforms, the effects being delayed, amplified, and prolonged. Moreover, they reconfigured the balances, deepened gaps, and generated new inequities. Various countries and industries saw diverse outcomes from the post-crisis recovery, as well as differences in the recovery length and consequences from the different policy instruments and measures used. In some situations, the recovery was only partially successful. Using the unemployment rate as a balance indicator and the NEETs rate and job vacancy rate as indicators for a strong recovery, we examined some of the consequences of the crisis on the labor market in this chapter. We focused on the effects of the labor market changes during and after the crisis on economic development measured by gross domestic product (GDP)/capita. The results of the comparative analysis identified to what extent the economic recovery is dependent on the resilience of the labor market.

Keywords Crisis · Labor market resilience · Comparative analysis

24.1 Introduction

The development of society in recent decades has been characterized by an increase in the number of extreme events and a faster succession of crises. Additionally, there was overlap, and their coexistence had various impacts that were increasingly frequently permanent and not just short-term. Regardless of their cause, the financial crisis of 2008 or the pandemic crisis of 2020, for example, generates chain effects,

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adjusting the economic and social environment differently. Both the financial crisis and the pandemic crisis have severely affected the labor market and created/accentuated imbalances, designing a world of work generally adapted to the new conditions of labor market recovery and rebalancing.

Economic recovery after the 2008 crisis proved to be fragile and poorly sustainable in many fields of activity, requiring the adaptation of the business environment and the reform of some activities/sectors. Both crises mentioned above were associated with a deep economic crisis, with a faster recovery in the second situation, but without being associated with a robust recovery and return to the previous period; on the contrary, they developed a "new normal," from the perspective of the labor market with higher fragility/vulnerability. Both of the situations generated time-lagged effects on the labor market with prolonged effects (austerity/reduction of labor income, employment fragility/technical unemployment, the need to reshape the jobs, to adapt to changes in production and service processes, adjustments in working conditions, (re)qualification, etc.). Moreover, national labor market reforms have been interrupted, balances have been reconfigured, gaps have deepened, and new inequities have emerged. Different strategies were used to recover from the crisis, sometimes only partially, with less favorable outcomes in particular regions, countries, and industries. These strategies also varied in terms of timing and the effectiveness of the governmental instruments/measures used.

In this chapter, we will analyze the effects of the crises on the labor market, measured by indicators such as the employment rate, the unemployment rate, the not in education, employment, or training (NEET) rate, and the job vacancy rate, highlighting to what extent the crisis on the labor market, resulting from the aforementioned crises, influences economic growth measured by GDP/capita.

The research hypotheses are defined as follows:

H1 – To what extent the crises affect employment-unemployment ratio and in which weight the decreasing of the employment is reflected in unemployment. We developed this hypothesis as a result of the fact that the expert analysis of the labor force confronted with layoffs brought about by various crises revealed a different behavior. This ranged from the transition to unemployment (as a natural action for a person who wants to stay on the labor market) until retirement, external mobility, and the transition to the underground economy, or inactivity, with exit from the formal labor market.

H2 – To what extent the crisis and the post-crisis recovery led to changes in the structure of employment, reflected by the job vacancy rate dynamics, and if this job restructuring is attractive for young people, measured by the variability of the NEET rate. This hypothesis was formulated starting from the fact that recovery after the crisis is accompanied by investments and modernization of the business environment to maintain/regain market competitiveness, which causes job disruption, and the new jobs should be more attractive for young people.

H3 – To what extent the economic recovery after the crisis was also associated with the recovery on the labor market, measured by the duration until reaching the

value of the indicators from the pre-crisis period. The experience of the last two crises shows that the economic recovery is not accompanied by a return to pre-crisis balances and requires the adaptation/recalibration of the influencing factors of the economic recovery to the new conditions, namely, the transition to a "new normal." For the labor market, it means not only reaching the pre-crisis employment level but also restructuring the jobs, extending the period in which the unemployment rate is higher than that of the pre-crisis period, maintaining the high job vacancy rate, being necessary first of all a recalibration between the demand and the supply of skills, etc.

H4 – If and to what extent the economic growth is influenced by the previously analyzed indicators, if employment and NEET rates correlate with the economic growth expected from the post-crisis recovery. This hypothesis was formulated as a result of expectations regarding the participation of young people in changing the business environment and the need to increase employment to ensure the active social inclusion of people with work potential.

The comparative analysis of the last two crises' effects on the labor market, including the severity of the impact and the length of the recovery period, provides the chapter's original contribution. The results demonstrated how critically dependent the economy's ability to recover is for the labor market's resilience.

The chapter includes an analysis of the specialized literature with the indication of some aspects that support the formulated research hypotheses. The research methodology and the results of the analysis of the labor market indicators are presented. The final section of the chapter presents comments, conclusions, and recommendations for labor market resilience as substantiate factors for sustainable development.

24.2 Literature Review

A global analysis of the specialized literature indicates a relatively secondary interest in the analysis of crises and the labor market. Although numerous articles have been published regarding the two crises, when it comes to their analysis in relation to the labor market, their number is reduced, namely, about 300 articles in WoS with the theme "financial crisis and the labor market" and a little over 250 with the theme "Covid crisis and the labor market," with sub-areas of analysis (Fig. 24.1).

Crises, regardless of their nature, have influenced the labor market from multiple perspectives. The financial crisis from 2008 to 2009 had a strong impact on the labor market, requiring more than a decade for the global unemployment rate to return to pre-crisis level, but the level of youth unemployment has not yet reached the one that existed before the crisis [14]. The crisis generated by the outbreak of the COVID-19 pandemic also had a negative impact on the labor market, with losses in 2020 in terms of working hours being about four times higher than during the global financial crisis. Similarly, the unemployment rate increase was much higher than

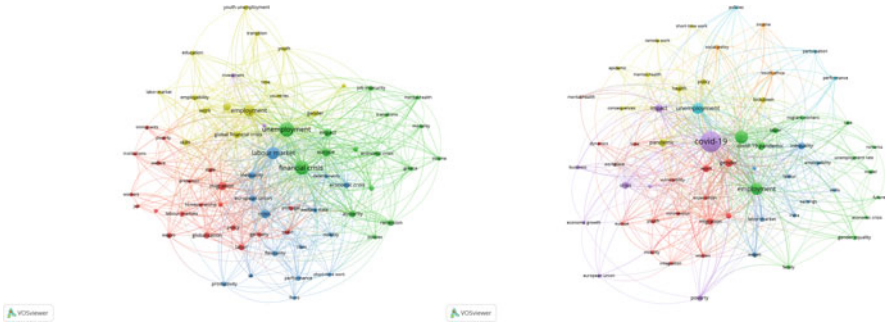

Fig. 24.1 Bibliometric analysis regarding the labor market and the last two crises. (Sources: WoS database, data retrieved on August 29, 2022, processed with VOSviewer)

that observed during the global financial crisis [10]. The impact was much harder for youth [20] and women [4, 7]. Also, there was a restructuring of employment by field of activity and the transformation of the employment model, generating asymmetric effects [13, 15].

The macroeconomic stimulus measures and labor market policies only partially offset the crisis, but they were important in avoiding severe economic contraction or the deterioration in the labor market [21]. Cho and Newhouse [3] analyzed the impact of the Great Recession (2007–2009) on different types of workers in different middle-income countries, showing that young people experienced the greatest negative impact on employment. Junankar [12] analyzed the impact of the global economic crisis (Global Financial Crisis) on unemployment in various countries, showing that there were differences between its impact on countries, that there was a decline in employment in the construction and manufacturing sectors, and an increase in unemployment in the financial and business sectors. Various countries have adopted measures to stabilize the economies, such as the increase of the expenditure on active labor market policies and policies to encourage firms to reduce working hours rather than laying off workers [12]. Countries have focused on measures to limit redundancies and also on unemployment benefits, employment guarantee schemes, and minimum wages [21].

The pandemic crisis affected the labor market also by making it vulnerable to a rapid increase of long-term unemployment [16]. Su et al. [17] analyzed the impact of COVID-19 on unemployment in various European countries, showing that the pandemic increases the unemployment rate. According to IMF [11], the crisis had a significant impact on low-skilled, young workers in temporary employment arrangements in contact-intensive services, and the use of job retention schemes had an important role in mitigating the impact of the pandemic on the labor market. According to ILO-OECD [9], various countries adopted measures to mitigate the impact of COVID-19 crisis on the labor market, such as reducing workers' exposure to COVID-19 in the workplace/the use of remote working, securing jobs, saving companies and maintaining essential service provision, and providing income security and employment support to affected workers. Various countries used job

retention schemes (to contain layoffs and protect incomes), restrictions on dismissals during the crisis (to limit the increase in layoffs), and measures to support liquidity of firms (subsidies, loan guarantees, and tax-related measures) [9].

The impact of the two crises includes, for example, a high number of unemployed, wage cuts, rising restructuring demands, and significant increase in job applications. On the other hand, the differences between the two crises are caused, inter alia, by their different origins. In one case, the crisis affected a wide range of industries and had a negative impact on the labor market in response to the health crisis, but in the other case, the recession was systemic and started with the financial sector, then extending to others. Also, the most affected industries during the crisis that began in 2007 were banking, real estate, and construction, while currently, the impact is higher in tourism, hospitality, food services, and the automotive sector. The first employees laid off during the global financial crisis of 2007–2008 were those with the highest salaries, but currently, the restructuring does not target these employees, as they are the most valuable for a company in a time of crisis. The level of digitalization is more advanced than in the past, and this helps companies as well as employees, and the work from home is widely adopted today [6].

In Germany, the crisis generated by COVID-19 has affected the economy and the labor market to a greater extent than the global financial crisis. Currently, more sectors are affected than in the past. However, the number of persons laid off has so far been limited compared to the number of workers who have entered into part-time schemes. At present, part-time schemes are used much more frequently than during the financial crisis. For example, in the hotel industry (accommodation and gastronomy), about 93% of employees have already been registered for part-time schemes. To date, unemployment is strongly concentrated in the hospitality industry [8].

In Ireland, the outbreak of the COVID-19 pandemic and the essential public health measures taken to fight the spread of the virus resulted in the highest increase in unemployment in March 2020. Although there have been job losses in all sectors, tourism, the food industry, and retail trade recorded the highest level [5].

In Austria, the impact of the crisis on the labor market is asymmetric between industries and groups of workers. Most job losses were recorded in tourism, with employment in the sector declining by almost 40% (about 75,000 jobs). Other industries that have been particularly affected by the crisis include the arts sector, entertainment and recreation culture, and the provision of other commercial services (i.e., temporary employment agencies). In these industries, employment has fallen by 12% to 15% [2].

In the USA, young and low-educated workers were more affected during the global financial crisis, while women and Hispanics were more severely affected during the COVID-19 pandemic. Surprisingly, jobs for which teleworking can be used, those involving social interactions, and the essential ones have historically been less cyclical.

24.3 Methodology

This chapter highlights the differences that exist between EU countries. A statistical analysis of the period 2008–2021 was performed, with a focus on the effects of the outbreak of the financial and pandemic crises on some indicators of the labor market. Thus, we highlighted the developments in 2009–2010 and 2020–2021, as compared to the pre-crisis levels. Also, the chapter underlined some aspects of the labor market resilience and robust recovery capacity in the post-crisis period. The chapter analyzed the recovery period needed for some indicators of the labor market to reach pre-crisis levels, considering that the resilience can be also measured by an indicator related with the interval of recovery of the value in the pre-crisis year.

We used annual data, but due to the specificity of the last crisis, in order to capture the effects of the pandemic on the labor market, we analyzed the quarterly unemployment rate and job vacancy rate between 2019-Q4 and 2021-Q4, the latest data available. The available data on the adjusted annual unemployment rate cover the period 2009–2021. Our analysis was hampered by the lack of statistical data older than 2009.[1] In order to analyze the effects of the financial crisis on unemployment, we also took into consideration the data for 2008, as it was produced under the former framework regulation (the "historical" data). The unemployment rate was expressed as a share of the population in the labor force (age class: from 15 to 74 years). The share of young people neither in employment nor in education and training (15–24 years) (NEETs) was expressed as a share of the total population in the same age group. We analyzed the series for the period 2008–2021.

Our analysis faced some limitations related to the availability of data regarding the job vacancy rate. There were many EU member states with no data available for the entire period.

An empirical analysis was also developed, based on an annual dataset for the 2008–2021 period, for the EU-27 countries, which were split into three groups according to the level of GDP/capita. We used co-integration analysis, and we developed vector autoregression (VAR) models and a vector error correction (VEC) model. We used impulse response function to show the impact of a shock on the GDP variable.

[1] Starting on January 1, 2021, a new EU framework regulation for social statistics was introduced, resulting in changes in the definition of indicators and breaks in the time series. For the period 2009–2020, the values of indicators were corrected by Eurostat according to the new framework. Integrated European Social Statistics Framework Regulation – IESS (Regulation (EU) 2019/1700 Eurostat: Statistics Explained, EU labour force survey – correction for breaks in time series, April 13, 2022. https://ec.europa.eu/eurostat/statistics-explained/index.php?title=EU_labour_force_survey_-_correction_for_breaks_in_time_series&stable=0#Comparability_over_time_-_correction_of_breaks_in_time_series

24.4 Analysis/Result Interpretation

24.4.1 The Effects of Crises on Employment and the Balance of the Labor Market

Economic crises affect the balances on the labor market, primarily through the contraction of employment, in different proportions by activity, depending on the profile and characteristics of the crisis.

Traditionally, the reduction of employment through layoffs generated by the crisis should be found, in the largest proportion, in the increase in the number of unemployed and, residually, in early retirements; following that, during the recovery period, we should witness re-employment, with or without adjustments/adaptations from a skills perspective.

However, the last two crises highlighted the change in the post-crisis adaptation model. Globalization and the free movement of people, as well as the policies of selective attraction of the immigrant labor force to cover specific employment deficits on the local labor markets, have diminished the importance of the unemployment rate as an indicator for measuring the imbalance on the labor market. External migration for work, returning to the education system to update skills, and also the facilities through policy measures for early retirement represent increasingly attractive alternatives to the unemployment situation (with the higher risk of becoming unemployed in the long term).

We should not forget the alternative of moving into the unregistered economy, for immediate financial gains, but without social security, the alternative used over time. The uncertainty of post-crisis recovery and, in some countries, the insufficiency of unemployment benefits compared to the cost of living are the main motivations to choose another alternative than registered unemployment. Moreover, the measures to counter crises or rapid economic recovery have resulted in attractive job offers that have also attracted job changes for those already employed.

These changes in the behavior of the labor force, in a labor market affected by crises, significantly reduced the importance of the variation of the unemployment rate as a tool for adjusting employment policies. This is also the argument for which we formulated hypothesis H1 and analyzed the comparative evolution of the employment rate and the unemployment rate in the pre- and post-pandemic period, in the case of the last two crises.

During the 2008–2021 period, the unemployment rate at the EU-27 level had a significant increase between 2008 and 2009, from 7.2% to 9.3%; then the growth continued more slowly until 2013, when it reached a peak of 11.6% (Fig. 24.2). The unemployment rate decreased after 2013 and remained low until 2019, when it hit 6.8%, which is lower than the pre-financial crisis level (2008). The year 2020 and the outbreak of the coronavirus pandemic reversed this trend, and the unemployment rate increased to 7.2%, the crisis impact being much less important than in the previous crisis. Due to the various measures adopted by the states, the unemployment rate decreased rapidly in 2021 to 7.0%.

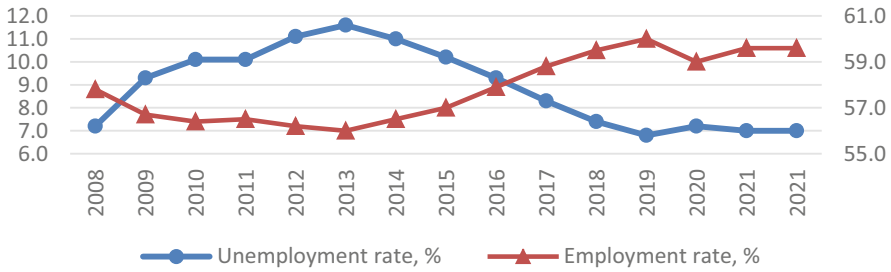

Fig. 24.2 The evolution of unemployment rate and employment rate in EU-27, 2008–2021. (Note: Unemployment rate as % of population in the labor force (age class: from 15 to 74 years) (online data code: UNE_RT_A); The employment rate is the percentage of employed persons in relation to the comparable total population (age class: from 15–74 years)

In EU member countries, the effects of the crisis measured on the one hand by the employment rate and on the other hand by the unemployment rate have highlighted different behaviors, which can be summarized as follows:

- The changes were more important as a result of the financial crisis, and the behavior of the countries was different – from the protection of employment through the reduction of salaries (such as the drastic reduction by 25% of salaries for civil servants in Romania – [18]), up to measures to support the unemployed (as, e.g., in the Mediterranean countries) or supporting employment and attracting immigrants (Germany). While the increase of unemployment rate at the EU level was by 2.1 p.p. in 2009 compared to 2008, the hardest hit member states were Latvia (+8 p.p., from 7.7% in 2008 to 17.7% in 2009), Lithuania (+8 p.p., from 5.8% to 13.8%), and Estonia (+8 p.p., from 5.5% to 13.5%). In other EU countries, the effects on unemployment rate were less severe, at least in short term, for example, Croatia (+0.6 p.p., from 8.6% in 2008 to 9.2% in 2009) or Belgium (+1 p.p., from 7% to 8%) or Italy (+1.2 p.p., from 6.7% to 7.9%). Luxembourg saw no change in the unemployment rate in 2009 vs. 2008, while Germany was the only member state where the unemployment rate decreased in the same period (−0.2 p.p., from 7.5% in 2008 to 7.3% in 2009).
- During the pandemic crisis, employment protection measures aimed at increasing the flexibility of the employment model; this was achieved by expanding work from home, remote work with digital transformation of companies, and employee training, with measures to attract young people into employment and immigrants in important positions (health, essential jobs; [1, 19]); if during the 2009 crisis the policies on the labor market were quite different between countries, in the case of the COVID-19 crisis, the similarity of the policies accentuated external mobility for work in essential jobs, supported technical unemployment as a temporary solution, and stimulated jobs' digitalization. All this has made the change in the unemployment rate much less important as an indicator for measuring the imbalance of the labor market, which is actually much more complex and difficult to manage.

A flexible and efficient business environment, associated with an attractive social insurance system for the workforce, can ensure the dynamic balancing of the labor market in case of crises or other major events with an impact on employment. According to classical theory, on the one hand, the unemployment rate represents the main warning of the imbalance of the labor market, job losses, in cases of unforeseen events, determining, in a global view, an increase in the unemployment rate. On the other hand, labor protection policies in case of inactivity/unemployment should actively contribute both to temporary financial protection (unemployment aid) and to the re-employment of the laid-off workforce through support measures (adjustment/adaptation through training, support in looking for a new job, etc.). For a flexible business environment, from the perspective of the labor market, layoffs should be found in the increase in the number of unemployed, and subsequently, they should reenter the form of employment – employee, self-employed, and entrepreneur. Currently, the labor market regulation mechanisms have multiplied; the entry-exit channels on the national labor market are influenced by globalization, for example, by the facilitation of free movement for work as well as by the social model and the efficiency of social policies in general. A comparative analysis of the changes in the employment and unemployment rates in the EU member states, during and after the two crises, based on Eurostat data, highlights the differences in behavior, allowing the countries to be clustered into the following subgroups:

- The classic situation, in which an economic crisis causes a reduction in employment and an increase in the number of unemployed.
- Unusual scenarios caused by a trend of non-correlation between the two rates when the two variables are associated with negative behaviors.

For the first subgroup we note the following:

- Case 1 – The reduction in employment is significantly greater than the increase in the number of unemployed, in which case part of those laid off are not among the registered unemployed for the following reasons: (a) the legislation granting unemployment benefits is restrictive and allows them to be registered, (b) the lack of the culture of registering as unemployed without compensation in order to benefit from the support measures offered by the local labor force management agencies (offer other jobs, training/retraining support, support for entrepreneurial initiatives, etc.), (c) the possibility of retirement anticipated, (d) discouragement and exit from the labor market, (e) international migration for work, or (f) re-entry into the education system for training. Added to this is the undesirable alternative of entering the unregistered economy, assuming the risks associated with the lack of social protection and relatively lower incomes.
- Case 2 – The reduction in employment is lower than the increase in the number of unemployed, in which case the adaptation process is practically strongly restricted (job destruction-job creation), a conservatism of maintaining employment and the limited access of new entrants to the labor market – young graduates and inactive people of working age (NEETs, housewives, people from the unregistered economy, returnees from international migration, etc.)

In the second subgroup there are atypical situations:

- Case 3 – Employment and unemployment increase, which means that the effect of the crisis was asymmetrical on activities, requiring employment in some sectors and forcing layoffs in other sectors, with all the associated effects.
- Case 4 – Employment and unemployment decrease; those who left employment were no longer interested in finding a job on the national market, became international migrants for work or moved to the unregistered economy, or became inactive (discouraged) or have resumed the education course for higher professional training or change of profession.
- Case 5 – During the crisis, employment increases and unemployment decreases, a preferable situation from the perspective of the labor market but rather difficult to manage in the business environment without a massive intervention of the public authorities by changing the legislative framework and/or by activating some instruments of employment protection (technical unemployment, flexibility of employment, tax facilities for employers, etc.).
- Case 6 – During the crisis, employment increases and unemployment remains quasi-constant, which can mean (a) an attraction of new entrants into employment through active measures/attractive jobs for young graduates or a special youth protection system, or on the contrary, (b) it practically implies an inefficiency of the insurance system for those laid off or significant legislative limits that make it unattractive; the natural process of entry-exit from the labor market (as a permanent process) avoids this path, with the alternative being from graduation directly to international migration or unregistered economy.

It is important to mention that the EU member states reacted to the crisis in the same way, enrolling in one of the cases mentioned above, regardless of the significantly different nature of the two analyzed crises; that is the situation of ten EU member states and EU-27 (EU-27, Czechia, Romania, Latvia, and Slovenia – Case 1; Spain, Lithuania, Slovakia, and Sweden – Case 2; Belgium and Cyprus – Case 3), or they had differentiated behaviors, adapted to the specifics of the crisis and national particularities (17 EU countries, see Table 24.1).

In conclusion, H1 is confirmed, in the sense that the labor market is influenced by crises/conjunctural situations that affect economic and social development in different ways and with different intensities, which causes the imbalance between the employment rate and the unemployment rate to be maintained; that is, the protection system in case of layoff does not fully cover the current variety of cases faced by the labor force, and it is necessary to reconsider the entire protection system in case of layoff – legislative framework and institutions, including reconsideration of the significance of the unemployment rate as an instrument of the analysis of balances on the labor market – its role being substantially diminished in the current economy.

Table 24.1 The evolution of employment and unemployment in the EU member states during the two crises

Cases (C)	Financial crisis (2010/2008)	COVID-19 crisis (2021/2019)	Similar behavior in both crises	Differentiated behavior
Case 1 (C1)	EU-27, CZ, RO, LV, SI, IRL, IT, BG, DK, EE, HR, FI	EU-27, CZ, RO, LV, SI, DE, PT	EU-27, CZ, RO, LV, SI	C1 + C2: EE, HR, FI C1 + C3: IRL, DK C1 + C4: IT, BG C2 + C1: PT C2 + C3: PL, HU C2 + C5: FR, EL, NL C3 + C2: A C3 + C6: MT C4 + C1: DE C5 + C6: LX
Case 2 (C2)	ES, LT, SK, SE, FR, EL, NL, PL, HU, PT	ES, LT, SK, SE, EE, HR, A, FI	ES, LT, SK, SE	
Case 3 (C3)	BE, CY, MT, A	BE, CY, DK, IRL, HU, PL	BE, CY	
Case 4 (C4)	DE	BG, IT	–	
Case 5 (C5)	LX	EL, FR, NL	–	
Case 6 (C6)	–	LX, MT	–	

Source: Authors' contribution

24.4.2 The Effects of Crises on the Demand for Work and the Influence on the Change in Share of NEETs and Job Vacancy Rate

Crises generate different effects on the business environment and the fields of economic activity, speeding up or delaying the labor market reform. If the financial crisis produced changes on the labor market from the perspective of the employment structure by activities and the competitiveness on the market, with effects on labor payment and productivity, the pandemic crisis hastened the digital transformation of jobs and the transition to hybrid employment. Therefore, the demand for work from the business environment and the attractiveness of employment for young people have changed. Although, in times of crisis, young people are the most affected by layoffs, they also have increased opportunities for (re)employment through the job destruction-job creation process. The changes are all the more intense when the economic recovery is accompanied by significant technological advance as was the case of firms; the digital forced transition during COVID-19 determined business model changes in many industries. Therefore, the change in the job vacancy rate[2] and the share of NEETs can be considered as the parameters of the changes in the labor market caused by the crises.

For the analyzed periods, we note the following. In the majority of EU states, the changes in the share of NEETs were larger under the financial crisis than the pandemic context (Fig. 24.3).

[2] According to Eurostat, job vacancy rate measures the proportion of total posts that are vacant (newly created, unoccupied, or about to become vacant), expressed as a percentage as follows: JVR = number of job vacancies * 100 / (number of occupied posts + number of job vacancies) (https://ec.europa.eu/eurostat/databrowser/view/teilm310/default/table?lang=en).

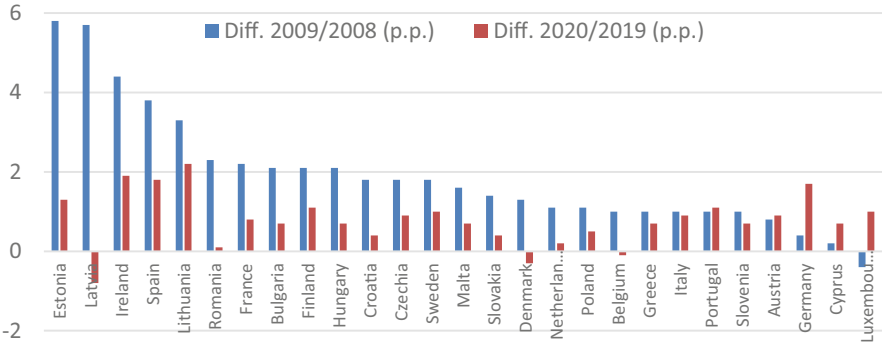

Fig. 24.3 Percentage points change in the share of NEETs* in EU member states amid financial and pandemic crises (p.p). (Note: Young people neither in employment nor in education and training (15–24 years) as % of the total population in the same age group. Source: Own calculations based on Eurostat data (online data code: TIPSLM90))

New member states seem to be more affected than the old ones. While the top five countries that recorded the highest increases in the share of NEETs in 2009 vs. 2008 include three new member states (NMSs) (Estonia (+5.8 p.p.), Latvia (+5.7 p.p.), and Lithuania (+3.3 p.p.)), at the opposite end, out of eight countries with 1 p.p. and less rise in the share of NEETs, six were old member states (Belgium, Greece, Italy, Portugal, Austria, and Germany). Moreover, in Luxembourg, the share of NEETs decreased during the same period (−0.4 p.p.). On the contrary, the share of NEETs seemed more affected by the pandemic crisis in Portugal, Austria, Germany, Cyprus, and Luxembourg. The perspectives of employment among the young people improved after the outbreak of the coronavirus pandemic in only one of NMSs, namely, Latvia (−0.8 p.p.), and in two of the old member states: Denmark (−0.3 p.p.) and Belgium (−0.1 p.p.). The aggregated data for EU-27 was not available.

The EU members states that recorded the fastest recovery of the share of NEETs to the pre-financial crisis level (we will use the term "recovery period") were Germany, Austria, and Sweden (2 years), followed by Luxembourg and Latvia (7 years) – in both instances, the percentage of NEETs fully recovered in 2015 following the financial crisis and fell below levels seen in 2008 (Annex 24.1).

- In Belgium, Ireland, and Hungary, the share of NEETs returned to the pre-crisis level after 8 years, in 2016.
- In Bulgaria, Czechia, Spain, Portugal, and Slovenia, the share of NEETs reached the levels of 2008 after 9 years (in 2017), followed by Lithuania, Malta, Poland, and Slovakia (10 years), Estonia (11 years), and Greece and Finland (13 years).
- In seven countries (four old member states: France, Italy, Denmark, and the Netherlands, and three new member states: Cyprus, Romania, and Croatia), the share of NEETs did not recover to the pre-crisis level (2008).

After the outbreak of the pandemic crisis, the share of NEETs recovered to the pre-pandemic levels in 2021, mostly in UE old member states (eight out of

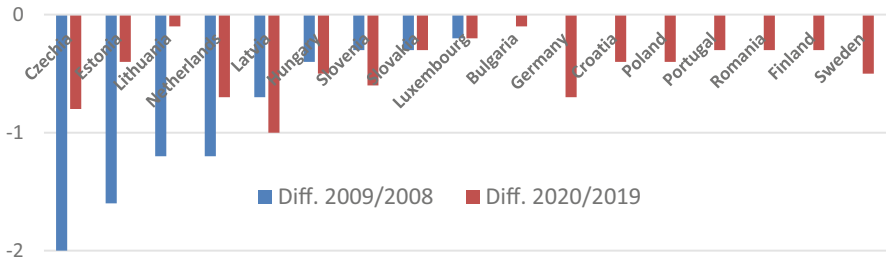

Fig. 24.4 Percentage points change in the job vacancy rate in EU member states amid financial and pandemic crises. (Source: Own calculation based on Eurostat data (online data code: JVS_A_RATE_R2))

12 countries: Denmark, Ireland, Greece, Spain, France, Portugal, Finland, and Sweden; Belgium represents a separate case, where the share of NEETs maintained a downward trend after 2019, despite the numerous restraining conditions adopted amid the coronavirus pandemic).[3] Only three new member states managed to record a similar trend: Cyprus, Hungary, and Slovenia. In the other 15 EU countries, the specific pandemic context led to a rise in the share of NEETs, which remained higher than the pre-pandemic crisis levels (by the end of 2021). It seems that the new member states were especially affected by this situation: nine out of the 15 countries (Bulgaria, Czechia, Estonia, Croatia, Latvia, Lithuania, Malta, Romania, and Slovakia). The other six were old member states (Germany, Italy, Luxembourg, Netherlands, Austria, and Poland). It is interesting to mention that the effects of the pandemic crisis were extended in 2021 as well: in 13 out of the 15 countries in this group, the share of NEETs continued to rise also in 2021.

Another interesting aspect is related to the situation of Greece and Finland, which had the longest recovery period of the share of NEETs after the financial crisis (13 years) and where the complete recovery was achieved in 2021, despite the second crisis.

Regarding the second indicator that illustrates the changes in the labor market caused by the crises, namely, the job vacancy rate (JVR), our analysis faced limitations related to the availability of data. There are many EU member states where there are no data for the entire period (Denmark, Ireland, Greece, Spain, France, Italy, Cyprus, Malta, and Austria); for others, there are information only for few years (Belgium – 2010 and 2011), or the series lack the values of the first/second/third year. Moreover, the aggregated data for EU-27 was also not available.

Out of the nine member states with available data for the entire period (2008–2021), in four countries, the financial crisis had a greater impact on job vacancy rate than the pandemic crisis: three NMSs (Czechia, Estonia, and Lithuania) and one old member state (the Netherlands) (Fig. 24.4). In Latvia, Hungary, and

[3] Results obtained by own calculations based on Eurostat data (online data code: TIPSLM90).

Slovenia (all three are part of the new member states), the coronavirus pandemic generated the biggest impact on job vacancy rate, while in Slovakia and Luxembourg, job vacancy rate declined equally both after the financial crisis and the coronavirus pandemic.

The country with the shortest period in which the job vacancy rate returned to pre-financial crisis level (we will use the term "recovery period") was Luxembourg (2 years), followed by Hungary and Slovenia (6 years) – in both situations, the job vacancy rate fully recovered in 2014 from the financial crisis and surpassed 2008 levels (Annex 24.2).

- In Latvia, the job vacancy rate returned to the pre-crisis level after 8 years, in 2016.
- In Czechia, it took 9 years for job vacancy rate to reach the levels of 2008 (in 2017), followed by the Netherlands (10 years) and Lithuania (13 years).
- In Estonia and Slovakia, the post-crisis job vacancy rate has not yet managed to recover to the 2008 level.

At the level of the pandemic crisis, we used quarterly data also because the recovery was faster. We calculated the difference between the minimum level of JVR reached between 2020-Q1 and 2021-Q4 and the level recorded in the fourth quarter of 2019, before the outbreak of COVID-19 pandemic (Annex 24.3).

Germany was the worst affected EU member state during the pandemic: the job vacancy rate dropped 1.3 p.p. as compared to the level before the pandemic, followed by Latvia (−1.1 p.p.) and Czechia (−1.0 p.p.). In Romania, the decrease of this indicator was by 0.3 p.p., as well as Portugal and Slovakia. The countries where the job vacancy rate declined the least during the pandemic are Bulgaria and Luxembourg (−0.1 p.p.).

According to Annex 24.3, Lithuania managed the fastest return to the pre-pandemic job vacancy rate in just two quarters (in 2020-Q2). In Bulgaria and Croatia, the job vacancy rate returned to pre-pandemic levels after two and three quarters, but the trend was fluctuating. In Luxembourg, Slovenia, and Sweden, the pre-pandemic levels were reached after five quarters (in 2021-Q1), while in Hungary, the Netherlands, Poland, Portugal, and Estonia after six quarters (2021-Q2). In Romania and Germany, the recovery was accomplished after seven quarters (2021-Q3). The longest period needed to return to the pre-pandemic job vacancy rate was recorded in Latvia (eight quarters, in 2021-Q4) and Slovakia (nine quarters, in 2022-Q1), while in Finland and Czechia, the pre-pandemic level of this indicator was not reached until the end of the period with available data.

All these results show that the financial crisis generated deeper changes in the economies that were more dependent on the evolution of financial markets, confirming H2.

In the majority of EU states, the changes in the share of NEETs were larger under the financial crisis than the pandemic context. New member states seem to be more affected than the old ones. The three countries with the fastest recovery of the share of NEETs after the financial crisis were old member states (Germany, Austria, and Sweden – the share of NEETs returned to the level of 2008 after 2 years). On the

contrary, there are seven countries (four old member states: France, Italy, Denmark, and the Netherlands, and three new member states: Cyprus, Romania, and Croatia) where the share of NEETs did not recover to the pre-crisis level (2008).

On the other hand, the recovery of the share of NEETs to the pre-pandemic levels was recorded mostly in UE old member states, while the new member states represented the majority of countries where the share of NEETs did not return to the pre-pandemic levels until the end of 2021. It turns out that the recovery after the crisis had a relatively slow pace and the investments made by the business environment were not able (yet) to generate more attractive opportunities for young people.

Out of the nine countries with data available, there were only two old member states that had very different recovery periods for the job vacancy rate. In Luxembourg, this indicator recovered to the pre-financial crisis level in just 2 years, while in the Netherlands, it took a five times longer period. In the other group (seven new member states), there were five countries where the job vacancy rate managed to recover to the levels before the financial crisis in 6 to 13 years (faster in Hungary and Slovenia – 6 years; the slowest recovery was in Lithuania – 13 years), while in Estonia and Slovakia, the efforts of modernizing the business environment in the post-crisis period were not sufficient for boosting the job vacancy rate that remained under the levels of 2008. At the same time, the recovery period was faster after the pandemic crisis. In the case of the old member states, the job vacancy rate recovered to the 2019 level in five (Luxembourg, Sweden) to seven quarters (Germany). In the new member states (with data available), the behavior of the job vacancy rate was more diverse, starting with a fast recovery in two quarters (Lithuania) to eight and nine quarters (in Latvia and Slovakia). Out of the two countries where the job vacancy rate remained low, under the pre-pandemic levels, there were one old member state (Finland) and one new member state (Czechia).

24.4.3 The Resilience of the Labor Market

In order to highlight the resilience of the labor market, we analyzed the recovery period needed by the unemployment rate to reach the pre-financial crisis levels across EU countries (Annex 24.4). This analysis shows, among others, the following:

- The nations where the unemployment rate recorded the fastest recovery period, reaching the pre-financial crisis levels after 6 years were Malta and Hungary (6 years) – in both cases, the unemployment rate completely recovered after the crisis in 2014 and reached levels below that recorded in 2008.
- In Czechia and Poland, the unemployment rate returned to the pre-crisis level after 8 years, in 2016.
- In Ireland and Slovakia, it took 9 years for unemployment rate to reach the levels of 2008 (in 2017).

- In six member states (Belgium, Estonia, Croatia, Latvia, Portugal, and Romania), the unemployment rate reached the levels recorded in 2008 after 10 years (in 2018).
- The unemployment rate for EU-27 needed 11 years to recover (2019), as well as Bulgaria and Slovenia.
- In eleven countries, the post-crisis unemployment rate has not yet managed to recover to the 2008 level: nine old member states (Denmark, Greece, Spain, France, Italy, the Netherlands, Austria, Finland, and Sweden) and two new member states (Cyprus and Lithuania).
- In Luxembourg, unemployment rate recorded a unique evolution; during 2009–2012, it stagnated or declined compared to 2008, despite the financial crisis; an increase was recorded starting in 2013.
- Germany was the only member state where the unemployment rate recorded a downward trend for the entire 2009–2019 period, decreasing from 7.5% in 2008 to 3.0% in 2019.

Amid the outbreak of the COVID-19 pandemic, in most EU member states, the unemployment rate increased in 2020 compared to 2019, especially as a result of the lock-downs and hard restrictions imposed on various activities. The EU-27 unemployment rate rose by +0.4 p.p., from 6.8% to 7.2% in 2020 (Annex 24.5). The smallest increase was recorded in Belgium (+0.3 p.p., from 5.5% to 5.8%) and Portugal (+0.3 p.p., from 6.7% to 7.0%). During the analyzed period, the unemployment situation worsened most in the Baltic countries, where the unemployment rate rose by 1.8 p.p. in Latvia, 2.2 p.p. in Lithuania, and 2.4 p.p. in Estonia.

Only four member states recorded decreases in the unemployment rate: Poland (−0.1 p.p., from 3.3% to 3.2%), Greece (−0.3 p.p., from 17.9% to 17.6%), France (−0.4 p.p., from 8.4% to 8%), and Italy (−0.6 p.p., from 9.9% to 9.3%).

Depending on the evolution of the unemployment rate in the period 2019–2021, two groups of countries were identified. For most EU member states [20], the outbreak of the pandemic has caused a rise in the unemployment rate in 2021 as compared to 2019. In some member states, the increase was more significant (+1.3 p.p. in Latvia, +1.4 p.p. in Austria, +1.7 p.p. in Estonia, and + 1.8 p.p. in Sweden). In countries such as Bulgaria, Denmark, and Poland, the unemployment rate rose slightly between 2019 and 2021 (+0.1 p.p.), while in Romania, the unemployment rate increased by 0.7 p.p. in 2021 compared to 2019. The second group consists of seven EU member states, characterized by a decrease in the unemployment rate between 2019 and 2021 (Greece, France, Italy, Luxembourg, the Netherlands, Portugal, and Malta).

In order to highlight the extent of the unemployment rate change during pandemic, we calculated, for each country, the difference between the maximum level reached between 2020-Q1 and 2021-Q4 (the last for which Eurostat data are available) and the level recorded in the fourth quarter of 2019, before the outbreak of COVID-19 pandemic (Annex 24.6). Thus, some countries appear more adversely affected by the pandemic: Estonia, where, during the pandemic, the unemployment rate reached a level of 3.7 p.p. higher than before the pandemic, followed by

Lithuania (+2.8 p.p.), Austria (+2.6 p.p.), and Ireland and Croatia (+2.5 p.p.). The difference registered at EU-27 level was +1.1 p.p., while in Romania, it is +1.7 p.p. The countries where the unemployment rate rose the least during the pandemic are Poland (+0.7 p.p.) and France (+0.5 p.p.).

According to Annex 24.6, Portugal managed the fastest return to the pre-pandemic unemployment rate in just two quarters (in 2020-Q2). In France, Italy, and Greece, the unemployment rate returned to pre-pandemic levels after four quarters (in 2020-Q4), Luxembourg after five quarters (in 2021-Q1), and the Netherlands and Denmark after six quarters (2021-Q2). In Malta and Bulgaria, the recovery was made after seven quarters. The longest period needed to return to the pre-pandemic unemployment rate was recorded in Poland, Croatia, and Cyprus – eight quarters, only in 2021-Q4.

However, in 2021-Q4, there were still 15 EU member states (Czechia, Germany, Hungary, Slovenia, Estonia, Austria, Ireland, Romania, Belgium, Slovakia, Latvia, Lithuania, Finland, Sweden, and Spain) in which the unemployment rate increased and reached higher levels than in the pre-pandemic quarter (2019-Q4). Thus, in the case of these states, one cannot yet speak of a return of the unemployment rate to the level before the pandemic.

The analysis of the evolution of unemployment rate in EU member states during and after the two major crises highlights that, in the case of the coronavirus pandemic, the recovery was faster than after the financial crisis. If the crisis is outside the economic factors, the economic activity can recover faster. When the crisis involves also economic factors, the impact is likely to be more extensive on industries, and the recovery will be slower. After the financial crisis, the unemployment rate needed a few years to recover to pre-crisis levels. The fastest recovery period in the EU was recorded in Hungary and Malta, where the unemployment rate reached pre-crisis levels after 6 years (in 2014). At the same time, in the case of the coronavirus pandemic, unemployment rate reached the pre-crisis levels in just a few quarters. The fastest recovery period was recorded in Portugal (Q2 of 2020), followed by France, Italy, and Greece (Q4 of 2020). All these differentiated evolutions confirm H3.

24.4.4 Empirical Analysis

In this section, an annual dataset for the 2008–2021 period was developed for EU-27 countries (Belgium, Bulgaria, Czech Republic, Denmark, Germany, Estonia, Ireland, Greece, Spain, France, Croatia, Italy, Cyprus, Latvia, Lithuania, Luxembourg, Hungary, Malta, the Netherlands, Austria, Poland, Portugal, Romania, Slovenia, Slovakia, Finland, and Sweden). The variables used in analysis are presented in Table 24.2. The descriptive statistics for the series are presented in Annex 24.7.

The analysis is developed on three groups of countries, created according to the level of GDP per inhabitant: first group – Luxembourg, Ireland, Denmark, Sweden, the Netherlands, Finland, Austria, Belgium, and Germany; second group – France,

Table 24.2 The variables used in analysis

Acronym	Explanation	Unit of measure	Source
GDP	Gross domestic product	Current prices, purchasing power standard (PPS) per capita, share in EU-27 average	Eurostat
EMPL	Employment rate	Percentage of population from 15 to 74 years	
NEETs	Young people neither in employment nor in education and training (15–24 years)	Share of the total population in the same age group	

Source: Developed by the authors

Italy, Malta, Cyprus, Spain, Slovenia, Estonia, Czechia, and Portugal; and third group – Lithuania, Slovakia, Latvia, Greece, Hungary, Poland, Croatia, Romania, and Bulgaria.

The first step of the analysis is related to the development of the panel unit root test and requires all variables to have the same properties. The variables should have the same order of integration. The results are presented in Annex 24.8.

For this test, the null hypothesis is "panel data has unit root," and the alternative hypothesis is "there is no unit root in panel data." In our case, we obtained the probability values that are >5% for data in level for all groups of countries. This means that we cannot reject the null hypothesis. In level, the variables are non-stationary.

We obtained the probability values that are <5% for data in the first difference. This means that we can reject the null hypothesis. In the first difference, the variables do not have unit root so they become stationary. In this case, we can run the panel cointegration test for all groups of countries (see Annex 24.9).

For group I and group II of countries, the probability value is more than 5%, so in this case, we can accept the null hypothesis of no cointegration among variables. As a result, we can run the panel VAR model. This aspect is discussed in subsection A. For group III of countries, the probability value is less than 5%, so in this case, we cannot accept the null hypothesis of no cointegration among variables. There is a cointegration relationship between variables. As a result, we can run the panel VEC (vector error correction) model. The vector error correction model shows variables' dynamics and how they return to equilibrium after a shock. This aspect is discussed in Sect. 24.4.4.1.

24.4.4.1 Vector Autoregression (VAR) Model

For group I and group II of countries, VAR models were developed to check the relationships between variables. EViews provided the results for the model.

An important step is the use of the Hausman test to check which model is appropriate (with fixed effects or with random effects). The null hypothesis is "the

random effects model is appropriate," and the alternative hypothesis is "the fixed effects model is appropriate."

For the first group of countries, the probability value is 0.001 <5%, so we can reject the null hypothesis. The fixed effects model is appropriate in this case. For the second group of countries, the probability value is 0.425 >5%, so we cannot reject the null hypothesis. The random effects model is appropriate in this case. The results of the model for the first group of countries show that all independent variables have statistically significant coefficients (see Annex 24.10). There is a positive impact on dependent variable from variable GDP in lag and a negative impact from NEETs and EMPL variables in lag (R-squared value is 0.99).

For the second group of countries, the results of the model show that independent variables have statistically significant coefficients for the 5% level, except NEETs variable in lag (see Annex 24.10). There is a positive impact on dependent variable from variable GDP in lag and a negative impact from NEETs and EMPL variables in lag.

The negative sign of the NEETs variable in lag shows the importance of this category of population (young people neither in employment nor in education and training), which could better contribute to the GDP, if youth employment prospects would improve.

Regarding the negative impact of the EMPL variable in lag (which is actually present in both models), one can mention that there is a decrease in GDP through the restructuring of jobs as a result of the reforms and a relative increase in jobs with higher productivity. The increase in productivity leads to an increase in GDP even when we have a decrease in employment.

24.4.4.2 Vector Error Correction (VEC) Model

For group III of countries, a vector error correction model (VECM) is developed. In the case of a system with two variables and no lagged difference terms, the formula for the VEC model is

$$\Delta y_{1,t} = \alpha_1 \left(y_{2,t-1} - \beta y_{1,t-1} \right) + \varepsilon_{1,t} \tag{24.1}$$

$$\Delta y_{2,t} = \alpha_2 \left(y_{2,t-1} - \beta y_{1,t-1} \right) + \varepsilon_{2,t} \tag{24.2}$$

where.

$y\_(i,t)$ is the variable
α_i is the coefficient measuring the speed of adjustment of the i-th endogenous variable toward the equilibrium
β_i is the cointegrating vector
$\varepsilon\_(i,t)$ is the error term

In our case, the equation that considers the GDP variable in difference as a dependent variable is written as follows (R-squared = 0.423, Durbin-Watson statistic = 2.147):

$$\Delta GDPt = \alpha 1 \times (GDPt - 1 + \beta 1 \times NEETSt - 1 + \beta 2 \times EMPLt - 1 + ut) + \alpha 2 \times \Delta GDPt - 1 + \alpha 3 \times \Delta GDPt - 2 + \alpha 4 \times \Delta NEETSt - 1 + \alpha 5 \times \Delta NEETSt - 2 + \alpha 6 \times \Delta EMPLt - 1 + \alpha 7 \times \Delta EMPLt - 2 + \varepsilon t \quad (24.3)$$

and

$$\Delta GDPt = -0.027 \times (GDPt - 1 + 4.796 \times NEETSt - 1\text{–}0.254 \times EMPLt - 1\text{–}117.815) + 0.570 \times \Delta GDPt - 1 - 0.153 \times \Delta GDPt - 2 + 0.172 \times \Delta NEETSt - 1 + 0.059 \times \Delta NEETSt - 2 + 0.062 \times \Delta EMPLt - 1\text{–}0.043 \times \Delta EMPLt - 2 + 0.320 \quad (24.4)$$

In the VECM:

- The value of α1 shows the existence of long-term causality.
- α4, α5, α6, and α7 show short-term causality if there are significant p-values for each coefficient.

The results show that the variables are characterized by a long-run causality (from the independent variables to the dependent one). Moreover, the speed of adjustment to long-term equilibrium for the system is represented by the value of α1 of − 0.027 (2.7%, annually).

The coefficients of the lagged independent variables (from α4 to α7) show the positive (ΔNEETSt−1, ΔNEETSt−2, and ΔEMPLt−1) or negative (ΔEMPLt−2) impact on the dependent variable, considering a 1% change. Ceteris paribus, this impact is considered, on average, in the short run.

If we check the values of the associated probabilities for each coefficient of the lagged independent variables (from α_4 to α_7), one can mention that there are no statistically significant coefficients (see Annex 24.10).

The impulse response function (see Figs. 24.5 and 24.6) shows the impact of a shock on the GDP variable over 10 years. In the case of the EMPL variable, the effect is positive from the beginning of the period and also for the accumulated response. In the case of the NEETs variable, the effect is negative from the beginning of the period, and the situation is the same for the accumulated response.

The results obtained from empirical analysis are very interesting. It seems that the division into groups of countries represented an important research approach, highlighting some differences between them. One can mention that H4 is validated; that is, there are important relationships between the variables used in the models, the analysis carried out underlining the fact that for each group of countries, there are features that influence the respective relationships (e.g., for the first two groups of countries, VAR models were used, taking into account fixed effects in the first case and random effects in the second case), but in the case of the third group, a VECM is employed.

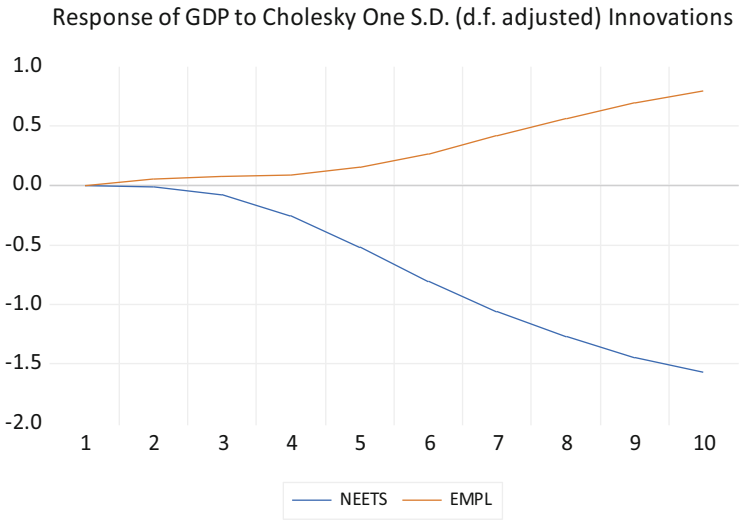

Fig. 24.5 Impulse response functions of GDP. (Source: Developed by the authors)

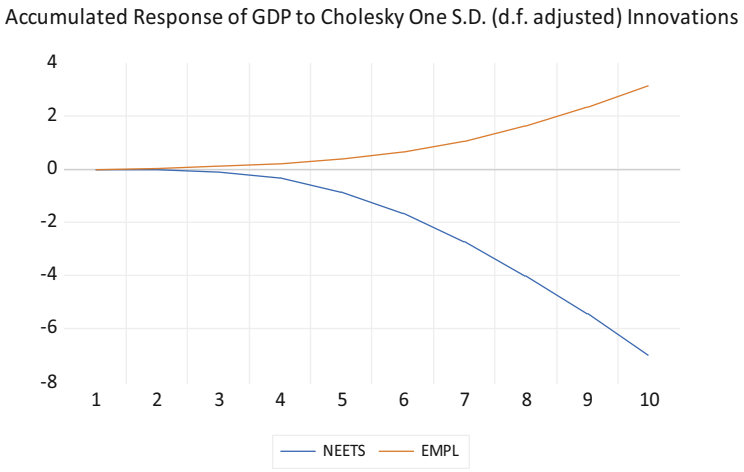

Fig. 24.6 Impulse response functions of GDP (accumulated response). (Source: Developed by the authors)

24.5 Conclusions

Both the financial crisis and pandemic crisis severely impacted the labor market. In this chapter, we analyzed the effects of these two crises on some indicators of the labor market: unemployment rate, employment rate, job vacancy rate, and share of NEETs in total population.

The examination of the advancement of unemployment rate in EU countries amid and after the two crises underlines that the COVID-19 crisis resulted in a faster recovery compared to the financial crisis. When a crisis originates from factors external to the economy, the economic activity tends to bounce back more quickly. Conversely, when a crisis involves economic factors, it tends to have a broader impact on various sectors, leading to a slower recovery. Following the financial crisis, it took several years for the unemployment rate to return to pre-crisis levels. Hungary and Malta experienced the swiftest recovery in the EU, taking six years for the unemployment rate to reach pre-crisis levels, specifically in 2014. In contrast, during the COVID-19 crisis, the unemployment rate rebounded to the levels before the crisis within a few quarters. Portugal demonstrated the fastest recovery period, followed by France, Italy, and Greece.

It seems that during the financial crisis, the reaction of the business environment consisted mainly of reducing jobs/employment to a minimum, while those activities that did not resist the crisis were shut down. On the other hand, during the pandemic crisis, the companies were encouraged to maintain actual employment levels by receiving important financial support from the state. Various schemes of encouraging job retention were used, such as working capital financing, technical unemployment, and so on. Some companies in sectors that recorded an expansion during the pandemic crisis (health, information and communications technology (ICT), etc.) managed to improve their employment deficit in order to cope with the increasing demand. The labor market does not adjust only by unemployment but also by other instruments/factors, which may be objective or subjective. Thus, the use of different empirical models is justified (including in the mode job vacancy rate).

The access to unemployment is limited by the legislation in force and the fulfillment of certain conditions. Some of those who lose their jobs may not end up unemployed. They may enter another country's labor force by migration, they may find a job in a different occupation (occupational asymmetry), or there may be factors that lead from employment to inactivity, which will feed some indicators of imbalances on the labor market, such as NEETs or inactive population.

The financial crisis affected younger generations to a greater extent than the pandemic crisis. First, the limitation of economic activities during the financial crisis led to the decline in the job opportunities for young people. The pandemic crisis had an opposite effect: the "forced" digitalization led to boosting employment of young people with better digital competencies as compared to the rest of employees. The second reason is related to adapting the workforce to the requirements of economic recovery: during the financial crisis, maintaining employment was also associated with savings related to total labor costs. The companies did not mainly pursue the

improvement of employees' skills. On the other hand, during the pandemic crisis, financial resources were used for investments in digital equipment and for acquiring/improving the digital competencies of employees, as means of survival against the new pandemic framework, for moving some activities into the digital/online system and for supporting work in a hybrid/remote format, etc.

The results obtained from empirical analysis highlight that there are different features of the relationships between variables, depending on the groups of countries. For the first two groups, VAR models were employed, but for the last one, a VECM was used (showing that the variables are characterized by a long-run causality, from the independent variables to the dependent one).

Regarding VAR models, for the first group, a fixed effects model was used, and for the second one, a random effects model was employed. The signs of the coefficients are the same in both cases (positive sign from GDP in lag and negative sign from NEETs and EMPL variables in lag), but in the second case, the coefficient of the EMPL variable in lag is not statistically significant. The negative sign of the EMPL variable in lag shows that the increase in productivity leads to an increase in GDP even when we have a decrease in employment.

The negative coefficient of the lagged NEETs variable highlights the significance of addressing the needs of this particular group of individuals - young people who are not in employment, education, or training. Enhancing youth employment prospects could potentially lead to a more substantial contribution of this vulnerable category to the GDP.

An important part of the analysis is represented by the impulse response function, showing the impact of a shock on the GDP variable. There is a positive effect in the case of the EMPL variable, but in the case of the NEETs variable, the effect is negative, emphasizing again the importance of the contribution of this category of population within a country's economy.

Future research will present the differences by activities and economic sectors and will extend the analysis period to better capture the impact of the pandemic crisis on the structure of the business environment and on the business model based on digital transformation, as a means of building economic resilience.

Annexes

Annex 24.1 The share of NEETs in EU member states in 2008 and recovery period after the financial crisis

EU countries	Share of NEETs in 2008 (%)	Max. level of share of NEETs in post-crisis period (%)	Recovery period needed for share of NEETs to reach the pre-crisis level (or below)		Year when share of NEETs reached the pre-financial crisis level
			Year	No. of years	
Germany	8.4	8.4	2009	2	2010
Austria	7.4	8.5	2009	2	2010
Sweden	7.8	7.8	2009	2	2010
Luxembourg	6.2	8.7	2014	7	2015
Latvia	11.8	11.8	2010	7	2015
Belgium	10.1	10.1	2013	8	2016
Ireland	13.9	13.9	2010	8	2016
Hungary	11.5	11.7	2013	8	2016
Bulgaria	17.4	17.4	2011	9	2017
Czechia	6.7	6.7	2013	9	2017
Spain	14.3	14.3	2013	9	2017
Portugal	10.2	10.2	2013	9	2017
Slovenia	6.5	7.7	2015	9	2017
Lithuania	8.8	11.3	2010	10	2018
Malta	8.3	10.1	2012	10	2018
Poland	9.0	11.2	2013	10	2018
Slovakia	11.1	12.1	2010	10	2018
Estonia	8.7	10.9	2009	11	2019
Greece	11.4	15.3	2013	13	2021
Finland	7.8	9.4	2015	13	2021
France	10.5	11.4	2009, 2010	Not recovered	
Croatia	11.6	15.4	2013	Not recovered	
Italy	16.6	20.1	2013	Not recovered	
Cyprus	9.7	16.1	2013	Not recovered	
Denmark	5.2	7.7	2012	Not recovered	
Romania	11.6	18.	2015	Not recovered	
Netherlands	3.9	5.1	2013	Not recovered	

Source: Own calculations based on Eurostat data (online data code: TIPSLM90)

Annex 24.2 Job vacancy rate in EU member states in 2008 and recovery period after the financial crisis

EU countries	Job vacancy rate (JVR) in 2008 (%)	Minimum level of JVR in post-crisis period (%)	Recovery period needed for JVR to reach the pre-crisis level (or higher)		Year when JVR reached the pre-crisis level
			Year	No. of years	
Luxembourg	0.6	0.4	2009	2	2010
Hungary	1.3	0.9	2009	6	2014
Slovenia	1.0	0.7	2009, 2010	6	2014
Latvia	1.6	0.9	2009, 2010	8	2016
Czechia	3.2	0.8	2010	9	2017
Netherlands	2.9	1.2	2013	10	2018
Lithuania	1.7	0.5	2009	13	2021
Estonia	2.5	0.9	2009	Not recovered	
Slovakia	1.3	0.8	2010–2013	Not recovered	

Source: Own calculations based on Eurostat data (online data code: JVS_A_RATE_R2)

Annex 24.3 Job vacancy rate in EU member states in 2019-Q4 and recovery period after the outbreak of the pandemic

EU countries	Job vacancy rate (JVR) in 2019-Q4 (%)	Min. level of JVR in pandemic (up to 2021-Q4) (%)	Difference between min. JVR in pandemic and JVR in 2019-Q4		Recovery period needed for JVR to reach the pre-pandemic level (or higher)	Quarter when JVR reached the pre-pandemic level
			Quarter	p.p.	No. of quarters	
Lithuania	1.3	1.1	2020-Q1	−0.2	2	2020-Q2
Bulgaria	0.8	0.7	2020-Q1, 2020-Q4	−0.1	2, 5	2020-Q2, 2021-Q1
Croatia	1.2	0.8	2020-Q2	−0.4	3, 5	2020-Q3, 2021-Q1
Luxembourg	1.5	1.4	2020-Q2, 2020-Q4	−0.1	5	2021-Q1
Slovenia	2.0	1.4	2020-Q2	−0.6	5	2021-Q1
Sweden	2.0	1.4	2020-Q3	−0.6	5	2021-Q1
Hungary	2.3	1.9	2020-Q1	−0.4	6	2021-Q2
Netherlands	3.2	2.4	2020-Q2	−0.8	6	2021-Q2
Poland	1.0	0.6	2020-Q1	−0.4	6	2021-Q2
Portugal	0.9	0.6	2020-Q1	−0.3	6	2021-Q2
Estonia	1.7	1.3	2020-Q2	−0.4	6	2021-Q2
Romania	1.0	0.7	2020-Q2	−0.3	7	2021-Q3
Germany	3.3	2.0	2020-Q2	−1.3	7	2021-Q3
Latvia	3.0	1.9	2020-Q4	−1.1	8	2021-Q4
Slovakia	1.0	0.7	2020-Q4	−0.3	9	2022-Q1
Finland	1.6	1.4	2020-Q4	−0.2	Not recovered	
Czechia	6.1	5.1	2020-Q4, 2021-Q1, Q2	−1.0	Not recovered	

Source: Own calculations based on Eurostat data (online data code: TEILM310)

Annex 24.4 Unemployment rate in EU member states in 2008 and recovery period after the financial crisis

EU countries	Unemployment rate, 2008 (UR)* (%)	Max. level of UR in the post-crisis period (%)	Year	Recovery period needed for UR to reach the pre-crisis level (or below) No. of years	Year when UR reached the pre-crisis level
Germany	7.5	7.3	2009	Despite the financial crisis, the UR decreased continuously throughout the post-crisis period and also until 2019	
Hungary	7.8	10.8	2010	6	2014
Malta	6.0	6,9	2009, 2010	6	2014
Czechia	4.4	7,3	2010	8	2016
Poland	7.1	10.6	2013	8	2016
Ireland	6.8	15.5	2012	9	2017
Slovakia	9.5	14.3	2013	9	2017
Belgium	7.0	8.7	2014, 2015	10	2018
Estonia	5.5	16.6	2010	10	2018
Croatia	8.6	17.3	2013, 2014	10	2018
Latvia	7.7	19.7	2010	10	2018
Portugal	7.7	17.2	2013	10	2018
Romania	5.8	9.1	2011	10	2018
EU-27	7.2	11.6	2013	11	2019
Bulgaria	5.6	13.9	2013	11	2019
Slovenia	4.4	10.1	2013	11	2019
Cyprus	3.7	16.1	2014	Not recovered**	
Denmark	3.7	7.8	2011, 2012	Not recovered**	
Netherlands	3.7	8.4	2014	Not recovered**	
Austria	4.1	6.5	2016	Not recovered**	
Lithuania	5.8	17.8	2010	Not recovered**	
Sweden	6.2	8.8	2010	Not recovered**	
Finland	6.4	9.4	2015	Not recovered**	
Italy	6.7	12.9	2014	Not recovered**	
France	7.4	10.3	2013, 2014, 2015	Not recovered**	
Greece	7.8	27.8	2013	Not recovered**	
Spain	11.3	26.1	2013	Not recovered**	
Luxembourg	5.1	6.7	2015	Atypical; UR started to decline after 2008, then increased (reaching the pre-crisis level – 5.1% in 2012); then started to increase and still not recovered	

Source: Own calculations based on Eurostat data (online data code: UNE_RT_A)
Note: *Unemployment rate for age group 15–74 years, as % of labor force; **in 2021

Annex 24.5 Changes in unemployment rate in EU countries during the COVID-19 pandemic period

	Unemployment rate (%)			Difference (+/− p.p.)		
EU countries	2019	2020	2021	2021/2019	2020/2019	2021/2020
Greece	17.9	17.6	14.7	−3.2	−0.3	−2.9
France	8.4	8	7.9	−0.5	−0.4	−0.1
Italy	9.9	9.3	9.5	−0.4	−0.6	0.2
Luxembourg	5.6	6.8	5.3	−0.3	1.2	−1.5
Netherlands	4.4	4.9	4.2	−0.2	0.5	−0.7
Portugal	6.7	7	6.6	−0.1	0.3	−0.4
Malta	3.6	4.4	3.5	−0.1	0.8	−0.9
Bulgaria	5.2	6.1	5.3	0.1	0.9	−0.8
Denmark	5	5.6	5.1	0.1	0.6	−0.5
Poland	3.3	3.2	3.4	0.1	−0.1	0.2
EU-27	6.8	7.2	7	0.2	0.4	−0.2
Slovenia	4.4	5	4.8	0.4	0.6	−0.2
Cyprus	7.1	7.6	7.5	0.4	0.5	−0.1
Germany	3	3.7	3.6	0.6	0.7	−0.1
Romania	4.9	6.1	5.6	0.7	1.2	−0.5
Spain	14.1	15.5	14.8	0.7	1.4	−0.7
Belgium	5.5	5.8	6.3	0.8	0.3	0.5
Czechia	2	2.6	2.8	0.8	0.6	0.2
Lithuania	6.3	8.5	7.1	0.8	2.2	−1.4
Hungary	3.3	4.1	4.1	0.8	0.8	0
Finland	6.8	7.7	7.7	0.9	0.9	0
Croatia	6.6	7.5	7.6	1	0.9	0.1
Slovakia	5.7	6.7	6.8	1.1	1	0.1
Ireland	5	5.9	6.2	1.2	0.9	0.3
Latvia	6.3	8.1	7.6	1.3	1.8	−0.5
Austria	4.8	6	6.2	1.4	1.2	0.2
Estonia	4.5	6.9	6.2	1.7	2.4	−0.7
Sweden	7	8.5	8.8	1.8	1.5	0.3

Source: Eurostat and own calculation based on the Eurostat database

Annex 24.6 Unemployment rate in EU member states in 2019-Q4 and recovery period during the pandemic

EU countries	Unemployment rate (UR) in 2019-Q4 (%)	Max. level of UR in pandemic (up to 2021-Q4) (%)	Quarter	Difference between max. UR in pandemic and UR in 2019-Q4 p.p.	Recovery period needed for UR to reach the pre-pandemic level (or below) No. of. quarters	Quarter when UR reached the pre-pandemic level
Portugal	6.8	7.8	2020-Q3	1	2	2020-Q2
France	8.3	8.8	2020-Q3	0.5	4	2020-Q4
Italy	9.5	10.8	2020-Q3	1.3	4	2020-Q4
Greece	17.0	19.4	2020-Q2	2.4	4	2020-Q4
Luxembourg	5.8	7.8	2020-Q3	2	5	2021-Q1
Netherlands	4.4	5.3	2020-Q3	0.9	6	2021-Q2
Denmark	5.0	6.2	2020-Q3	1.2	6	2021-Q2
Malta	3.5	4.9	2020-Q3	1.4	7	2021-Q3
Bulgaria	5.2	6.6	2020-Q2	1.4	7	2021-Q3
Poland	3.1	3.8	2021-Q1	0.7	8	2021-Q4
Croatia	6.4	8.9	2021-Q1	2.5	8	2021-Q4
EU-27	6.7	7.8	2020-Q3	1.1	8	2021-Q4
Cyprus	6.7	8.4	2020-Q4	1.7	8	2021-Q4
Czechia	2.1	3.3	2021-Q1	1.2	UR not recovered*	
Germany	3.0	4	2020-Q3	1	UR not recovered*	
Hungary	3.3	4.5	2020-Q2	1.2	UR not recovered*	
Slovenia	4.1	5.3	2020-Q2, 2021-Q1	1.2	UR not recovered*	
Estonia	4.2	7.9	2020-Q3	3.7	UR not recovered*	
Austria	4.6	7.2	2021-Q1	2.6	UR not recovered*	
Ireland	4.8	7.3	2021-Q1	2.5	UR not recovered*	
Romania	4.9	6.6	2020-Q2	1.7	UR not recovered*	
Belgium	5.3	6.6	2020-Q3, 2021-Q1	1.3	UR not recovered*	
Slovakia	5.7	7.2	2021-Q1	1.5	UR not recovered*	
Latvia	6.2	8.5	2020-Q3	2.3	UR not recovered*	
Lithuania	6.6	9.4	2020-Q3	2.8	UR not recovered*	
Finland	6.8	8.3	2020-Q3	1.5	UR not recovered*	
Sweden	7.1	9.3	2020-Q3	2.2	UR not recovered*	
Spain	14.0	16.3	2020-Q3	2.3	UR not recovered*	

Source: Own calculations based on Eurostat data (online data code: UNE_RT_Q)
Note: * in 2021-Q4

Annex 24.7 Descriptive statistics

	GDP	EMPL	NEETs
Mean	100.000	58.639	11.172
Median	88.875	58.900	10.600
Maximum	283.984	70.400	22.200
Minimum	43.229	42.900	3.900
Std. dev.	43.998	5.513	4.239
Skewness	2.240	−0.281	0.595
Kurtosis	9.395	2.463	2.601
Jarque-Bera	960.201	9.504	24.822
Probability	0.000	0.009	0.000
Sum	37800.000	22165.700	4223.200
Sum sq. dev.	729816.800	11460.280	6774.074
Observations	378	378	378

Source: Developed by the authors

Annex 24.8 Panel unit root test

	GDP	D(GDP)	NEETs	D(NEETs)	EMPL	D(EMPL)
Method	Statistic					
Panel unit root test: summary (first group of countries) Null: unit root (assumes common unit root process)						
Levin, Lin, and Chu t*	−0.776	−6.137***	−0.845	−6.772***	0.222	−6.494***
Null: unit root (assumes individual unit root process)						
Im, Pesaran, and Shin W-stat	0.971	−4.158***	−0.861	−5.917***	1.164	−4.846***
ADF-Fisher chi-square	17.264	48.738***	26.453	64.359***	13.514	55.266***
PP-Fisher chi-square	9.464	53.203***	20.771	81.751***	14.866	79.170***
Panel unit root test: summary (second group of countries) Null: unit root (assumes common unit root process)						
Levin, Lin, and Chu t*	−2.180	−6.387***	−1.032	−7.773***	0.299	−5.044***
Null: unit root (assumes individual unit root process)						
Im, Pesaran, and Shin W-stat	0.361	−5.238***	−0.436	−5.845***	0.439	−3.241***
ADF-Fisher chi-square	18.224	58.543***	19.550	63.969***	15.125	39.259**
PP-Fisher chi-square	11.480	59.580***	20.302	87.086***	13.139	44.748***
Panel unit root test: summary (third group of countries) Null: unit root (assumes common unit root process)						
Levin, Lin, and Chu t*	−0.050	−3.748***	−1.716	−4.599***	−2.158	−2.787**
Null: unit root (assumes individual unit root process)						
Im, Pesaran, and Shin W-stat	1.594	−4.013***	−0.957	−3.149***	−0.212	−2.318*
ADF-Fisher chi-square	10.253	46.942***	21.408	42.066**	27.983	31.624*
PP-Fisher chi-square	20.000	62.022***	15.098	43.519***	6.450	39.040**

Source: Developed by the authors
Note: * p-value ≤0.1, ** p-value ≤0.01, *** p-value ≤0.001

Annex 24.9 Panel cointegration test – Kao Residual Cointegration Test

Series: GDP NEETs EMPL		
Null hypothesis: no cointegration; trend assumption: no deterministic trend		
Automatic lag length selection based on SIC with a max lag of 2		
	t-Statistic	Prob
ADF first group	−1.067	0.143
ADF second group	−1.447	0.074
ADF third group	−1.965	0.025

Source: Developed by the authors

Annex 24.10 Estimation of the model parameters

The model with fixed effects (cross-section) (first group of countries)				
Dependent variable: GDP. Method: panel least squares. Sample (adjusted): 2009–2021. Periods included: 13. Cross-sections included: 9. Total panel (balanced) observations: 117				
Variable	Coefficient	Std. error	t-Statistic	Prob.
GDP(−1)	0.895	0.055	16.394	0.000
NEETs(−1)	−1.485	0.536	−2.771	0.007
EMPL(−1)	−0.781	0.364	−2.148	0.034
C	76.295	29.870	2.554	0.012
R-squared	0.992			
Adjusted R-squared	0.991			
Durbin-Watson stat	2.025			
The model with random effects (cross-section) (second group of countries)				
Dependent variable: GDP. Method: panel EGLS (cross-section random effects). Sample (adjusted): 2009–2021. Periods included: 13. Cross-sections included: 9. Total panel (balanced) observations: 117				
Variable	Coefficient	Std. error	t-Statistic	Prob.
GDP(−1)	0.923	0.027	34.362	0.000
NEETs(−1)	−0.179	0.097	−1.838	0.069
EMPL(−1)	−0.177	0.074	−2.379	0.019
C	18.789	5.504	3.414	0.001
Weighted statistics				
R-squared = 0.914	Adjusted R-squared = 0.912	Durbin-Watson stat = 1.546		
Unweighted statistics				
R-squared = 0.949		Durbin-Watson stat = 1.422		
The VECM coefficients and associated probabilities				
Dependent variable: D(GDP). Method: panel least squares. Sample (adjusted): 2011–2021. Periods included: 11. Cross-sections included: 9. Total panel (balanced) observations: 99				
	Coefficient	Prob.		
α1	−0.027	0.052		
α2	0.570	0.000		
α3	−0.153	0.081		
α4	0.172	0.406		
α5	0.060	0.765		
α6	0.062	0.777		
α7	−0.043	0.828		

Source: Developed by the authors

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Chapter 25
Investigating the Economic and Social Impact Induced by Electricity Prices

Constantin Marin, Cosmin-Octavian Cepoi, and Denisa Gabriela Grosu

Abstract We investigate the energy situation in Romania and the impact of the liberalization of energy prices on some key macroeconomic variables. The factors generating the energy crisis, especially the COVID-19 pandemic, do not seem to leave too much time for the governments to solve the energy and economic crisis. The effects of the growing interest rate will appear soon since the National Bank of Romania increased the monetary policy rate. The estimated results indicate that the electricity price index has a persistent impact on the prices of industrial production, which is an intuitive finding. However, the impact is more visible during episodes of high inflation.

Keywords Electricity price · Energy production · Exchange rate · Inflation rate · Quantile regression

25.1 Introduction

In 2021, the price of electricity exhibited record increases in almost all European Union countries, an increase that affected the economic recovery and thus eroded the net income of households. A number of geopolitical factors, among others, have contributed to this never-ending energy crisis, which is extremely concerning for authorities. Even though the EU is trying to reduce its long-term dependence on fossil fuels, renewable energy sources became for the first time the EU's main electricity engine in 2020. The changes were not widespread enough to offset the impact of the current crisis. Together, fossil fuels are providing more than a third of total production in EU countries.

The crisis situation, especially in the field of energy, brings to attention a topic that, lately, has been overlooked by decision-makers and the academic or specialist environment. On the contrary, the period of deflation has raised concerns about the

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Table 25.1 Energy consumption (Bitcoin 2018–2021)

Year	Estimated TWh per year	Minimum TWh per year
2018	62.52	40.10
2019	63.95	44.34
2020	70.29	49.13
2021	114.24	44.91

obstructive effects of weak price dynamics on economic growth. Globally, this stems from an imbalance between supply and demand, which can be explained by the following:

(a) The resumption of economic growth after the health crisis has experienced a slowdown.
(b) Increasing demand for energy and natural gas, the predominant source and for electricity production, the entry of Asia among large consumers.
(c) The structural increase of the electricity demand by.

- Orientation of domestic and industrial consumption for this type of energy.
- The emergence of new large consumers, such as cryptocurrency issuers, the electrification of the car fleet, and the replacement of other forms of energy with green energy in technological processes.

Only the issuance of cryptocurrencies (see Table 25.1) is a formidable consumer and tailored externalities, as experts estimate in terawatt-hour (TWh).

Despite skepticism or even opposition from free energy market participants, governments can and must generally intervene to prevent and treat speculative bubbles or serious market disturbances when they tend to disrupt the entire economic stability. Moreover, markets need to be redefined and reevaluated, given the long series of events that show that the power of some actors is being overused in manipulating the resource allocation mechanism.

In this chapter, we investigate the energy situation in Romania and the impact of the energy price on some key macroeconomic variables. Our contribution to the literature is threefold. First, we investigate the impact of the electricity price evolution and the policy responses given the pandemic period. Up to our knowledge, no other academic paper investigated a similar issue. Second, we capture the macroeconomic impact induced by the evolution of electricity price on exchange rate and industrial production. Third, we use the novel quantile regression approach to a hot topic such as energy price in European countries to capture some potential symmetric effects.

The rest of this chapter has the following structure: Sect. 25.2 presents the literature review; Sect. 25.3 illustrates the econometric approach. Section 25.4 is summarizing the findings, while Sect. 25.5 concludes this chapter.

25.2 Literature Review

All analyses of the market, its organization, and operations are based on the basic competitive model. In a synthetic formulation, it consists in the existence and functioning of the following pillars [6]:

(a) A rational consumer who pursues his own interest.
(b) Rational firms that seek to maximize their profits.
(c) Competitive markets.

The free price formation hypothesis is the cornerstone of economic thinking and practice. However, there are situations in which disturbances arise questioning the correctness of prices, the evolution of which alters the process of efficient distribution of resources and the living conditions of consumers, in the short or long term. Such disturbances lead to changes in relative prices, affecting aggregate demand and supply. Therefore, modern law upholds this statement, protects this principle, but does not neglect corrective action when and where circumstances require it or where specific conditions are likely to maintain regulations to ensure the stability of production and prices.

The energy price cap is useful for a limited time, and the essential condition is that the threshold level (PM) be as close as possible to the equilibrium price (PE) because, when the maximum price is higher than the equilibrium price ($PM > PE$), there is an excess of supply, and when it is below the equilibrium price ($PM < PE$), there is an excess of demand. In the case of the energy system, the equilibrium price tends to the level that also covers the cost of production necessary to ensure the balance of the system itself (see Fig. 25.1).

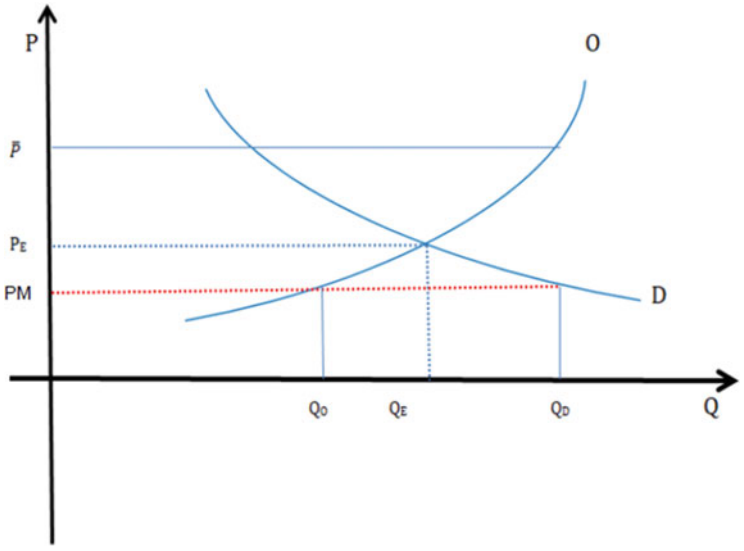

Fig. 25.1 Energy price cap mechanism

However, the general case must be adapted to the specificity of the field to which it applies. The field of electricity has a specific structure, and the final price relies on a mechanism similar to a system of locks, with cumulative influences from all stages. The first step is the production market with an oligopolistic structure, marked by high input capital costs, and with a structure that changes slowly, depending on the duration of the completion of investments. Next, it follows the retail supply market, which is easier to enter but which depends on the structure, number, and financial strength of the participants. The last level is the distribution market, whose operators have direct contact with consumers, but contractors are the suppliers.

The literature investigating the effectiveness of price capping is extremely scarce. Dnes et al. [2] investigated the legislation changes of the UK electricity system from a price-capping perspective. According to them, the abnormal returns are not a consequence of the information coming from authorities. Moreover, Eckenrod [3] studied the effect of price regulations on telecommunications industry. According to the reported results, the price markup increased moderately after price cap regulation.

Crowley and Meitzen [1] investigate the market impact among Canadian electricity distribution utilities. According to them, the price escalation declined annually after the price caps were introduced. Although these shifts are significant, they are not conclusive, especially given the short time horizon considered.

Finally, Milstein and Tishler [5] have studied the effects of capacity payments in competitive electricity markets. According to them, capacity payments improve the capacity, which mitigates the missing money issues and, at the same time, is sharply reducing the outage costs due to a price cap.

25.3 Methodology

We use quantile regression (QR) proposed by Koenker and Bassett [4] to examine the effects of electricity price at different intervals throughout the distribution of some important macroeconomic factors. Compared to other methods, QR is better at capturing the dependence structure among variables with asymmetrical distributions. Consider the variable Y with the following distribution function:

$$F(y) = Pr\,(Y \leq y) \tag{25.1}$$

In this context, for any quantile τ, the τ-th quantile of Y is defined as the inverse function:

$$Q(\tau) = \inf\ \{y : F(y) \geq \tau \tag{25.2}$$

where $\tau \in (0,1)$.

The conditional quantile function $Q\,(\tau \big| X = x) = X_i\,\beta(\tau)$ can be computed based on the algorithm given below:

$$\widehat{\beta}(\tau) = \arg\min_{\beta \in \mathbb{R}} \sum_{i=1}^{n} \rho_\tau (Y_i - X_i \beta)^2 \tag{25.3}$$

for any quantile τ. In Eq. 25.3, the term ρ_τ is the loss function defined by:

$$\rho_\tau(u) = u(\tau - I(u > 0)) \tag{25.4}$$

with I being an indicator function.

25.4 Analysis/Results' Interpretation

In what follows, we are going to present an overview of the energy situation in Romania. Regarding the structure of the energy generation capacity in 2021 (see Fig. 25.2), the main source is hydro (34%) that, along with nuclear energy (19%) and wind (11%), covers 64% of total energy production. This structure has two major advantages: on the one hand, it is close to the European Green label legislation, and on the other hand, it exhibits lower costs compared to other components. In this area, no factors have been identified that influence the dynamic of costs.

The increase in consumption in 2021 brings its level slightly above that of the year before the onset of the health crisis, the consumption necessities being covered by electricity generated in the country and a quasi-equilibrium regarding the import/export balance. It should be noted that the export of electricity from Romania to other European countries (especially Bulgaria) exhibited a pronounced upward trend

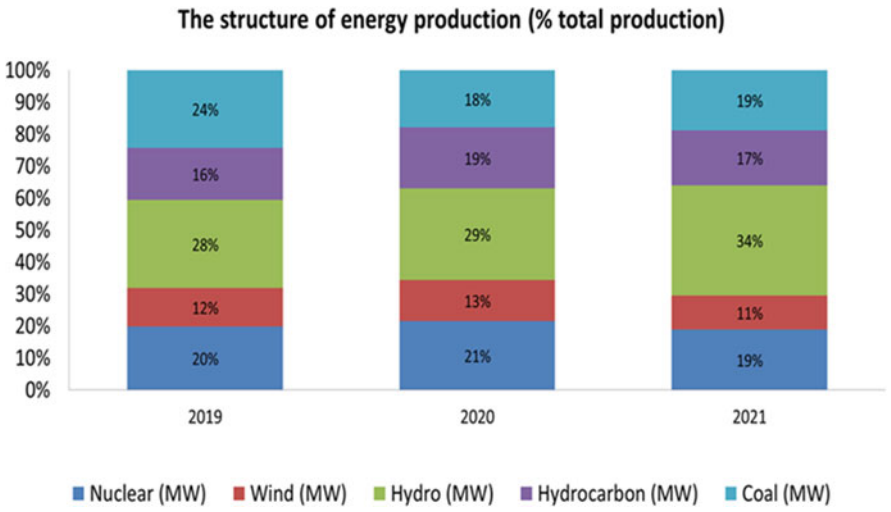

Fig. 25.2 Energy production statistics

Table 25.2 The structure of energy production in Romania

Factor	2019	2020		2021	
Factor	Yearly average (GWh)	Yearly average (GWh)	*Percentage change*	Yearly average (GWh)	*Percentage change*
Electricity consumption	4616	4457	−3.50%	4647	4.18%
Electricity exports	331	452	31.12%	652	36.62%
Electricity imports	458	685	40.33%	624	−9.24%

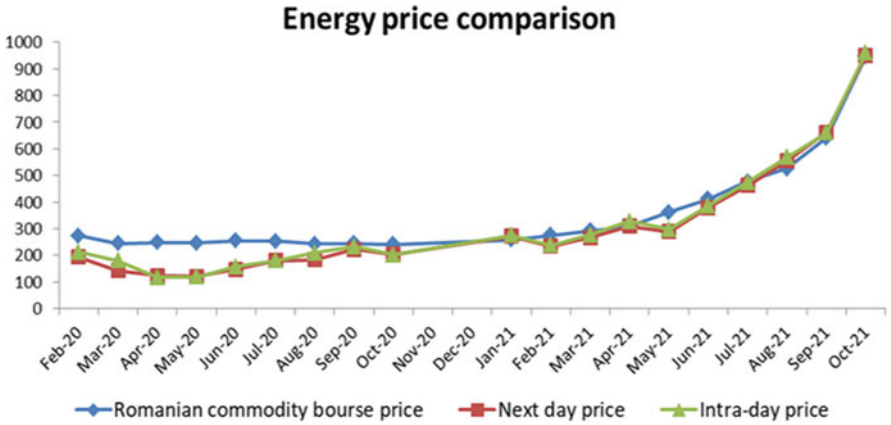

Fig. 25.3 Price comparisons

during the analyzed period. However, Romania continues to pay among the highest prices in the EU for imported electricity according to OPCOM[1] data (see Table 25.2 for details).

In the second half of 2021, electricity bills have risen sharply and prices will continue to rise. These movements arise in the context of the liberalization of the electricity market and geopolitical factors but also of the change in the functional structure of the market, in favor of short-term operations in specific markets, such as the intraday electricity market (IEM), next-day market (NDM), and the Romanian Commodities Exchange. All three forms of trade have a similar trend and will significantly influence the aggregate price of electricity. See Fig. 25.3 for additional details.

The price of electricity in the centralized market of bilateral electricity contracts with extended auction, with a fairly flat evolution in the last two and a half years, was accompanied by a downward but steady trend in volumes in the first half of 2021, in

[1] OPCOM is a subsidiary of the national electricity carrier, Transelectrica, which has the role of administrator of the electricity market, according to the provisions of the primary and secondary legislation in force. OPCOM was established in August 2000.

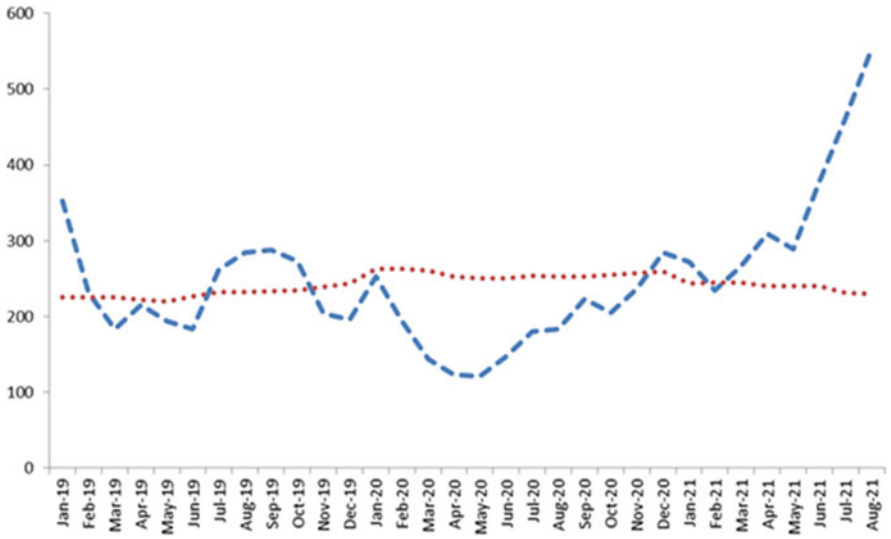

Fig. 25.4 Price for next day (blue) vs. price from extended auction (red)

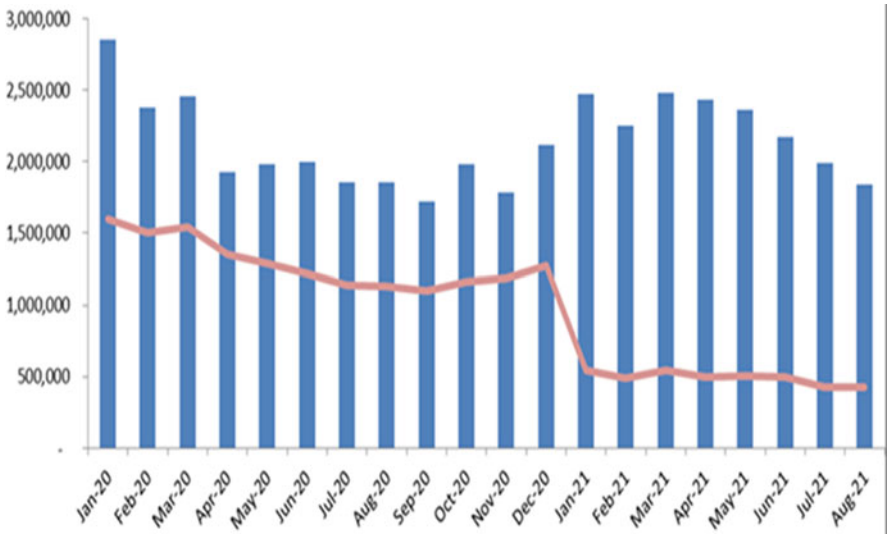

Fig. 25.5 Volume the next day (blue) vs. volume from extended auction (red)

contrast to the relatively increasing volumes in the markets for the next day (see Fig. 25.4).

In Fig. 25.5, we present a comparison regarding the volumes traded in the spot and forward markets.

The sharp decrease in the volumes of contracts with extended auctions relative to the volume from the next-day market leads to the conclusion that electricity suppliers

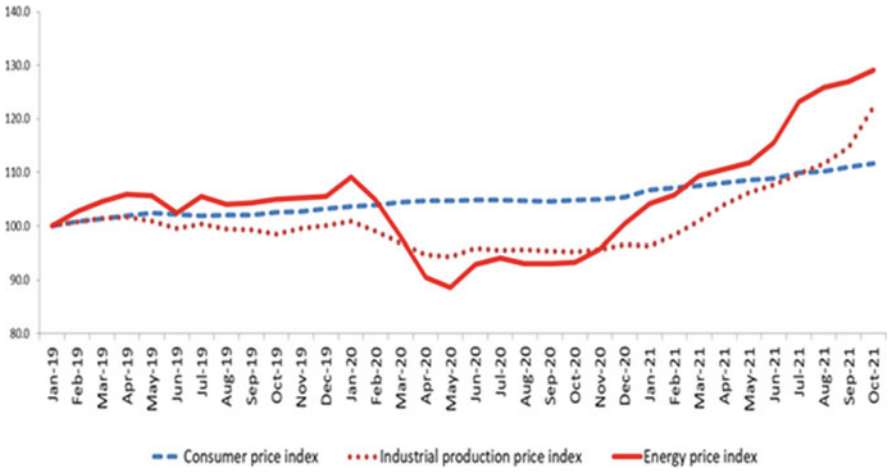

Fig. 25.6 Indexes comparison

Table 25.3 Granger causality test

Pairwise Granger causality	F-statistic	Prob.
Electricity price index (EPI) does not granger cause industrial production price index	1.8369	0.1819
Industrial production price index (IPPI) does not granger cause electricity price index does	2.9920	0.0700

have decreased their exposure to long-term contracts with producers, at lower prices, and have focused on short-term stock platforms with higher prices. Consequently, this type of behavior affects the price paid by the household consumer.

Moving forward, there are similar patterns between industrial production price indices and energy price index starting with January 2021 (see Fig. 25.6).

Additionally, the Granger causality test suggests, at 10% significance level, a unidirectional causality between industrial prices to energy prices, so there is statistical evidence linking the evolution of the spot market price for electricity to that of industrial production (see Table 25.3).

Figure 25.7 presents the estimates for a selection of five representative quantiles. We have monthly data during the 2018–2021 period, and the regression includes an intercept and the first lag in IPPI, which is the dependent variable. As we can see, the electricity price index exhibits a significant contemporary impact on industrial production price index regardless of the selected quantile.

The estimated results indicate that the electricity price index exhibits a persistent impact on the prices of industrial production, which is an intuitive finding. However, the impact is more pronounced during episodes of high inflation.

It is expected that the dynamics of production and supply of electricity and heat, gas, hot water, and air conditioning will be influenced by the evolution of the EUR/RON exchange rate (as a proxy for the dynamics of import/export). It can be

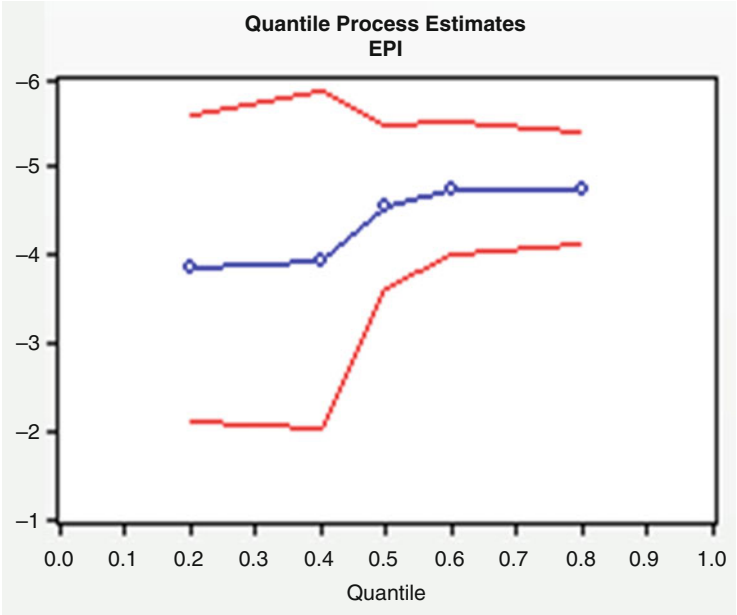

Fig. 25.7 Quantile regression coefficients for 20th, 40th, 50th, 60th, and 80th quantiles. E-views' calculations

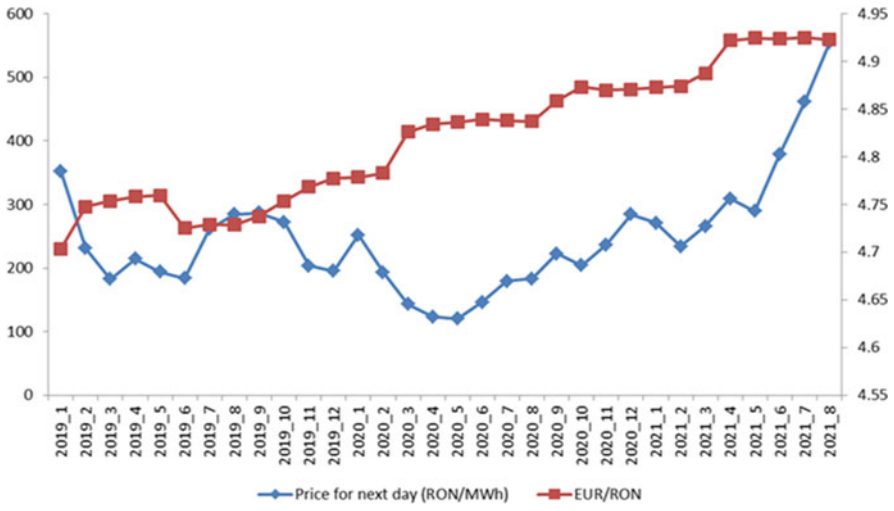

Fig. 25.8 Exchange rate vs. energy price

seen in Fig. 25.8 that in certain periods, at least in the first half of 2021, the depreciation of the national currency started simultaneously with a decrease in electricity production, most likely due to the increase in the price of raw materials purchased from imports (see Fig. 25.8).

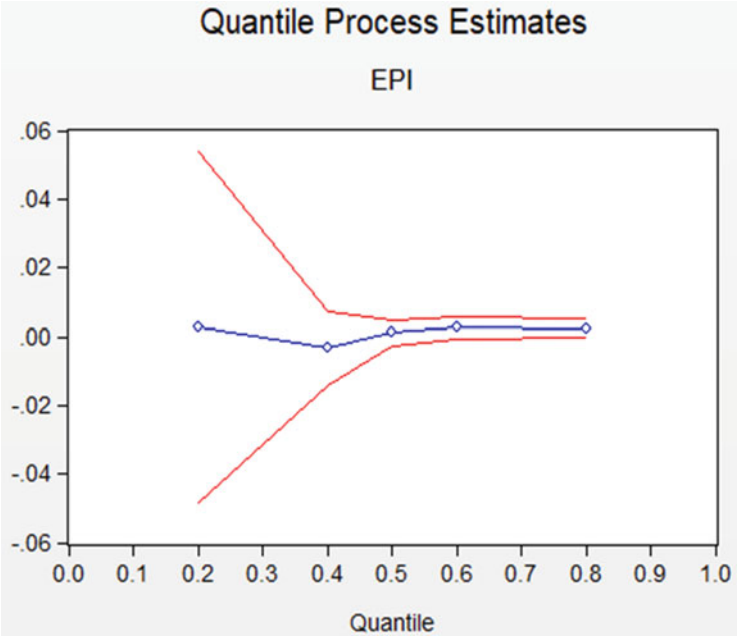

Fig. 25.9 Quantile regression coefficients for 20th, 40th, 50th, 60th, and 80th quantiles. E-views' calculations

In certain periods, such as the first half of 2021, the depreciation of the national currency started simultaneously with a decrease in electricity production, most likely due to the increase in the price of raw materials purchased from imports. A rather close correlation between the increase in price the price for next day and the depreciation of the EUR/RON exchange rate could show that, given the increase in the volume of transactions on interconnected markets, part of the increase in the domestic price of electricity also results from EUR/RON dynamic.

The quantile estimates presented in Fig. 25.9 indicate that the electricity price index exhibits a persistent impact on the exchange rate but only in the superior quantile, that is, when the exchange rate depreciation is very high. Indeed, the impact exhibited by energy prices on exchange rate is more pronounced during episodes of high depreciation of the national currency.

25.5 Conclusions

The energy system is a complex and multidimensional structured construction, which is revealed only in a multidisciplinary approach, as noted by reputable professionals and economists and some experienced specialists.

The present analysis is not seeking definitive and decisive conclusions. Its purpose is to examine, from an external point of view, accessible to all, issues that need clarification and resolution, in the face of major market failures, worrying about the consequences they have on the overall economic mechanism.

As reality shows, the factors generating the energy crisis, especially the COVID-19 pandemic, do not seem to leave too much time for the governments to solve the energy and economic crisis. The effects of the growing interest rate will appear soon since the National Bank of Romania increased the monetary policy rate. It should not be overlooked that in the European Union, the issue of prices and the applicable solutions must take into account the program of interventions to influence the structure of production, which in turn generates changes and constraints in policy making to mitigate the crisis.

In this chapter, we highlight the following findings that might be useful to policy makers:

(i) The structure of electricity generation capacity is in constant motion, nowadays the main source being hydro (34%) that, alongside nuclear energy (19%) and wind (11%), covers 64% of the total energy production.
(ii) The sharp decrease of the volumes for contracts with extended auctions relative to the volume from the next-day market indicates that electricity suppliers have decreased their exposure to long-term contracts with producers, at lower prices, and have focused on short-term stock platforms with higher prices.
(iii) The quantile regression estimates indicate that electricity price index exhibits a persistent impact on the prices of industrial production, which is more pronounced during episodes of high inflation.
(iv) The quantile estimates indicate that the electricity price index exhibits a persistent impact on the exchange rate but only at superior quantile, i.e., when the exchange rate depreciation is very high.

All in all, given the ongoing energy crises started in the mid of 2021, the European countries must examine the structures of the market in order to balance its levels and alleviate dependencies and asymmetries at these levels. With the industrial development and the long months of lockdown caused by the pandemic, the production activity resumed its practical activity everywhere, with a logical increase in energy requirements, which leads to higher prices. As a direct consequence of the rising cost of gas, electricity has also seen a sharp rise in price, as gas is one of the raw materials for the production of electricity. The first steps that can be taken at European level to reduce the burden of rising energy prices on the shoulders of consumers and businesses is to use the new own resources prepared by the European Commission. Finally, it will be necessary to identify whether there has been any manipulation of the European energy market in the last years and to ensure greater transparency in the future.

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Chapter 26
The Short Cycles of Labour Market Operation and Industrial Relations in Interwar Romania

Florin Marius Pavelescu

Abstract This chapter identifies the short cycles of labour market operation in interwar Romania considering the labour market disequilibria, changes of the labour legislation, the evolution of the forms of organization of employers and wage earners and the relations between labour market stakeholders and International Labour Organization (ILO). Some features of industrial relations in the context of short cycles of labour market are determined having in view the available statistical data related to the number of open and latent labour conflicts and their results. An econometric model proposed by the author reveals the modelling factors of the evolution of the number of the open labour conflicts. The use of an index of labour conflict results (ILCR) confirms the assumption that, during the interwar period, the labour conflicts tended to end with favourable results for the wage earners.

Keywords Labour legislation · Trade unions · Labour conflicts

26.1 Introduction

The interwar period represents for Romania an important stage of development of labour market. The respective time interval was marked by the important changes of the sectoral structure of the economy, on the one hand, and the implementation of social reforms, which sensibly altered the labour market operation, on the other hand. Therefore, the study of the interdependence between the features of labour market disequilibria and the evolution of industrial relations can give important learnings about the employers and wage earners behaviour in the context of a very complex economic and social environment.

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26.2 Literature Review

The concept of industrial relations implicitly occurred in the context of development of economic theory concerning the role of the institutional framework in the labour market operation. Brentano [4] was one of the first economists who revealed the role of the professional associations (guilds, trade unions) in the functioning of the market economy. During the last decade of the nineteenth century, in England, where the neoclassical approach dominated, S. Webb and B. Webb published in [19, 20] two books that revealed the importance of the trade union activities and the need of ensuring the power equilibrium between the stakeholders of the labour market, the employers and the wage earners. This way, the methodology of economic science was enlarged by including "the labour question" and, implicitly, the changes of the institutional framework among the most important research themes. In this context, even some neoclassical economists like A. Marshall[1] and A. C. Pigou[2] admitted the role played by institutional factors in the labour market operation.

During the 1890–1918 period, the impact of the labour market institutions in modelling the economic activities was also revealed by the G. Cassel and G. Bage, representative of Swedish economic school (cf. [7]), while the role of trade unionism and the changes of the labour legislation in the economic and social life was emphasized by the French authors L. Dupuit [6] and E. Levy [9]. Hence, at the eve of the World War 1, there were created favourable conditions for the definition of the concept of "industrial relations" and its implementation in the analysis of economic activity.

The explicit definition of the concept of "industrial relations" can be found in the early 1920 in the USA, with the essential contribution of J. Commons [5]. During the interwar period, the object of industrial relations was considered the study of all aspects of the employment relationship, i.e. management of labour, wage earners representation, implication of trade unions in wage bargaining and the role of state intervention in labour market operation (cf. [8]).

In these conditions, the study of different aspects of labour market operation and implicitly of the industrial relations extended worldwide. The respective evolution was essentially favoured by the establishment and development of the activity of the International Labour Organization in the framework of League of Nations [14]. This way, growing opportunities for the study of labour market operation and improvement of labour legislation occurred not only in developed countries but also in developing countries, like Romania.

[1] H. Gospel [8] considered that A. Marshall [10] implicitly defined the term "industrial relations" by revealing the role of trade unions and collective dealings in the development of industry.

[2] A. C. Pigou [13] remarked the role of the trade unions in imposing the level of minimum wage. He considered that the fixing of the minimum wage level in the context of the trade union pressures had a negative impact on the labour market operation by favouring the increase of the number of unemployed persons.

In the case of Romania, the official statistical data concerning the labour market disequilibria and some aspects of the industrial relations were published beginning in 1920. This situation creates favourable premises for the study of the interdependence between the labour market operation and the features of industrial relations during the interwar period.

26.3 Methodology

The methodology used in this chapter for the analysis of the interdependence between the labour market operation and the industrial relations in interwar Romania includes:

(a) **Emphasis of the main features of labour market disequilibria**.
(b) **Review of the changes of the institutional framework of the industrial relations**.
(c) **Presentation of evolution of the forms of organization of the employers and wage earners**.
(d) **Identification of the short cycles of the labour market operation**, considering the features of the labour market disequilibria, the changes of the institutional framework and the evolution of the forms of organization of employers and wage earners.
(e) **Emphasis of the features of the latent and open conflicts in the context of short cycles of the labour market operation**, revealed by the number of labour conflicts, the average number of participants, the degree of organization of participants and the average lost working days per participant to open labour conflict (strike).
(f) **Testing of an econometric model built to explain the evolution of the number of open labour conflicts (strikes)**.

We consider the number of the open labour conflicts (S) as dependent variable, while the number of latent labour conflicts (L) and the number of open conflicts in previous year (S(−1)) act as explanatory variables.

We firstly compute the correlation coefficients R(S;L) and R(S;S(−1)), where:

R(S;L) = correlation coefficient between S and L.
R(S;S(−1)) = correlation coefficient between S and S(−1).

Depending on the size of the respective coefficients, we determine the main explaining factor of the number of open labour conflicts.

Then, we estimate the following behavioural equations:

$$S = a_2 + b_2{}^{*}LC + c_2{}^{*}S(-1) \tag{26.1}$$

or

$$S = a_3 + b_3{}^{*}LC + c_3{}^{*}S(-1) + \text{DummyLL} \tag{26.2}$$

where:

DummyLL = dummy variable for particular years from the point of view of the labour law or other modelling factors of industrial relations.

The use of a dummy variable is recommended when we consider that the coefficient of determination related to behavioural Eq. 26.1 is too low. If the adding of a dummy variable in the behavioural equation determinates an increase of the adjusted coefficient of determination, we can conclude that the years covered by the respective variable were particular ones for the labour conflicts and/or labour legislation.

The estimated parameters b_2 and b_3 may be considered as indicators of the escalation of labour conflicts, while the estimated parameters b_2 and b_3 act as indicators of the confrontation tradition between the wage earners and employers.

(g) **Analysis of the labour conflict results considering an index (ILCR)** proposed by the author and defined by the formula:

$$\text{ILCR} = 1,5{}^{*}\text{gAPVWE} + \text{gCOMPR} + 0,5{}^{*}\text{gAPVE} \tag{26.3}$$

where:

gAPVWE = share of the labour conflicts ended with admission of wage earners' point of view in the total number of labour conflicts,

gCOMPR = share of the labour conflicts ended with a compromise between the points of view of wage earners and employers in the total number of the labour conflicts,

gAPVE = share of the labour conflicts ended with admission of employers' point of view in the total number of labour conflicts.

We note that gAPVWE + gCOMPR + gAPVP = *1*.

ILCR may be computed both in case of latent and open labour conflicts (strikes).

If ILCR>1, we consider that the results of the labour conflicts tended to be favourable for the wage earners.

If ILCR <1, we consider that the results of the labour conflicts tended to be favourable for the employers.

The data used in order to implement the proposed research methodology are extracted from the books and articles dedicated to the history of the interwar period written both by Romanian and foreign authors, on the one hand, and from the interwar Romanian Statistical Yearbook, on the other hand.

26.4 Analysis/Results Interpretation

26.4.1 Features of the Labour Market Disequilibria in Romania During the 1919–1939 Period

Between 1919 and 1939, the labour market disequilibria were mainly determined by the economic situation and by the labour demand generated by industry and other non-agrarian economic activities. Thus, **during the 1919 – 1926 period**, in the context of a fast economic growth[3], the unemployment was not an important economic and social problem. It is not unneglectable that some industrial activities face some consumer goods and labour shortages in the first part of the analysed time interval. **Over 1927 – 1929 time interval** the number of the unemployed persons sensibly grew as an outcome of the labour demand that diminished in some industrial activities.[4] Also, the agricultural production was unstable. Consequently, the unemployment became a social problem that could not be ignored by the public authorities. **During the 1930 – 1932 period**, Romania, like many other European countries, was confronted with economic crisis and sharp decrease of the labour demand. Consequently, the number of the unemployed persons continued to increase, and important pressures for the decrease of the level of the wages occurred. **During the 1933 – 1935 period,** the economic activity vigorously relaunched and led to the decrease of the number of unemployed persons. **During the 1936 – 1939 period,** the rate of economic growth was moderate, while the unemployment diminished and became structural.

26.4.2 The Changes of the Institutional Framework of Industrial Relations

Between 1919 and 1939, the labour market institutional framework experienced significant changes [11]. The main factors that generated respective changes were (a) structural changes of the economy, (b) relationships between Romania and the international organizations, (c) consolidation of labour law concepts in the context of the social policy [2] and (d) ideological orientation of government authorities.

[3] If we consider the data presented by V. Axenciuc [1], we can estimate that the rate of growth of gross domestic propduct was 7.72% between 1920 and 1926, 2.08% between 1926 and 1929, – 1.77% between 1929 and 1932, 4.15% between 1932 and 1935 and 2.47% between 1935 and 1939.

[4] Romanian public authorities began to publish, from 1928, statistical data concerning the unemployment. The average monthly number of the unemployed persons officially registered was 10,535 in 1928, 7449 in 1929, 38,958 in 1932, 13,778 in 1935 and 7268 in 1938. The above-mentioned figures reveal mainly the jobless active persons from the urban areas. We have not ignore that, during the interwar period, about 80% of active population was employed in the agriculture, where the underemployment phenomenon was largely manifested.

Therefore, the impressive development of industrial activities generated the increase of the labour demand so that the industrial relations became more and more an important modelling factor of the performances of the economic agents.

Romania's quality of founding member of International Labour Organization (ILO)[5] has favoured the implementation of a series of reforms concerning the labour market operation and modernization of industrial relations. Under these conditions, during the 1920–1928 period, when the political life was dominated by the National Liberal Party, the most important changes of the institutional framework concerning the industrial relations were:

(a) **The establishment of the Ministry of Labour and Social Protection** (March 1920), which took some of the attributes of the Ministry of Interior concerning the labour relations, social protection and public health. This way, the implementation of the ILO international conventions and recommendations was favoured [14]. Also, the public authorities could better analyse the labour market operation and adopt measures in order to diminish the social tensions.
(b) **The adoption of the law on labour conflicts** (October 1920).
(c) **The adoption of the professional trade unions** (May 1921).
(d) **The adoption of the law on juridical persons** (February 1924).

The National Peasants' Party governments tried to implement important economic and social reforms that imposed changes of the labour legislation. In April 1929, the Parliament adopted **the law on labour contracts,** which modified and better defined the content of individual, apprenticeship and collective labour contracts. In August 1929, a **new law on the organization of the ministries** was adopted. This normative act enlarged the Ministry of Labour power to intervene in the industrial relations.

In October 1932, the Parliament adopted the **law on Chambers of Labour**, which had some corporatist provisions. The respective bodies were designed to protect the interests of wage earners from private firms, civil servants and craftsmen.

During the 1934–1937 period, the corporatist orientation dominated the changes of industrial relations legislation. In August 1936, the Parliament adopted **the law on the Higher Economic Council and Professional Chambers**, with provisions that

[5] During the first interwar decade, the relationships between Romania and ILO were very good. Romanian governments have transposed some ILO conventions into the national legislation. Also, an important number of official persons and university professors developed an extensive collaboration with ILO. These facts were revealed in I. Răducanu et al. [16] and Gh. Tașcă et al. [17]. The peak of the cooperation between Romania and ILO could be observed during the goverments formed by National Peasants' Party between 1928 and 1931 and 1932 and 1933. An expression of this extended cooperation was the adoption of the law on social assurence in 1933 with the large techical support of the ILO experts (cf. [15]). The relationships between Romania and ILO contiuned to be maintained during the second half of 1930s, even in the context of changes of the labour legislation inspired by corporatist orientation. We note that the decree-law adopted in August 1936 for the reorganization of the Ministry of Labour mentioned that one of the attributes of the respective ministry was the implementation of the international conventions concerning the labour legislation.

sensibly favoured the state intervention in economic activities and the extension of the role of Chambers of Labour in the labour market operation. In March 1937, two laws, with an impact on the industrial relations, were adopted: i.e.: (a) **the law for the development of agriculture**, which had provisions concerning the relationships between the rural employers and wage earners, and (b) **the law on the labour for the public utility,** designed to reduce the level of intellectual unemployment and its negative impact on the urban labour market.

During the 1938–1939 time interval, under the conditions of an authoritarian monarchic political regime, the institutional framework was dramatically changed. In October 1938, the traditional trade unions were dissolved. In the same time, **a law on the establishment and operation of the guilds of workers, private clerks and craftsmen** was implemented. The respective law was clearly inspired by the corporatist doctrine. The guilds were professional associations that grouped both employers, wage earners and private clerks and had the exclusive right to sign collective labour contracts and represent the interests of their members. Also, the new institutional framework imposed important constraints on the cooperation between the guilds and the international organizations.

26.4.3 The Evolution of the Forms of Organization of the Main Stakeholders of Industrial Relations

Another modelling factor of the industrial relations during the analysed time interval was the evolution of forms of organization of the main stakeholders (wage earners and employers).

The favourable premises for the development of industrial activities acted as a stimulus for the development of employers' associations. Thus, the General Union of Romanian Industrialists (UGIR), founded in 1903 in the Old Kingdom extended its activities in all regions of the country. In March 1922, all the employers' associations from great industry were united under the umbrella of UGIR. The year 1922 marked the consolidation of UGIR from organisational point of view. In May 1923, the representatives of UGIR have presented the objectives of the respective employers' association to Romania's government. With this occasion, a cooperation between the public authorities and UGIR was initiated [3]. From 1924, UGIR became member of ILO and contributed to the extension of cooperation between Romania and the respective international organization. Also, indirectly, UGIR favoured the implementation of the ILO international conventions. During the 1924–1938 period, UGIR presented to the public authorities its views concerning the changes of taxes, the monetary stabilization, encouragement of the local industry, the establishment of the Higher Economic Council, etc.

We can also distinguish stages in the evolution of the trade unions as main form of organization of wage earners. The 1919–1920 time interval was a particular one for the trade unions' movement. In the context of the shortages of essential consumer

goods, high inflation, increased expectation of large social categories and unstable external environment, the trade unions have organized many revendicative actions. During the 1921–1922 period, important steps towards the unification of the trade unions in a single confederation were undertaken. This objective has been achieved in June 1922, through the establishment of the General Council of Trade Unions (CGS). In the second half of 1922 and the first part of 1923, the frictions manifested in the framework of trade unions' movement led to the division of CGS into two rival confederations, namely, the General Confederation of Labour (CGM) and the General Council of Unitary Trade Unions (CGSU).

CGM had a social democratic orientation and was affiliated to the International Federation of Trade Unions, established at Amsterdam in 1919. The above-mentioned confederation supported an extended cooperation with ILO and the implementation of ILO international conventions. CGSU was officially independent, but practically its actions were largely influenced by the directives of Red International of Labour Unions created in 1921 at Moscow.

CGM and CGSU dominated the trade unions' movement in interwar Romania. During the analysed period, some political forces (far right movements and National Peasants' Party) attempted to organize wage earner trade unions in order to enlarge their electoral support.

26.4.4 The Short Cycles of Labour Market During the Interwar Period

If we firstly consider the features of the labour market disequilibria and then the stages of evolution of the organization forms of the wage earners and employers, we can distinguish six short cycles of the industrial relations, i.e.: (a) 1919–1920, (b) 1921–1922, (c) 1923–1926, (d) 1927–1929, (e) 1930–1932, (f) 1933–1935 and (g) 1936–1939. The respective cycles are very near to Kitchin cycles of Romanian interwar economy.[6] During the 1919–1929 period, in the context of three Kitchin cycles we deal with four short cycles of labour market, mainly determinated by the stages of evolution of the forms of organization of the wage earners and employers.

[6]F. M. Pavelescu [12] identifies six Kitchin of Romanian interwar economy, that is, 1919–1921, 1922–1925, 1926–1929, 1930–1932, 1933–1935, and 1936–1939.

26.4.5 The Features of Labour Conflicts in the Context of Short Cycles of Labour Market

If we consider 1920 as an outlier,[7] the official statistical data reveal that during the 1920s, the number of latent labour conflicts tended to decrease. Therefore, the yearly average of the respective indicator was 878.5 during the 1921–1922 period, 296.3 during the 1923–1926 period and 160.3 during the 1927–1929 period (Table 26.1). We note that the average number of participants per latent labour conflict grew, revealing that the number of participants decreased slowly in comparison to the number of conflicts.

During the 1930–1932 period, when the economic crisis caused the intensification of social tensions, the number of latent conflicts increased in the context of the number of participants. The relaunch of economic growth during the 1933–1939 period was accompanied by the increase of number of latent labour conflicts and the number of participants. The degree of organisation of the participants tended to decrease during the 1930–1935 period.

The number of open labour conflicts was sensibly lower compared to latent ones. They decreased during the 1920s, in the context of economic growth and important

Table 26.1 Indicators of latent labour conflicts during the 1920–1939 period

Period	Average yearly number of latent conflicts	Average number of participants per latent conflict	Degree of organization of participants (%)
1920	123.0	66.5	71.6
1921–1922	878.5	57.6	77.3
1923–1926	296.0	236.7	74.0
1927–1929	160.3	377.6	62.6
1930–1932	187.3	221.6	60.4
1933–1935	204.7	240.3	57.6
1936–1939	242.8	261.2	71.7
1921–1939	296.9	243.4	67.3

Own calculations based on the data from Romanian Statistical Yearbook

[7] In 1920, according to the official statistical data, there were registered 580 strikes with 116,091 participants and 1,702,242 lost working days. The number of latent labour conflicts was 123 with 8181 participants. In October 1920, the trade unions, influenced by Socialist Party, organized a general strike in industry and transportations. The above-mentioned year is a special one from the point of view of the number of open labour conflicts. During the 1921–1939 period, the yearly number of the respective type of labour conflicts was lower than 200, the number of participants was lower than 31,000, while the number of lost working days was lower than 390,000.

Another particular feature of 1920 year is the small number of the latent labour conflicts and of the participants. During the 1921–1939 period, the yearly number of the latent conflicts was higher than 140, while the number of participants was higher than 20,200.

Table 26.2 Indicators of open labour conflicts (strikes) during the 1920–1939 period

Period	Average yearly number of open conflicts (strikes)	Average number of participants per open conflict	Degree of organization of participants (%)	Average number of lost working days per participant
1920	580.0	200.2	60.9	14.7
1921–1922	133.5	115.8	78.0	11.0
1923–1926	87.8	202.4	68.6	15.5
1927–1929	76.0	184.3	59.8	10.2
1930–1932	90.7	168.5	49.6	10.9
1933–1935	95.0	162.1	39.9	15.6
1936–1939	49.8	150.2	54.2	10.7
1921–1939	79.1	167.7	57.6	12.3

Own calculations based on the data from Romanian Statistical Yearbook

changes of the labour market disequilibria. The average yearly number of open labour conflicts was 133.5 during the 1921–1992 period, 87.8 during the 1923–1926 period and 76.0 during the 1927–1929 period (Table 26.2). The analysed indicator increased during the economic crisis (1930–1932) but also during the 1933–1935 time interval, when the economic growth was robust. The number of open labour conflicts sensibly diminished between 1935 and 1939, when the rate of economic growth was slower and changes of the labour legislation were made in a corporatist vision.

The average number of participants per open labour conflict tended to increase between 1922 and 1926 and diminished constantly during the 1927–1939 period. The respective indicator was lower in comparison to the average number of participants to latent labour conflicts, with the exception of the 1920–1922 period.

As a rule, the degree of organisation of the participants in case of the open labour conflicts was lower compared to the case of latent conflicts, with the exception of 1921–1922 time interval.

The average lost working days per participant to open labour conflict have correlated in a certain measure with the features of economic situation. Therefore, the respective indicator was higher than 15, when the economic activity relaunched, and was lower than 11 when the unemployment was a problem that cannot be ignored. In other words, the length of open labour conflicts depended on the capacity of resistance of the participants to protests. The exception from the above mentioned rule are as follows: (a) 1920 year, when the higher number of the lost working days per participant to open labour conflict is an outcome of a very tensioned social situation, and (b) the 1936–1939 time interval, when the lower size of the considered indicator was caused by a certain economic and social stability and by the labour legislation changes that discouraged the occurrence of the open labour conflicts.

Because we have considered 1920 as an outlier, we estimated the econometric model described by the behavioural Eqs. 26.1 and 26.2 for the 1922–1939 period.

We obtained

$$R(S;LC) = 0,7070$$

$$R(S,S(-1) = 0.3710$$

$$S = 22.2404 + 0.1119^{*}LC + 0.2926^{*}S(-1)$$

$$(1.3256) \qquad (3.8859) \qquad (1.5677)$$

$$R^2 = 0.5702 \; R^2{}_{adj} = 0.5129$$

N.B.: The statistics of Student's t-test are presented in the brackets.

where

R^2 = coefficient of determination.
$R^2{}_{adj}$ = adjusted coefficient of determination

We have considered that the coefficient of determination was relatively low, equal to 0.5702. In this situation, we used a dummy variable for 1938 and 1939, when the labour legislation was essentially influenced by corporatist orientation. The new behavioural equation is:

$$S = 47.7608 + 0.1134^{*}LC + 0.0712^{*}S(-1) - 58.7153^{*}dummy_{(1938,1939)}$$
$$(3.4448) \quad (5.5305) \qquad (0.4900) \qquad (-3.9456)$$

$$R^2 = 0.7965 \; R^2{}_{adj} = 0.7529$$

The addition of a dummy variable contributed to the sensible increase not only of the coefficient of determination but also of the adjusted coefficient of determination. In this context, we may consider that the proposed econometric model explains very well the dynamics of the open labour conflicts during the analysed period.

Hence, we can conclude that the number of open labour conflicts (strikes) was higher correlated with the number of latent labour conflicts and relatively low correlated with the number of open conflicts registered during the previous year. In other words, the open labour conflicts were mainly influenced by the present economic situation and only secondary by the history of industrial relations. In the same time, the econometric model confirms that the 1938–1939 time interval is a particular one from the point of view of the interwar industrial relations.

We remark that the rate of escalation of the labour conflicts was relatively low, about 11%. This situation supports the assumption that the latent labour conflicts tended to end with favourable results for wage earners. The above-mentioned assumption is in line with V. Vasile [18], which shows that interwar economic analysts concluded that most often, the labour conflicts ended with the acceptance of the wage earners revendications. The respective assumption can be once again validated by sizes of ILCR.

Table 26.3 Indicators of the results of latent labour conflicts during the 1920–1939 period (%)

Period	gAPVWE	gCOMPR	gAPVE	ILCR
1920	67.5	20.3	12.2	127.6
1921–1922	42.8	40.4	16.9	117.9
1923–1926	49.5	33.5	17.0	116.3
1927–1929	26.8	44.7	28.5	99.2
1930–1932	43.7	31.7	24.6	109.5
1933–1935	60.0	22.0	17.9	121.0
1936–1939	61.0	18.8	20.2	120.4
1921–1939	48.4	30.8	20.8	113.8

Own calculations based on the data from Romanian Statistical Yearbook

Table 26.4 Indicators of the results of open labour conflicts (strikes) during the 1920–1939 period

Period	gAPVWE	gCOMPR	gAPVE	ILCR
1920	11.0	16.9	72.1	69.45
1921–1922	49.2	27.2	23.7	112.8
1923–1926	45.1	33.3	21.7	95.5
1927–1929	33.3	35.8	30.9	101.0
1930–1932	26.2	40.2	33.6	104.0
1933–1935	44.0	23.1	32.9	112.0
1921–1939	41.7	32.3	26.0	107.8

Own calculations based on the data from Romanian Statistical Yearbook

In the case of the latent labour conflicts, the average ILCR over the 1921–1939 period is 113.8% (Table 26.3). The indicator tended to take higher values when the economic growth was manifested and the number of unemployed persons was relatively low.

In the case of open labour conflicts, the size of ILCR tended to be lower compared to the latent labour conflicts (Table 26.4).

The exception from the rule was registered during the 1927–1929 period, when the results of the latent labour conflicts appeared to be favourable for the employers, while the results of the open conflicts appeared as favourable for the wage earners. The respective time interval was marked by the change of the type of labour market disequilibria and also by the decrease in the number of labour conflicts and the degree of organization of the participants.

26.5 Conclusions

The public authorities of interwar Romania have implemented economic and social reforms, which sensibly influenced the industrial relations. The forms of organization of the employers and wage earners have differently evolved. The employers' associations from great industry have been unified since 1922, while the trade unions' movement remained divided from 1923 till its dissolution and establishment of guilds in 1938. The industrial relations were also influenced by the short cycles of the labour market operation.

The analysis of the correlations of some indicators of the industrial relations (number of latent and open labour conflicts, number of the participants to labour conflicts and their degree of organization) shows a low degree of escalation of latent conflicts in open ones and a relatively weak tradition of confrontation between wage earners and employers. In many cases, the labour conflicts were over with the acceptance of the points of view of the wage earners. Also, for the wage earners, the results of the latent labour conflicts appeared to be more favourable in comparison to the open ones.

The constraints imposed to the size of a paper presented to a scientific conference caused some limitation of the research. Therefore, we have not analysed the correlations between the number of the labour conflicts, the number of participants and their degree of organization. Also the equilibrium level of the number of latent and open conflict is not determined. These problems could be investigated in further researches.

The study of the role played by the institutional framework in shaping industrial relations can be extended by revealing the interdependencies between the results of labour disputes and the dynamics of the average wage in the entire economy and the most important economic branches. The relationship between the ways of resolving and the results of the labour conflicts could be another interesting research topic.

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Chapter 27
Urbanization and the Crisis of Natural Resources in the Context of Sustainable Development

Laurențiu Ciornei

Abstract By 2050, it is estimated that more than two-thirds of the world's population will live in urban areas, with an annual increase in urban population of over 70 million people. Currently, it is known that more than 60% of natural resources are consumed by the urban environment, while producing more than 70% of global emissions.

Living space has increased, to the detriment of the natural environment. Also, the resource consumption has increased. Urbanization will continue to lead in increasing of demand for resources. In these circumstances, maintaining environmental conditions in life-friendly parameters is becoming increasingly difficult. Thus, reducing the gap between urban and rural areas, even if it is included in the 2030 Agenda as a major goal to be achieved in this decade, will be difficult to achieve, in a context in which crises have become increasingly urban.

In Romania, the living space has increased in the last three decades, while increasing the consumption of resources needed for heating because over 50% of households continue to depend on firewood. Many studies have been carried out on the firewood consumption, but the results are different and do not correspond to NIS statistics. In such a context, the current study aimed at conducting several econometric analyses, in order to confirm/reject the official statistics and demonstrate the general impact on the environment and on sustainable development.

The results indicate that the actual statistics on firewood consumption could be different from those taken by NIS, case being also suggested by NFI (II) results. This could be explained by the informal forest economy.

Keywords Urban environment · Firewood · Sustainable development · Crisis of natural resources · Forest economy

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27.1 Introduction

The exponential growth of the urban population is evident, especially in the last decades, because of several causes, of which the internal migration has had and continues to play a decisive role. The migration of the population from rural to urban areas is a common phenomenon, especially in the countries in the process of industrialization, although there is also the reverse flow, from urban to rural, especially in the case of developed countries. Ernst Georg Ravenstein's[1] theory seems to explain the causes of migration in the twenty-first century, as the urban population continues to migrate less than the rural population, so that the world's cities have become increasingly crowded and polluted, in recent decades. Since 2007, the rural population has been surpassed by the urban population, the growth trend being relatively constant (the number of urban inhabitants increasing by almost 73 million every year), the United Nations forecasts for 2050 exceeding the two-thirds of the world's population [7, 8].

In such a context, the need for living space has increased, which is reflected in urban sprawl to the detriment of the natural environment and increased consumption of energy resources. According to the study carried out by Mahtta and his collaborators,[2] by means of remote sensing, on a sample of 478 cities with a population of more than one million inhabitants, five typologies of urban growth were identified: stabilized and external. Outward budding is the dominant typology worldwide, on the largest total area, although a more precise and comprehensive characterization would include a combination of the five typologies [3].

The link between urban sprawl and the environment refers to the increase in resource consumption, with green energy becoming one of the major concerns of many specialists in these conditions. Numerous scientific studies aim to find the most efficient and environmentally friendly energy resources, depending on the geographical position of urban settlements, so as to reduce the consumption of natural resources. Other scientific research aims to find out the factors that determine energy consumption, at a much higher level of granularity, reaching even the way the land is used. In this sense, according to the study developed by Frishcosi and his collaborators, the mass of different fuels used in the urban area and the total amount of energy released depend on the way the land is used (with residential, commercial, business constructions, etc.); this has a decisive role to play in the type and amount of fuel used per capita [2].

However, there are many underdeveloped countries or developing or even developed countries where slum dwellers on the suburbs of large urban areas are strictly concerned with survival; in such case, the illegal exploitation of natural resources is the most convenient solution but which threatens future generations.

[1] Ernst Georg Ravenstein (1834–1913) is a German-English geographer and cartographer who was concerned with developing a theory to describe the causes of population migration.

[2] https://iopscience.iop.org/article/10.1088/1748-9326/ab59bf

In Romania, about 90% of rural households and 15% of urban households (over 50% of Romanian households) continue to be heated mainly with firewood, too, in inefficient stoves, with incomplete combustion, without particulate filters [5]. According to NIS, this results in an annual consumption of firewood of about 6.5 million cubic meters (at the end of 2020), but, according to the results of NFI (II) – Romanian Second National Forest Inventory, the amount of wood harvested is double that declared in the data statistics. According to a scientific study conducted by Laura Bouriaud,[3] annual firewood consumption is estimated to range from eight million cubic meters (2001) and 16 million cubic meters (2010), based on a survey in which 526 households and 25 wood intermediaries were interviewed. The same study concludes that the firewood market is largely informal (gray or black market). Other studies, while promoting other results, converge on the idea that official statistics are far from reality.

Based on these premises and the fact that the Romanian living space has increased in the last three decades, this study aims to perform analysis to confirm/reject the informal exploitation of wood in our country and to draw conclusions about the potential impact on the environment and on achieving the assumed sustainable development goals.

27.2 Study Area

The study area refers to the Romanian urban environment in which, officially, more than half of the country's population lives (see Fig. 27.1).

Romania occupies the central-south-eastern position of Europe (45°N, 25°E), the latitudinal extension of the country's territory being almost 5°, while the longitudinal dimension extending about 10°.

The share of the main landforms is approximately equal (30% plains, 35% hills and plateaus, and 35% mountains), and the total area is over 238 thousand km^2. The climate is temperate-continental, the Carpathian-Danubian-Pontic climate with four seasons being marked by different influences from east, southwest, west, and northwest. The thermal difference between the eastern and western extremities is 1°Celsius, while the temperature differences between south and north are over 3 °C. In fact, there are differences in temperature between the rural area, which is less dense, and the urban area, which is much more crowded, as well as between the localities, depending on the relief forms on which they are located.

Officially, the population exceeds 19 million inhabitants, but, according to estimates, the number of inhabitants is lower, unofficially, as a result of those who work abroad but continue to live in the country. Officially, the urban population exceeded 54% of the total in 2020, but the unofficial data are higher, as a result of the

[3] https://businessdocbox.com/Forestry/119633097-Scientific-report-on-implementing-the-project-for-the-first-reporting-period.html

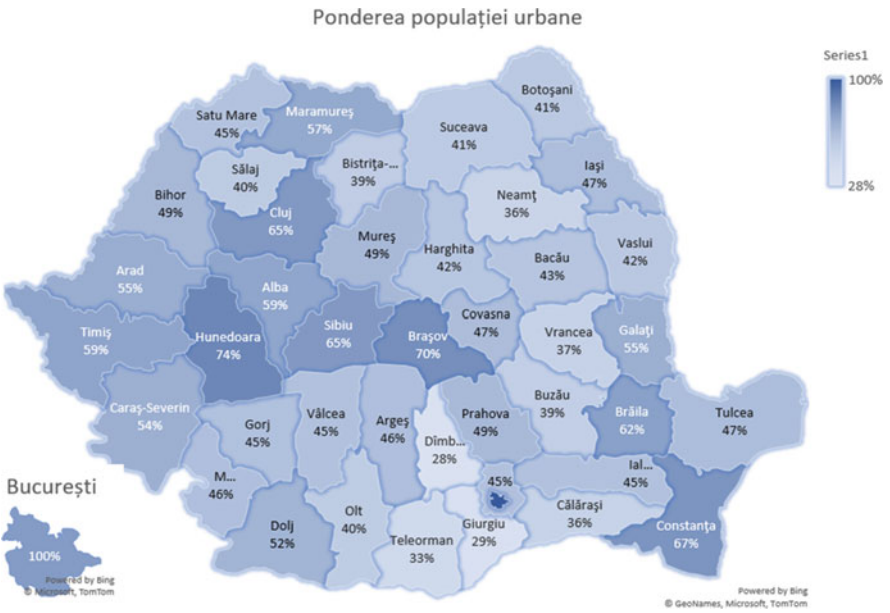

Fig. 27.1 The share of the urban population – the structure by counties. (Source: Own processing based on NISSE statistical data [POP105A])

Fig. 27.2 Left: traditional house. Right: contemporary house. (Source: Author's own processing)

population residing in rural areas who have both home and work in urban areas. This has led to an increase in urban living space, driven in particular by urban growth by budding on the outside as well as up and out (especially residential, business, and commercial/storage areas). Moreover, urban growth in Romania has been achieved by replacing traditional architecture (see Fig. 27.2), characterized by houses with a specific local specificity and small developed areas, with contemporary architecture, often chaotic and oversized, in disagreement with local traditions and the number of people living in the household.

Finally, the urbanization in Romania was accentuated in the rural environment as well, by not preserving the existing plot, not protecting the existing vegetal elements, and replacing them under the current real estate pressure. The peasant houses were demolished; in very few situations, it was decided to rehabilitate or convert the existing ones. Because the historical housing typologies were not encouraged by the institutions with specific responsibilities, the rural living space, out of the desire to adapt to modern needs, was not adapted to the local conditions. Thus, forms and construction materials inappropriate to the area in which the houses were developed were used, without adapting to the local conditions of climate, relief, cardinal points, and a series of elements related to the framing in the landscape. The cultural landscape in the countryside has been damaged, and the current architecture reflects a mix between traditional, modern, and kitsch, contrary to the steps initiated by the Romanian Order of Architects, which advocates for sustainable development, the perpetuation of specific characteristics that could determine the uniqueness of areas, and the construction of living space with respect for the natural landscape and local architecture.

The brutal replacements of the traditional living space, the modernization of the existing buildings in disagreement with the local specifics, with the affectation of the cultural heritage and the vertical constructions have determined the habitable surface in Romania to increase by over 77% in the last three decades (see Fig. 27.3).

Given that the average winter temperatures are −2.9 °C and half a year the homes must be heated, at least (for those located in the mountain area, heating is necessary

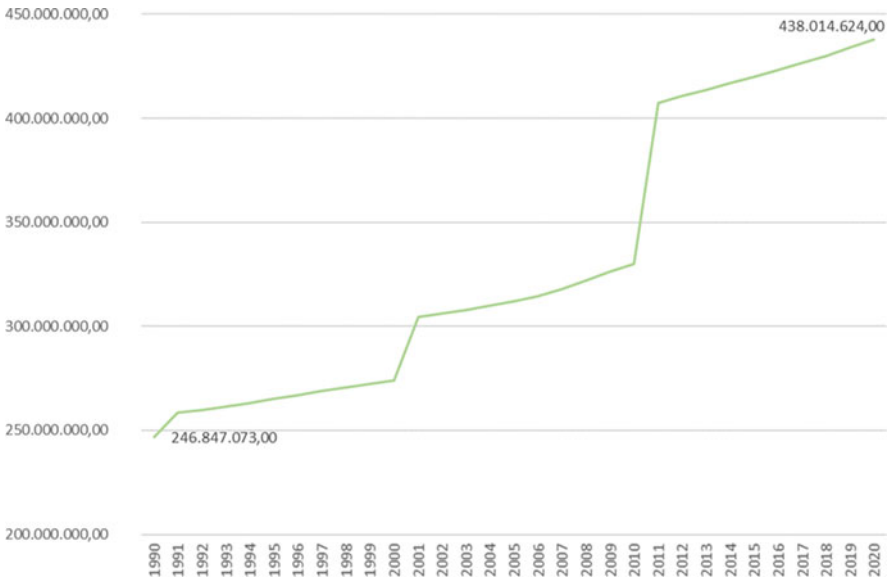

Fig. 27.3 Evolution of the living space area 1994–2020 (developed area). (Source: Author processing based on NISSE data (LOC103A))

Fig. 27.4 Firewood harvested in the 1991–2020 period (thousand cubic meters). (Source: Author processing based on Eurostat data (online data code: FOR_REMOV))

throughout the year), increasing the living space entrained and increased the consumption of resources needed for heating, hot water preparation, and food.

The underdeveloped gas network, the legislative gaps in the field, and the limited and expensive access of the population to this energy resource or to alternative resources have led to an increase in the number of households that have resorted to heating homes based on firewood and electricity. According to the NIS, in Romania, over 60% of homes are based on firewood for heating homes. In such a context, the official amount of firewood used to heat homes has tripled in the last thirty years (see Fig. 27.4).

However, from January 1, 2021, the complete liberalization of the energy market has generated an alarming increase in the price of electricity and gas, which could lead to the implicit increase in the number of households that will migrate to the consumption of firewood, as a more appropriate heating alternative to the income of the population, contrary to the objectives of sustainable development and the resilience and recovery plan assumed.

27.3 Methodology

The Romanian Government is committed in implementing the objectives and targets of sustainable development included in 2030 Agenda. From this perspective, the heating and endowment of housing have become a major concern in Romania, both for the population and for the decision-maker. However, reducing the consumption of firewood will be difficult to achieve, even if it is included in the NPRR, as a major

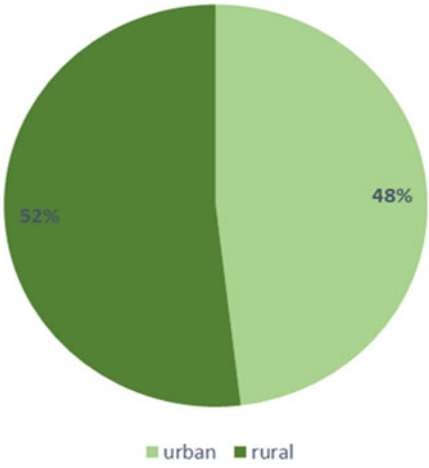

Fig. 27.5 Number of dwellings built in the 1994–2020 period. (Source: NISSE (LOC104A))

goal to be achieved in the next five years, in the context in which the energy crisis is just beginning and urban expansion is growing.

According to the Law 350/2001, "spatial management of the territory aims to ensure individuals and communities the right to fair use and responsibility for efficient use of land, adequate living conditions, quality of architecture, protection of architectural, urban and cultural identity of urban and rural localities, working conditions, services and transport that respond to the diversity of needs and resources of the population, reducing energy consumption, ensuring the protection of natural and built landscapes, conserving biodiversity and creating ecological continuity, public safety and health, rationalizing travel demand."

In such a context, in order to draw realistic conclusions about the way in which the authorities understood to urbanize the national territory, some general aspects were analyzed regarding the application of the current spatial planning and urban planning legislation. As a result of this approach, the change in land use has led to an increase in the consumption of primary resources, changing the relationship with nature and leading to the current transformations of the landscape. Moreover, urbanized constructions made in rural areas were more numerous than those in urban areas, with a share of over 52%. Finally, most of the constructions were built in the vicinity of large urban agglomerations and in the peri-urban area, on the reclaimed lands, which were previously part of the forest fund or of the agricultural one (see Fig. 27.5).

Moreover, the pace of population growth in urban areas (see Fig. 27.6) and the expansion of localities are above the rate at which the authorities have the opportunity to equip the new areas with utilities, contrary to the legal provisions aimed at "improving living conditions through eliminating dysfunctions, ensuring access to infrastructure, public services and affordable housing for all residents." In most cases, the gap between housing construction and their connection to utilities and public services is at least five years, so it goes without saying that the formal or

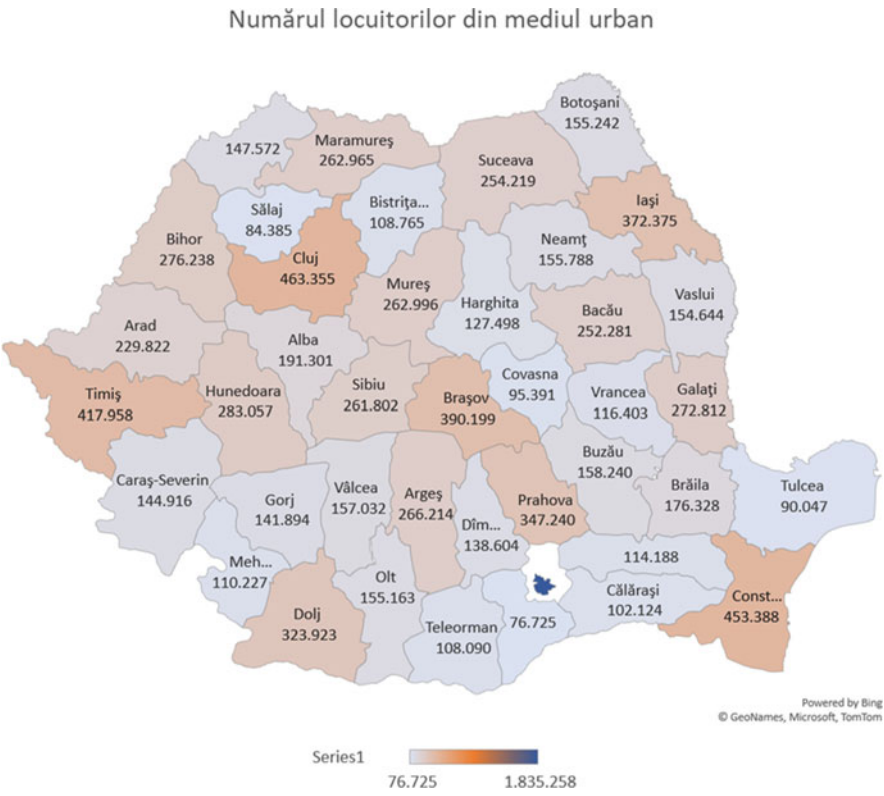

Fig. 27.6 Number of inhabitants in urban areas – structure by counties. (Source: Own processing based on NISSE statistical data [POP105A])

informal market for wood for heating newly built spaces is self-evident or to pollute the environment by uncontrolled dumping.

Also, there are obvious legislative gaps in the facilities provided for accessing environmentally friendly energy resources. For example, the value available for photovoltaic panels for 2022 is only 650 million lei, the financing covering up to 90% of the total value of eligible expenses, up to the amount of 20,000 lei, which means approximately 33 thousand households/year. Compared to the total number of households, the results indicate that, in just many decades, sufficient photovoltaic panels could be installed, so as to significantly reduce greenhouse gas emissions and improve energy efficiency and air quality, contrary to the objectives set through the 2030 Agenda.

In the last decades, the media has made public many illegalities regarding the zonal urban plans (ZUPs) in many Romanian urban settlements, the urbanism practiced in Romania causing the loss of architectural and cultural identity, the deterioration of natural landscapes and biodiversity, and the increase of energy and waste consumption, increasing density, congestion, and loss of green space. The

main concern was to find statistical data, in an attempt to establish correlations between the dynamics of urbanization, the expansion of housing, the area occupied by forests, the consumption of firewood, and new and existing housing. Some of this information was found in the public statistics of NISSE, another part of Eurostat. Regarding green energy and sustainable cities, no complete and relevant statistics were found, neither in the specific categories nor in the sustainable development objectives (O7 and O11). Therefore, the study was based on the statistical data mentioned above, as published.

27.4 Analysis/Results Interpretation

Only from the perspective of the heating of the living space, in order to draw conclusions about the impact that the growth of the living space had on the environment, there have been made some correlations between the previously mentioned indicators. Testing the nature of the data series, the results are those mentioned in Table 27.1. The results suggest a type I [1] structure for all five series analyzed.

Therefore, the correlation coefficients were calculated in the first difference (see Fig. 27.7). There is a close connection between the living area and the number of existing homes, and the existence of a direct link, of medium intensity, between the number of new homes completed during the year and the number of existing men. Otherwise, the links between the variables are of low intensity. This is also confirmed by the t-statistic and the probability attached to the hypothesis.

At a significance threshold of 5%:

- The results in Fig. 27.8 indicate the existence of a one-way causal relationship between the dynamics of the harvested firewood, the dynamics of the living area, and the evolution of the total number of dwellings.
- There is a causal link between the change in the area occupied by forests and the number of newly built dwellings, as well as between the number of newly built dwellings and the living space.

Table 27.1 Unit root test

	Level		First differentiation		Conclusions
Variable	ADF	$P(H_0)$	ADF	$P(H_0)$	
Suprafața desfășurată (total sqm)	23,210	0,9937	−47,567	0,0000	I(1)
Locuințe existente (existing household (HH))	23,387	0,9940	−56,234	0,0000	I(1)
Lemn de foc (firewood)	0,8327	0,8859	−68,477	0,0000	I(1)
Locuințe noi (new HH)	0,2579	0,7542	−49,902	0,0000	I(1)
Suprafață păduri (forestry area)	27,286	0,9977	−29,273	0,0050	I(1)

Covariance Analysis: Ordinary
Date: 11/07/21 Time: 14:54
Sample: 1991 2020
Included observations: 30
Balanced sample (listwise missing value deletion)

Correlation t-Statistic Probability	D(FIREWO...	D(FOREST ...	D(AREA_TH...	D(EXISTING...	D(NEW_HH)
D(FIREWOOD)	1.000000 ----- -----				
D(FOREST_TH_HA)	0.100296 0.533407 0.5980	1.000000 ----- -----			
D(AREA_TH_SQM)	0.284488 1.570253 0.1276	0.060061 0.318387 0.7526	1.000000 ----- -----		
D(EXISTING_HH)	0.176321 0.947852 0.3513	0.118558 0.631805 0.5326	0.531456 3.319857 0.0025	1.000000 ----- -----	
D(NEW_HH)	0.227502 1.236243 0.2266	0.046427 0.245933 0.8075	-0.157988 -0.846628 0.4044	0.420423 2.451893 0.0207	1.000000 ----- -----

Fig. 27.7 The correlation coefficients. (Source: Own processing based on Eviews12)

At a significance level of 10%, it can be stated that there is a two-way causal link between the total number of dwellings and the dynamics of the firewood harvested. From the analysis of the same variables, but only regarding the rural environment, there is only one direct link of medium intensity between the living area and the number of existing dwellings. At a significance level of 10%, the unidirectional causal relationship between the dynamics of harvested firewood and the dynamics of the rural living area is maintained, as well as between the evolution of the new number of rural dwellings and the evolution of the living area in the same rural environment. These results confirm the NIS studies, according to which the increase in the number of dwellings is associated with the dynamics of the harvested firewood. The fact that econometric analyses show that there is no link between harvested firewood and other variables (contrary to the NIS study, according to which over 60% of homes in Romania are heated with firewood), could be an indication that the rest of firewood was harvested. In order not to draw erroneous conclusions, the dynamics of the firewood imports have been analyzed (see Fig. 27.9).

Even though imports increased, the amount imported was mainly aimed at large processors and not at the consumption of the population (only to a small extent through DIY stores, especially for the population in the south of the country).

From the perspective of firewood used for heating, sustainable development requires that wood resources be harvested in a sustainable manner (without

Pairwise Granger CausalityTests
Date: 11/07/21 Time: 14:55
Sample: 1990 2020
Lags: 2

Null Hypothesis:	Obs	F-Statistic	Prob.
D(FOREST_TH_HA) does not Granger Cause D(FIREWOOD)	28	0.68532	0.5139
D(FIREWOOD) does not Granger Cause D(FOREST_TH_HA)		0.50082	0.6125
D(AREA_TH_SQM) does not Granger Cause D(FIREWOOD)	28	1.67729	0.2089
D(FIREWOOD) does not Granger Cause D(AREA_TH_SQM)		4.35440	0.0249
D(EXISTING_HH) does not Granger Cause D(FIREWOOD)	28	2.58775	0.0969
D(FIREWOOD) does not Granger Cause D(EXISTING_HH)		3.68723	0.0408
D(NEW_HH) does not Granger Cause D(FIREWOOD)	28	0.35858	0.7025
D(FIREWOOD) does not Granger Cause D(NEW_HH)		1.75415	0.1954
D(AREA_TH_SQM) does not Granger Cause D(FOREST_TH_HA)	28	0.31911	0.7300
D(FOREST_TH_HA) does not Granger Cause D(AREA_TH_SQM)		1.13625	0.3384
D(EXISTING_HH) does not Granger Cause D(FOREST_TH_HA)	28	0.15494	0.8574
D(FOREST_TH_HA) does not Granger Cause D(EXISTING_HH)		1.41329	0.2637
D(NEW_HH) does not Granger Cause D(FOREST_TH_HA)	28	1.16223	0.3305
D(FOREST_TH_HA) does not Granger Cause D(NEW_HH)		3.41675	0.0502
D(EXISTING_HH) does not Granger Cause D(AREA_TH_SQM)	28	0.10126	0.9041
D(AREA_TH_SQM) does not Granger Cause D(EXISTING_HH)		0.16869	0.8458
D(NEW_HH) does not Granger Cause D(AREA_TH_SQM)	28	4.58073	0.0212
D(AREA_TH_SQM) does not Granger Cause D(NEW_HH)		0.49188	0.6178
D(NEW_HH) does not Granger Cause D(EXISTING_HH)	28	2.34073	0.1188
D(EXISTING_HH) does not Granger Cause D(NEW_HH)		0.51849	0.6022

Fig. 27.8 Causal relationship between indicators. (Source: Own processing based on Eviews12)

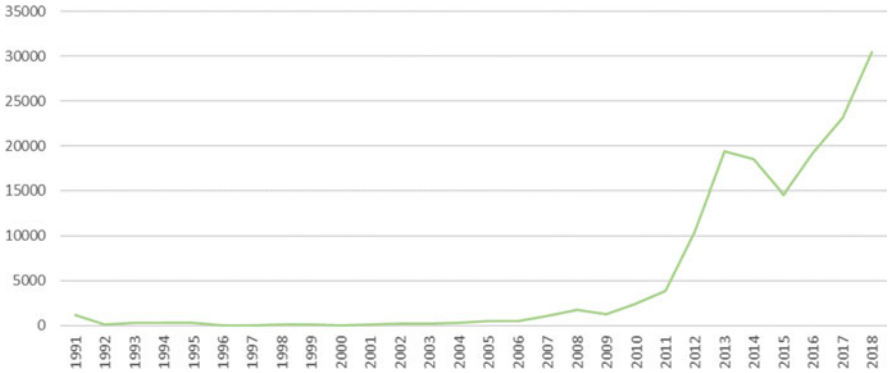

Fig. 27.9 Firewood imports in the 1991–2018 period (thousand Euro). (Source: NISSE (online data code: EXP102F))

exceeding the rate of natural regeneration and by adopting new technologies to reduce consumption or based on biomass – tips, branches, and roots – and not on round wood). The results indicate a possible illegal exploitation of timber resources – an aspect that is also globally recognized, but which cannot be fully quantified.

Te implications of these results for sustainable urban development are manifold.

First of all, the results suggest that the elaboration of future urbanization models should not be left to chance; this should be aligned with the inexhaustible energy resources available in the area, or with renewable resources, respecting the annual regeneration rate. Secondly, the modeling of the way cities develop must be based on appropriate policies and markets, depending on the geographical position and the variation of the relief forms on which the Romanian cities are located. Finally, each city/town has certain specificities that must be taken into account when developing local ZUPs; the strategies must be differentiated on the basis of energy efficiency criteria.

27.5 Discussions

Globally, the firewood accounts for about half of the annual amount of wood harvested. Firewood refers to wood harvested in order to obtain thermal energy, given the potential energy stock that is released through the burning process. Because this natural resource can generate energy without large capital investments, it requires firewood to have cross-sectoral potential to sustain itself as an energy source [7]. The firewood is consumed, either raw or processed. The firewood is consumed, in most cases, in the country of origin (very small being traded internationally), being used for heating and cooking, especially in rural areas and in developing countries. In recent years, especially in the EU member states, the use of wood in modern biomass-based cogeneration plants has increased, because of incentives for renewable energy. However, most of the wood used in these cogeneration plants does not refer to raw wood but to wood residues and waste, which are not classified as firewood because they come from forest residues (branches, roots, etc.) and from the processing of industrial round wood. These countries have understood that wood is a slow renewable resource, so firewood comes largely from indirect sources because of previous wood processing. Wood pellet production has increased the most in recent years, because of the demand generated by the bioenergy targets set by the European Commission, European pellet consumption being 75% of global consumption (reaching 37 million tons in 2018). While many European and other developed countries (such as Japan and South Korea) are energy efficient, by reducing their consumption of primary natural resources, underdeveloped or developing countries use raw wood resources predominantly for energy purposes. Under these conditions, developing countries are expected to experience

imbalances due to resource depletion, while energy alternatives are physically or financially inaccessible [6].

As the natural forest decreases from year to year, actions to combat illegal deforestation and logging have been stepped up [1], with concomitant measures to ensure a balance between the needs of local communities, the demand for resources that supports livelihoods, and conservation objectives. The adoption of sustainable practices, both in terms of exploiting the energy resources needed to sustain life and in terms of the planned expansion of the urban environment, needs to be accelerated on a large scale. In most cases, these actions require a review of policies and current regulatory frameworks. If throughout human history energy resources that have had value in socioeconomic systems have been considered mainly natural wood resources, the strategic need for this carbon storage tank requires a rethinking of the potential for sustainability and sustainable development [4].

In humanity's struggle to save energy and fight climate change, cities are a major battleground [9]. But globally, most of the time, cities are developing by setting up large-scale informal settlements, at a much faster rate than any legal utilities or services can keep up. These issues urge the population to exploit illegally or to use the most convenient solutions, often in contradiction with the objectives of sustainable development. For these reasons, local communities need to find the best ways to organize, so that basic utilities are the most energy efficient and environmentally neutral.

27.6 Conclusions

As it appears from the official statistics of the NIS, regarding the heating of the houses, although the amount of firewood has tripled, its evolution is not confirmed by the results of the econometric analysis. This can only be justified if the living space is not fully heated or if part of the amount of wood needed for heating is harvested through the informal environment. The results of NFI (II) indicate that the total amount of wood harvested was much higher than statistically stated, a theory that can be confirmed by the results of the analysis and other studies performed in this regard.

As a result of overexploitation, the degradation of forest areas has been hotly debated in the media and can be considered as a starting point for further study. Until then, it can be said that in order to be sustainable, cities will either become friends with nature – by reducing the consumption of nonrenewable or slowly renewable resources, will be digitized and preserve their architectural and cultural heritage, or will be stifled under the effect accelerated urbanization. For these reasons, policies and the decision-maker have a key role to play in ensuring that urban sprawl is carried out intelligently, sustainably, and in accordance with the unwritten principles of nature. Green urban policies have a vital role to play in saving energy, through a variety of decentralized and local energy systems; their adoption and implementation at a practical level must not be delayed.

In fact, the whole legislation on spatial planning and urbanization needs to be revised so as not to allow for gaps and alternative solutions that affect natural resources and the environment. Starting from these premises, the study will be continued with the analysis of some examples of good practices, in an attempt to extrapolate the results obtained, at national level.

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Conclusions and Follow-Ups

The 8th International Conference on Economic Scientific Research – Theoretical, Empirical and Practical Approaches (ESPERA 2021) "The crisis after the crisis. When and how the New Normal will be"

By
Luminita Chivu, National Institute for Economic Research "Costin C. Kiriţescu", Romanian Academy
Ignacio de Los Rios Carmenado, Polytechnic University of Madrid, Spain
Jean Vasile Andrei, Petroleum-Gas University of Ploiesti, Romania

On 10 December 2021, the 8th International Conference on Economic Scientific Research – Theoretical, Empirical and Practical Approaches (ESPERA 2021) was concluded after 2 days of scientific debates in group and plenary lectures. ESPERA 2021, held on 9 and 10 December, was titled "The crisis after the crisis. When and how the New Normal will be".

ESPERA 2021 was organized by "Costin C. Kiriţescu" National Institute for Economic Research (Institutul National de Cercetari Economice – INCE), an entity of the Romanian Academy, jointly with its partners: the Association of Economic Departments of Romanian Universities, the European Academy of Management and Business Economics, the Academy of Economic Studies of Moldova, the Romanian National Committee of the World Energy Council, Bucharest Chamber of Commerce and Industry of Romania, Research Network on Resource Economics and Bioeconomy Association, the Association Business Ethics – Ro, Gestion y Planificacion Research Group (GESPLAN), Spain, Institute of Agricultural Economics, Belgrade, Serbia, Institute of Economic Sciences, Belgrade, Serbia, Faculty of Social and Cultural Services and Tourism, Stavropol, State Agrarian University, Russia; Faculty of Economics and Business Administration, "St. Kliment Ohridski" University, Sofia, Bulgaria, and Faculty of Hotel Management and Tourism, University of Kragujevac, Serbia.

L. Chivu et al. (eds.), *Crisis after the Crisis: Economic Development in the New Normal*, Springer Proceedings in Business and Economics,
https://doi.org/10.1007/978-3-031-30996-0

ESPERA 2021 was an important milestone in concentrating the researches in the field of economics carried under the wing of INCE by the institutes and centres under the umbrella of the Romanian Academy, and by other Romanian academic researchers. The conference provided a great opportunity and the instrument to properly disseminate the knowledge, experience and expertise of researchers originating from 12 countries, who delivered their presentations online.

ESPERA 2021 was intended to remind that economic paradigm has shifted for the whole world after the COVID-19 crisis, bringing about some deep and long-lasting changes, expected to build up a "New Normal". The "New Normal" is part of a much broader ecosystem; therefore, the purpose of this conference is not to present and continue as usual, but to encourage debates with a much more incisive approach, meant to bear increased positive effects on the acceptance of the new economic paradigms as the new normal.

The event that took place in early December 2021 has reiterated the willingness of the "Costin C. Kirițescu" National Institute for Economic Research (INCE), which is part of the Romanian Academy, to continue the traditional scientific event started in 2013, in order to increase the understanding of the role of national research institutes in strengthening the links between theoretical research and the work of practitioners and academia, and to inspire new tendencies in the field.

ESPERA 2021 was abundant in lectures, dissertations and practical workshops delivered by Romanian and international researchers and experts. They all provided the opportunity to draw knowledge and network with colleagues in different fields of research. On both days, the conference presentations delivered by the rapporteurs were accessed and viewed online by more than 500 persons.

The Honorary Chair of the International Conference on Economic Scientific Research – Theoretical, Empirical and Practical Approaches (ESPERA) is held jointly by the Romanian Academy's member and President Ioan Aurel POP, and by Acad. Mugur Constantin ISARESCU, the President of the Department of Economic, Juridical Sciences and Sociology, Romanian Academy, who is also the Governor of the National Bank of Romania. They were assisted by three Co-chairs: Luminita Chivu, General Director, National Institute for Economic Research "Costin C. Kiritescu", Romanian Academy, Valeriu Ioan-Franc, Corresponding Member of the Romanian Academy, and General Deputy Director of the National Institute for Economic Research "Costin C. Kiritescu", Romanian Academy, and by George Georgescu, General Deputy Director, National Institute for Economic Research "Costin C. Kiritescu", Romanian Academy.

The Board of the Scientific Committee of the conference was formed of representatives of Romanian and foreign research institutes, universities and academia, as follows:

- Jean Jacques Askenasy, Honorary Member of the Romanian Academy, Professor at the University of Tel Aviv, Israel
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The 8th International Conference on Economic Scientific Research – Theoretical, Empirical and Practical Approaches (ESPERA 2021) was structured in 15 conference sections, with each section having designated a review board. Below we present the Editorial Scientific Review Committee and its members:

Conference Section 1. Romania's sustainable economic and social development. Models, scenarios, evaluations

- *Valeriu Ioan Franc*, National Institute for Economic Research "Costin C. Kiritescu"
- *Valentina Vasile*, Institute of National Economy

Conference Section 2. Natural resources patrimony – costs and benefits of its valorization

- *Gabriel Popescu*, Centre of Studies and Research in Agricultural and Forestry Biodiversity
- *Mihai Sabin Muscalu*, Center of Industry and Services Economics

Conference Section 3. Knowledge, innovation, smart development and human capital

- *Luminita Chivu*, National Institute for Economic Research "Costin C. Kiritescu"
- *Sorin Cace*, Institute for Research of the Quality of Life

Conference Section 4. Economy dynamics and structural changes for a competitive growth

- *George Georgescu*, National Institute for Economic Research "Costin C. Kiritescu"
- *Marina Badileanu*, National Institute for Economic Research "Costin C. Kiritescu"

Conference Section 5. European integration and globalisation – new challenges

- *Mugur Constantin Isarescu*, Romanian Academy
- *Napoleon Pop*, National Institute of World Economy
- *Simona Moagar Poladian*, Institute of World Economy

Conference Section 6. Economic instability and stabilisation policies

- *Aurel Iancu*, Complex Research Center
- *Constantin Marin*, Centre of Financial and Monetary Research

Conference Section 7. Development and improvement of economic and social forecasting tools

- *Emilian Dobrescu*, Center for Macro-economic Modelling
- *Lucian Liviu Albu*, Institute of Economic Forecasting
- *Marioara Iordan*, Institute of Economic Forecasting

Conference Section 8. Food safety and security – challenges for the economic development of agriculture

- *Cecilia Alexandri*, Institute of Agricultural Economy
- *Lucian Luca*, Institute of Agricultural Economy
- *Iuliana Ionel*, Institute of Agricultural Economy

Conference Section 9. Assessment of economic-social and political experiences and thoughts

- *Florin Marius Pavelescu*, Institute of National Economy
- *Andrei Marius Diamescu*, National Institute for Economic Research "Costin C. Kiritescu"

Conference Section 10. Contributions to the New Encyclopaedia of Romania

- *Valeriu Ioan-Franc*, National Institute for Economic Research "Costin C. Kiritescu"
- *Ilie Badescu*, Institute of Sociology

Conference Section 11. Quality of life and social policies evaluations

- *Catalin Zamfir*, Institute for Research of the Quality of Life
- *Simona Stanescu*, Institute for Research of the Quality of Life

Conference Section 12. Demo-economic cycles and transitions

- *Vasile Preda*, National Institute for Economic Research "Costin C. Kiritescu"
- *Carmen Gheorghe*, Center for Demographic Research

Conference Section 13. Sustainable development of mountains areas

- *Radu Rey*, Centre for Mountain Economics
- *Ioan Surdu*, Centre for Mountain Economics

Conference Section 14. PhD and post PhD student debates

- *Andrei Marius Diamescu*, National Institute for Economic Research "Costin C. Kiritescu"
- *Adrian Cantemir Calin*, Institute of Economic Forecasting

Conference Section 15. Business ethics and corporate social responsibility

- *Adriana Grigorescu*, National University of Political Studies and Public Administration
- *Constantin Holzer*, University College Cork, Ireland

The ESPERA 2021 participants have expressed their appreciation regarding the comprehensive exchange of knowledge that the conference made possible, the irreproachable organization of the event, and suggested that follow-up conference activities and topics should be developed further to enhance the research activities and contributions to the debates arguing the perspective on when and how the New Normal will happen. Also, the conference participants have acknowledged and pointed out the need to develop and extend scientific cooperation between domestic and international research institutions and universities in order to design a proper framework for the New Normal paradigm.

Attendees have delivered lectures by researchers and academics representing most of INCE institutes and centres, members of the Romanian Academy, Romanian academic researchers and guests from other countries. It should be also remarked as well that the majority of lectures, presentations and interactive debates have dealt with economics and business sciences topics, which created a great opportunity to establish new and modern trends in economic research, in addition to promoting the scientific skills of young researchers and Ph.D. students.