A Comparative Analysis of Organic Crop Production in Different European Regions

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Abstract: This study aimed to analyze growth trends of different European regions for organic crop production in the agriculture sector up to 2023. This study also focused on a comparative analysis of organic crop production in different countries in European regions. Data for organic crop production for different European regions was obtained from the Eurostat database from 2011 to 2023 and analyzed for trends and regression using Microsoft Excel. Our findings revealed Poland from Eastern Europe, France from Western Europe, Finland from Northern Europe, and Italy and Spain from Southern Europe with the most significant overall organic crop production in 2023. Typically, better yields in organic farming in the southern region than in the other regions of Europe are due to good weather, which affects overall output. This study concluded that organic crop production is becoming increasingly significant in Southern Europe compared to other regions, greatly enhancing the region's agricultural sustainability and biodiversity preservation and busting the regional economy by promoting organic farming business. While organic crop production is generally on the rise, obstacles still exist to overcome before obtaining consistent growth and support throughout Europe.

Keywords: Agri-businesses, Organic farming, Eastern Europe, Western Europe, Northern Europe, Southern Europe
JEL Classification : G14, Q14, Q17

1 Introduction

Over the 10 years, the organic crops marketplace in various European economies has progressively grown, owing in part to regulations targeted at fostering the long-term sustainability of the farming industry within the framework of the idea of sustainable development, as well as financing from governments for the growth of the organic market. Such an increase, in particular, is aided by demand patterns and consumption of crops per person. From 2011 to 2013, there was a favourable trend of a rise in the total number of farmers (by 57.6%), particularly in the most industrialized countries of Europe. The EU accounts for 14% of all organic product farmers worldwide (Fernández et al., 2022). The European organic product market focuses on producing and consuming cereals, wheat, spelt oats, and a combination of the new season grains, green plants, and freshly harvested vegetables. The key obstacles to the market for organic foods until 2022 remained inadequate output to fulfil demand from customers, low agricultural performance, particularly in Europe's countries with the least developed economies, and the difficulties of introducing new methods of cultivation in organic agriculture (N. F. Zaruk et al., 2023). Agricultural difficulties will be significantly compounded, particularly due to the Eastern European food crisis created by the need to feed millions of migrants and seasonally displaced people.

According to Psuturi (2023), European countries accounted for over 2.6 million acres of land, or 21% of the total organic farming in Europe (12.1 million hectares). This indicates that European countries play a vital role in the organic market's evolution. The organic European countries' market is worth at least 524 million euros; however, most of the European agricultural marketplace is in a relatively undeveloped area. Most European countries' organic sectors have developed more slowly than others. Agricultural land area and farming growth did not correspond to equivalent expansion of markets or processing of goods network (N. Zaruk et al., 2023). The food recession, modifications to the consumer

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consumption framework, increasing food costs, and people migrating to other countries due to conflict or other reasons will all impact organic food marketplaces. As a result, it is essential to investigate the changes in agricultural sectors throughout Europe. The present work seeks to evaluate organic crop production in various European regions.

2 Literature Review

The academic literature constantly analyzed the establishment and growth of organic crop markets in various European regions; the primary research occurred from 2011 to 2023. During this time, the regulatory structure, organizations, and governmental regulations supporting organic agricultural farmers were being developed in conjunction with the European region's membership. The European organic food markets are characterized by a surplus of output over demand, a scarcity of materials needed for domestic agricultural processing facilities, and imports of processing products made from organic materials, all of which negatively influence regional development initiatives. According to research on the organic markets across several European regions, Kociszewski et al. (2023) discovered that Poland, Hungary, the Czech Republic, and Romania had the highest turnovers. Based on a different investigation, the organic business in various European domains was €260 million. The markets in each country have grown depending on the revenue relationships: in Bulgaria as well and Poland, the market developed multiple circumstances from 2006 to 2010; in the Czech Republic and Romania, the market developed multiple times from 2006 to 2020; in Estonia, the marketplace increased across the same period; and there was almost no market expansion in the country of Hungary and Slovakia. Solfanelli et al. (2022) organized the primary features of the Eastern European organic market: the Czech Republic market is the most established; Poland and the Baltic countries demonstrate the most rapid expansion, which includes farming; the Ukraine, Bulgaria, and Romania - the enormous market that started rapidly establishing regional organic markets and where improvement has been tracked to decreased stages; Hungary continues to expand at the slowest rate. Regional organic crops market growth activities in European countries are generally intensifying, particularly those aimed at exports. At the same time, the key issues in the Eastern European market are local farms' growth, access to international markets, and establishment of successful promotional networks. According to Peng (2019), in their research on the market for organic crop growth in Romania, local farms have significant challenges in developing official market networks; thus, they rely on producing items for their own consumption and unofficial sales. Consumers believe that a lack of market knowledge forces them to depend on food imports (Chiurciu et al., 2020). The researchers determine the factors that follow as significant obstacles to the growth of the organic sector in various European areas, such as encouraging and educating agricultural producers about technological advances in organic farming, guaranteeing the effectiveness of the supply chain, offering economies of magnitude from the processing of products and selling goods, advising customers and offering incentives to buy organic products, gathering encourage regulations, and demonstrating identifying and certification of products (Golijan-Pantović et al., 2022).

Investigating the organic market in many European countries in the past few years has shown promising possibilities. According to Pergola et al. (2018), adding additional countries to the EU following 2004 enabled increased organic output. On the contrary, organic production began flourishing across Europe due to the EU's official assistance. Solfanelli et al. (2019) discovered an increasing tendency in the organic market and a slowing rise in organic regions across the EU. Kotyza & Smutka (2021) found disparities in European countries' organic markets regarding client opinions on organic products, financial circumstances, manufacturing and transportation patterns, and export orientation. Francis (2020) investigated trends in organic farming using prior studies from several European locations. They discovered that organic farming increased in many countries after they joined the EU. However, in Europe, there are significant indications of the growing number of organic farms in their respective regions and the contemporaneous development of the organic crops market in each region.

3 Methods

This study conducted a comparative analysis of organic crop production across Eastern, Western, Northern, and Southern European regions. The selection of countries within these regions was based on the availability of comprehensive data on the key characteristics and trends of organic product markets from 2011 to 2023. This data provided the foundation for assessing organic crop production across Europe.

Statistical analysis was performed on organic crop production, focusing on total production volumes (measured in tonnes) over specified time periods. Data was sourced from the Eurostat database and analyzed using key evaluation indicators. The results were visually represented through graphs, including regression values for each country, to highlight regional trends and variations in organic crop production.

4 Result and Discussion

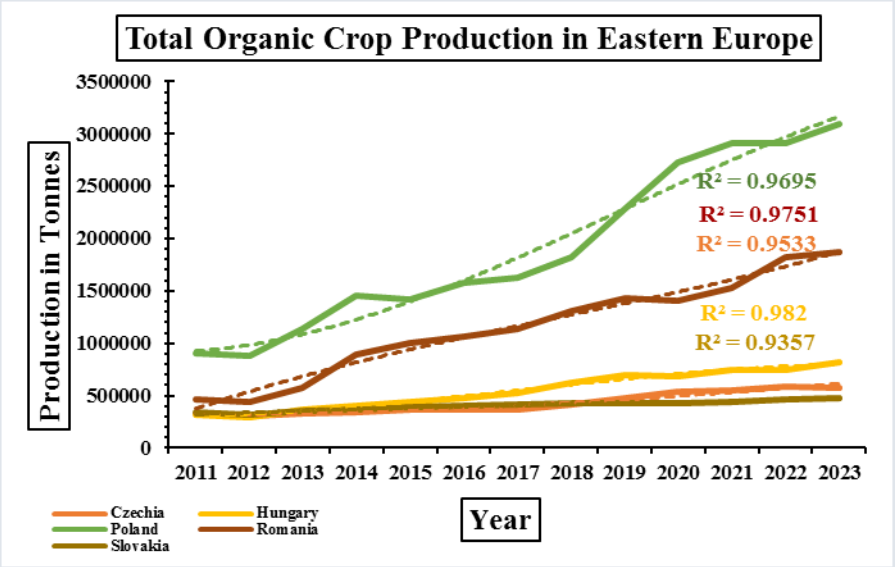
Europe has experienced a notable surge in the production of organic crops in Tonnes, and by 2030, the European Union (EU) hopes to raise the percentage of organic agriculture from 10 to 25%. Growing organic farming contributes to environmental benefits, including lower pollution and more biodiversity, which makes it essential to sustainable agricultural strategies. The effectiveness of organic farming, however, differs from country to country. While some, like France, Spain, and Italy, have led the way in developing organic farming, others have lagged behind because of a lack of understanding and support for programs like the Common Agricultural Policy (CAP). Our study focused on total organic crop production in different European regions.

4.1 Organic Crop Production in Eastern Europe

The total organic crop production in Eastern Europe is represented in Figure 1. The total organic crops produced in Czechia, Hungary, Poland, Romania and Slovakia were about 331 649, 320 312, 908 828, 463 703, and 337 836 Tonnes, respectively, in 2011. Total production was observed with continuous increase in Poland (309 411 Tonnes), Romania (186 672 6 Tonnes), and Hungary (824 294 Tonnes), and a slight increase in Czechia (579 579 Tonnes) in Slovakia (474 342 Tonnes) from the period of 2012 to 2023. Studies reveal that this trend in the production of total organic crops might remain increasing in Eastern European countries. In 2023, more than 405 5 thousand Tonnes of organic crops were produced throughout Eastern Europe. This region demonstrates a dedication to sustainable farming practices and biodiversity preservation by emphasizing the cultivation of grassland and fodder inside organic crop zones.

In addition, Eastern Europe produced many organic fruit crops such as citrus, olives, grapes, nuts, berries, and subtropical and temperate fruits. Despite economic downturns, Europe's domestic market values and the amount of land managed organically have grown steadily, suggesting a solid basis for producing organic crops there. Furthermore, the growth of organic plant production highlights the continuous initiatives to advance organic farming methods and advocate for safe goods for human health. With significant organic agricultural sectors found within the EU-13 group of Member States, including Poland, the Czech Republic, and Romania, it is clear that organic farming is expanding throughout Europe (N. Zaruk et al., 2023).

Figure 1 Total Organic Crop Production in Eastern Europe



Source: Own processing

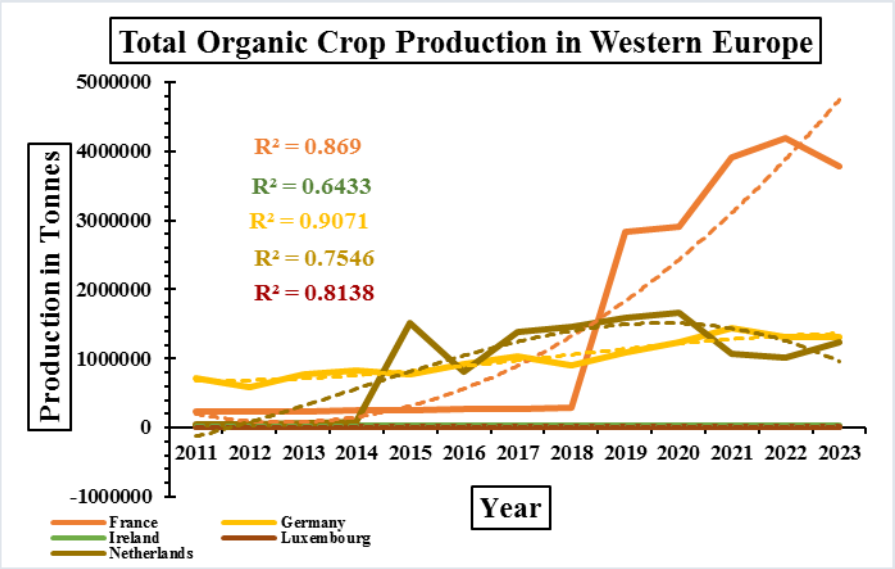
4.2 Organic Crop Production in Western Europe

The total organic crop production in Western Europe is represented in Figure 2. In 2011, France, Germany, Ireland, Luxemburg and the Netherlands produced about 237 748, 711 545, 297 36, 684 9, and 501 90 Tonnes of organic crop, respectively. From 2011 to 2018, the organic crop production in France was very slow (283 014 Tonnes); in 2019, robust growth was observed at 284 124 1 Tonnes, which continuously increased till 2022 (418 218 7 Tonnes). Germany (131

747 9 Tonnes) and the Netherlands (124 200 6 Tonnes) had steadily increased trends in organic crop production, whereas Ireland (34 922 Tonnes) and Luxemburg (12 155 Tonnes) remained constant in the organic crop production race throughout the years from 2011 till 2023.

Western Europe's increasing organic crop production will significantly impact the global food market. With significant areas devoted to different fruits such as olives, grapes, nuts, and temperate fruits, Western Europe is a significant producer of organic fruit crops. The organic agricultural sector in the region has demonstrated its durability and potential during economic downturns, as seen by the robust growth in domestic market values and organically managed land. Furthermore, as a result of growing consumer demand and environmental concerns, organic farming has increased, leading to the mainstream adoption of organic products and the creation of local and international economic opportunities. The growth of the organic food market in Western Europe is in line with the global trend of consumers seeking safe, high-quality, and environmentally friendly food products, even in the face of obstacles such as supply-demand imbalances and certification issues (Ulukan et al., 2022).

Figure 2 Total Organic Crop Production in Western Europe



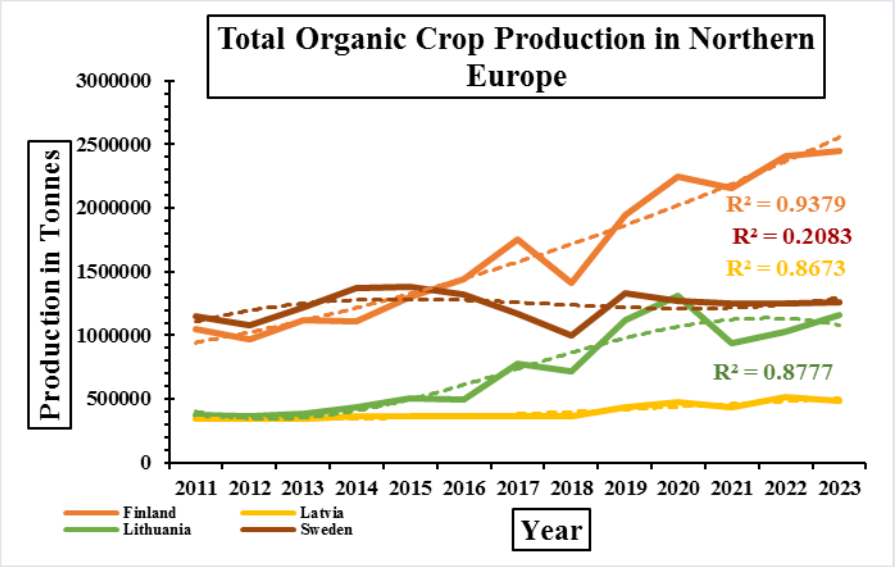
Source: Own processing

4.3 Organic Crop Production in Northern Europe

The total organic crop production in the Northern European region is represented in Figure 3. In 2011, Finland, Latvia, Lithuania, and Sweden produced about 104 506 2, 343 366, 377 098, and 115 232 4 Tonnes of total organic crops, respectively. Till 2023, production of organic crops was observed to continuously increase for understudied countries such as 244 974 4 for Finland, 484 158 for Latvia, 115 757 0 for Lithuania, and 125 886 1 for Sweden in Tonnes.

Growing organic crops is a significant component of sustainable agriculture in Northern Europe. With countries like Sweden leading the way in the total organic crop area ratio to total agricultural area, the region is home to a sizable portion of organic agricultural land. Northern Europe is a leading producer of organic fruit crops, encompassing subtropical, temperate, berry, citrus, olive, and grape varieties. To meet the EU's target of 25% organic farmland by 2030, the total production of organic crops in Northern Europe is anticipated to rise by 10.7% per year (Nesmyslenov, 2020).

Figure 3 Total Organic Crop Production in Northern Europe



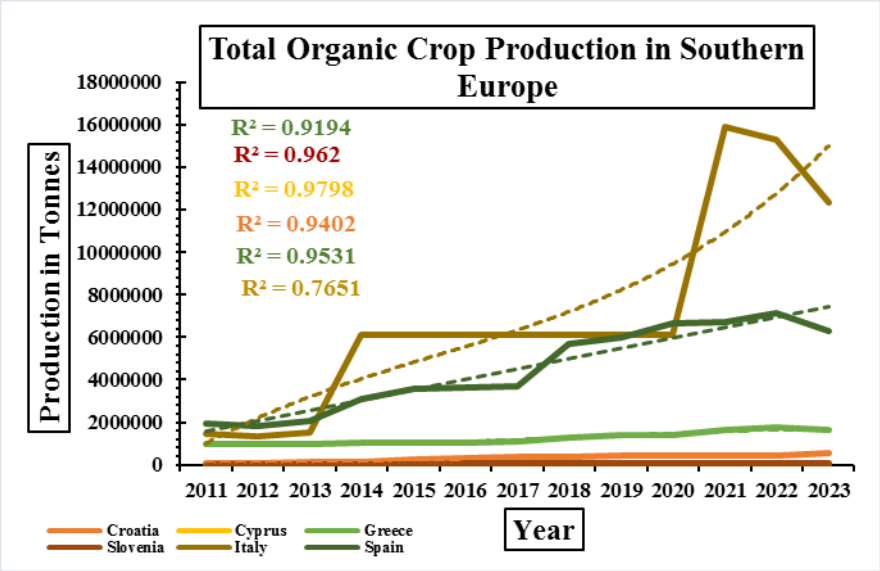
Source: Own processing

4.4 Organic Crop Production in Southern Europe

The total organic crop production in the Southern European region is represented in Figure 4. The total organic crop production recorded in Croatia, Cyprus, Greece, Slovenia, Italy, and Spain in 2011 were about 101 144, 150 37, 996 846, 252 87, 144 786 9, and 195 589 2 in Tonnes, respectively. Except in Slovenia, the production of organic crops was observed to be increasing continuously in every selected country from 2012 to 2023. In 2023, the total production of organic crops was recorded as 528 777, 419 07, 162 140 3, 737 36, 123 472 93, and 631 226 2 Tonnes in Croatia, Cyprus, Greece, Slovenia, Italy, and Spain, respectively.

Organic farming, especially in Southern Europe, is crucial to producing sustainably produced food. A significant percentage of the arable land in countries like Spain and Italy is farmed organically. They grow organic fruit crops, including olives, grapes, nuts, berries, citrus, subtropical fruit, and temperate fruit. The emphasis is on enhancing biodiversity and self-regulating systems. Furthermore, in 2018, there were 15.6 million hectares of organic agricultural land in Europe; the highest organic land areas were found in Italy and Spain, significantly increasing the output of organic crops on the continent. This demonstrates how organic crop production is becoming increasingly significant in Southern Europe, greatly enhancing the region's agricultural sustainability and biodiversity preservation (Kundius, 2023).

Figure 4 Total Organic Crop Production in Southern Europe



Source: Own processing

5 Conclusion and Recommendations

Our study summarised that Poland, France, Finland, Italy, and Spain were the countries with the most significant overall organic crop production till 2023. European organic crop production trends highlighted the requirement for ideal crop production across territories, which shows a connection with traditional agricultural production areas. The following countries had a percentage of organic forming shares exceeding 10%: Czechia, Finland, France, Greece, Italy, Poland, Romania, Slovakia, Slovenia, and Spain. A comparative study of the production of organic crops in various European locations indicates notable differences impacted by regulatory, economic, and meteorological factors. Due to good weather, southern regions typically have better yields. However, Eastern, Western, and Northern Europe confront problems, including shorter growing seasons and lower temperatures, which impact overall output and the significance of local soil health and biodiversity, significantly affecting the success of organic crops. Generally, organic crop production in Europe is promising, but regional differences call for customized approaches to increase organic agriculture's productivity and sustainability. Comparative studies of organic farming systems in various geographic regions emphasize the significance of switching to organic farming practices for sustainable land use and environmental safety.

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References

Chiurciu, I., Cofas, E., & Dragomir, V. (2020). Study on the Production and Marketing of Potatoes in the European Union. *Romanian Agricultural Research*, 37, 243–251. doi: 0.59665/rar3727.

Fernández, J. A., Ayastuy, M. E., Belladonna, D. P., Comezaña, M. M., Contreras, J., de Maria Mourão, I., Orden, L., & Rodríguez, R. A. (2022). Current Trends in Organic Vegetable Crop Production: Practices and Techniques. In Horticulturae, 8(10). doi:10.3390/horticulturae8100893.

Francis, C. (2020). Improving organic crop cultivation. Agroecology and Sustainable Food Systems, 44(5), 676–679. doi:10.1080/21683565.2019.1688901.

Golijan-Pantović, J., Sečanski, M., & Gordanić, S. (2022). Seed Health Treatments In Organic Seed Production. *Agriculture and Forestry*, 68(4), 41–57. doi: 10.17707/AgricultForest.68.4.04.

Kociszewski, K., & Szubska-Włodarczyk, N. (2023). The Level Of Organic Farming Productivity In Selected Eu Countries. *Economics and Environment*, 86(3), 417–435. doi:10.34659/eis.2023.86.3.623.

Kotyza, P., & Smutka, L. (2021). Sustainable agriculture: Development of organic farming. Case study of the Czech Republic. *In Sustainable development: Innovations in business*, 77–94. doi:10.18559/978-83-8211-084-5/5.

Kundius, V. (2023). Efficiency Of Organic Agriculture In The Conditions Of Scientific And Technological Sovereignty. *Russian Journal of Management*, 11(4), 125–138. doi:10.29039/2409-6024-2023-11-4-125-138.

Nesmyslenov, a. P. (2020). Regional organic agriculture development in the context of european experience of state support for the crop production sector. *Scientific review: theory and practice*, 10(8), 1538–1552. doi: 10.35679/2226-0226-2020-10-8-1538-1552.

Peng, M. (2019). The growing market of organic foods: Impact on the us and global economy. In Safety and Practice for Organic Food, 3–22). doi:10.1016/B978-0-12-812060-6.00001-5.

Pergola, M., Persiani, A., Palese, A. M., Di Meo, V., Pastore, V., D'Adamo, C., & Celano, G. (2018). Composting: The way for a sustainable agriculture. *Applied Soil Ecology*, 123, 744–750. doi: 10.1016/j.apsoil.2017.10.016.

Psuturi, B. (2023). Some aspects of the legal regulation of state support for the production of organic crop production. *Uzhhorod National University Herald. Series: Law*, 2(75), 56–61. doi:10.24144/2307-3322.2022.75.2.9.

Solfanelli, F., Gambelli, D., Vairo, D., & Zanoli, R. (2019). Estimating missing data for organic farming by multiple imputation: the case of organic fruit yields in Italy. *Organic Agriculture*, 9(3), 295–303. doi: 10.1007/s13165-018-0228-8.

Solfanelli, F., Ozturk, E., Dudinskaya, E. C., Mandolesi, S., Orsini, S., Messmer, M., Naspetti, S., Schaefer, F., Winter, E., & Zanoli, R. (2022). Estimating Supply and Demand of Organic Seeds in Europe Using Survey Data and MI Techniques. *Sustainability (Switzerland)*, 14(17). doi: 10.3390/su141710761.

Ulukan, D., Grillot, M., Benoit, M., Bernes, G., Dumont, B., Magne, M. A., Monteiro, L., Parsons, D., Veysset, P., Ryschawy, J., Steinmetz, L., & Martin, G. (2022). Positive deviant strategies implemented by organic multi-species livestock farms in Europe. *Agricultural Systems*, 201. doi: 10.1016/j.agsy.2022.103453.

Zaruk, N. F., Kagirova, M. V., Romantseva, Y. N., Kharitonova, A. E., & Kolomeeva, E. S. (2022). Analysis of the state and prospects for the development of organic crop production in Russia. *Buhuchet v Sel'skom Hozjajstve (Accounting in Agriculture)*, 12, 810–822. doi: 10.33920/sel-11-2212-03.

Zaruk, N. F., Kagirova, M. V., Kharitonova, A. E., Romantseva, Y. N., & Kolomeeva, E. S. (2023). Analysis of trends and location of organic crop production in European countries. *IOP Conference Series: Earth and Environmental Science*, 1206(1). doi:10.1088/1755-1315/1206/1/012009.

Zaruk, N., Romantseva, Y., Kagirova, M., Aramov, M., & Jumayev, S. (2023). Analysis of the State and Location of Organic Crop Production in Australia. *Smart Innovation, Systems and Technologies*, 362, 97–105. doi: 10.1007/978-981-99-4165-0_9.