

## Research papers

### SUITABILITY OF COMPLEXITY ECONOMICS FOR LONG-TERM AGRICULTURAL POLICY-MAKING

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#### Abstract

*The development of agricultural policy is becoming a more and more difficult task. The number of factors which should be taken into account continues to grow, while at the same time there is an increased diversification of agricultural needs as well as higher consumer and taxpayer expectations. In this situation, the approach to agricultural policy-making used so far does not function properly.*

*The final shape of the Common Agricultural Policy (CAP) in the new multi-annual financing frameworks of the European Union has not been fully established yet. The work has been prolonged for many reasons. The current European Commission pays much attention to environmental and climate challenges, proposing the implementation of the European Green Deal strategy. One of the key elements of this development concept is the “Farm to Fork” strategy, which indicates the directions of transformation of food systems in the EU.*

*A question arises whether the proposed shape of the EU strategy for agriculture is optimal in terms of challenges faced by this sector. Complexity economics may be an answer to this question, as it offers an approach to policy-making based on the recognition of the complexity of socio-economic systems and their specific dynamics requiring a specific shape of actions taken by the state.*

*The aim of the article is to present the complexity economics as an appropriate approach to agricultural policy-making in the context of many challenges faced by this sector and to indicate to what extent the current agricultural policy takes the indications of the complexity economics into account.*

**Keywords:** complexity economics, agricultural policy, food systems, environmental and climate challenges, common agricultural policy.

**JEL codes:** Q18, Q58, Q28.

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## Introduction

The final shape of the Common Agricultural Policy (CAP) in the new multi-annual EU funding framework has not been fully established yet. The works have been prolonged for many reasons. Currently, the coronavirus pandemic is an additional difficulty. At the same time, it should be emphasized that the proposals of the CAP reform were presented by the European Commission (EC) during its previous term (led by J.-C. Juncker), and the final works on its shape are done by the current EC under the leadership of U. von der Leyen. The present EC focuses much more on environmental challenges than its predecessor.

The following strategic documents drafted by the EC in 2020 may be considered to be the complementation and extension of the 2018 proposal:

- EU Biodiversity Strategy for 2030. Bringing nature back into our lives;
- “Farm to Fork” strategy for a fair, healthy and environmentally-friendly food system;
- Commission Communication “Europe’s moment: Repair and Prepare for the Next Generation”;
- Communication from the Commission to the European Parliament, the European Council, the Council, the European Economic and Social Committee and the Committee of the Regions. The European Green Deal.

The proposed solutions concerning agriculture have met with different opinions of different stakeholder groups (e.g. Bas-Defossez et al., 2018; Heinemann and Weiss, 2018; Sadłowski, 2019; European Public..., 2020; Gerritsen, Kopsieker, Underwood and Tucker, 2020; Institute for..., 2020; Jongeneel, 2020; Pe’er et al., 2020). Different parties highlight different aspects of the proposed changes, underlining that such a strong environmental focus is a huge challenge. At the same time, however, such focus on environmental protection is not visible, either in the range of actions of the future CAP or in its financing, where still more than 3/4 of the funds are directed towards direct payments, which does not have a positive impact on the ecological efficiency of farms (Czyżewski, Matuszczak, Grzelak, Guth and Majchrzak, 2020).

The aim of the article is to present complexity economics as an appropriate approach to agricultural policy-making in the context of various challenges faced by this sector and to indicate to what extent the current EU agricultural policy takes the indications of the complexity economics into account.

The article is divided into three main parts. The first part presents the theoretical basis of the complexity economics. The second part describes selected tools which, when used in practice, make it possible to take into account the objectives of complexity economics in a long-term agricultural policy-making. The third part shows the results of the analysis of proposed changes in the CAP and strategic objectives to be implemented in subsequent years within the framework of the agricultural policy and the entire EU agri-environmental policy based on the previously presented indications developed by complexity economics.

### **Complexity economics**

As in other areas of socio-economic life, a long-term agricultural policy-making is becoming a more and more complex task covering a number of aspects. This is due to the growing complexity and number of mutual connections between different elements of the system which, in a nutshell, consists not only of people and economy and institutional and legal framework created by them, but also of the environment. In the case of agriculture, which is extremely strongly linked to the environment, this component of the system plays a key role.

Complexity economics<sup>1</sup>, which is currently part of the heterodox trend in modern economics<sup>2</sup>, deals with the complexity of systems in the field of economics. A wider interest in complexity economics was caused by an attempt to find a response to the causes of the 2008 crisis and to seek solutions that will speed up recovery and reduce probability of such crises in the future.

Complexity economics has its roots in the concept of complex systems found in other sciences dealing with complex systems such as the human brain or climate. At the same time, it attempts to propose new solutions that would respond to criticism of mainstream economics. Complexity economics includes the following elements:

- heterogeneity of individuals and their limited knowledge and rationality, while at the same time the ability to learn, modify and adapt their behaviour;
- dynamics of economic systems characterised by a constantly growing complexity and imbalance;
- multiplicity and diversity of interactions between individuals;
- non-linear and non-ergodic nature of socio-economic processes.

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<sup>1</sup> This does not mean that economists representing other trends and directions of economic thought do not notice the fact that the socio-economic system is complex. As Colander stated (2008, p. 3), "It is precisely because of this (the complexity of the economy) that the world needs economists (...)".

<sup>2</sup> As Fontana points out, the problem of complexity of the economic system was recognised in their works by prominent representatives of mainstream economics such as Marshall, Keynes and Hayek (Fontana, 2008, p. 23). Also, Colander (2008) points out that complexity economics has its roots in the works of mainstream economists.

According to Gräbner (2016), the key aspect that should most explicitly distinguish the complexity economics from other areas of economics, and that can be an effective tool, is to study dependencies and social mechanisms instead of focusing on forecasts.

As Kovács (2019) points out, the approach indicated by complexity economics is now necessary because of numerous phenomena that make the current approach based on a simplified perception of social and economic phenomena impossible to develop effective state policies. Among these phenomena Kovács mentions:

1. Long-term stagnation, which is signalled by a systematic fall in productivity growth<sup>3</sup>.
2. Demographic change – ageing population and decline in the active labour force.
3. Climate change.
4. Growing divergence between financial sector and real economy.
5. Changes in the characteristics of emerging economies, where the industrial sector is no longer a dominant part of the economy.
6. The impact of the 2008 crisis is still being felt.
7. The fourth industrial revolution.

It is debatable to what extent the above list is complete or whether all its points are really important, but it is difficult to disagree with the fact that at least some of them are phenomena that fundamentally change the conditions under which the socio-economic system functions. At the same time, these are phenomena that affect the functioning of agriculture and the entire food system in many ways. On the other hand, the food system itself and the agricultural sector, which is a component thereof, can be regarded as complex adaptive systems<sup>4</sup>. This means that in the case of agriculture and the food system the knowledge of the functioning of individual components of the system does not ensure the understanding of the functioning of the whole system.

Recent studies on economic policy-making within the paradigm of complexity economics (e.g. Elsner, 2015) underline the need for a complete change of policy making and implementation. There is a need to shift from centrally controlled bureaucracy to overlapping structures that work together. At the same time, the policy must be proactive and based on a democratic framework, i.e. with the actual participation of representatives of various stakeholder groups. The policy should also adapt to current changes, which indicates the need for systematic monitoring and evaluation thereof. This is possible only based on statistical data and research

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<sup>3</sup> It is worth stressing that it also concerns agriculture, which is extremely important from the point of view of constantly growing demand for food and decreasing production capacity of the Earth (lack of areas that could be transformed into new utilised agricultural areas, lack of water). This phenomenon has been pointed out in works by Heisey, Wang and Fuglie (2011) and Sheng, Mullen and Zhao (2011).

<sup>4</sup> With regard to food systems, such statement appears in Chapman et al. (2017), and in the case of agricultural systems, e.g. in Darnhofer, Bellon, Dedieu and Milestad (2010). However, the recognition of the economy (of which agriculture is part) as a complex system of adaptation appears e.g. in Beinhocker (2007).

results. This recommendation is consistent with an effective evidence-based policy-making fostered in the literature<sup>5</sup> (e.g. Newman, Capillo, Famurewa, Nath and Siyanbola, 2013).

Moreover, policies based on the achievements of complexity economics should take into account different alternative scenarios and different research results, which brings policy recommendations closer to those formulated by the institutionalism (Elsner, 2017). Hardt (2012), on the other hand, points out that the postulates of complexity economics fit into the concept of (sufficiently) good governance.

The review of literature on the subject of the study indicates that the approach offered by complexity economics is particularly useful especially facing the need for a fundamental transformation of the socio-economic and ecological system forced by climate change. As Foxon, Köhler, Michie and Oughton (2013) state, there are already many realistic proposals for reforming the current socio-economic system to make the necessary changes possible.

However, attention must be paid to the limitations of complexity economics. This is still such a new direction in economics that precise frameworks and concepts have not been developed yet, so this ambiguity may cause confusion and hinder further development of complexity economics. Moreover, many publications on complexity economics, which are based on its objectives, come up with other recommendations for the policy<sup>6</sup>, which may reduce its actual usefulness. The answer to this problem is further research on the development of complexity economics, increasing the practical usefulness of the conclusions and recommendations. It seems that the development of information technologies and artificial intelligence should foster the research that uses the objectives of complexity economics. At the same time, however, it should be accepted that the results of a given policy are uncertain, although it is known that policy is more effective thanks to its decentralization, since the local needs and conditions for the implementation of the developed policy are better known (Nash, 2012, p. 16-17).

### **Selected tools to implement some of the objectives of complexity economics**

There are new tools for the practical implementation of the postulates of complexity economics into the practice of developing and implementing state policies and they are constantly being developed. Among these tools, two approaches have been particularly highlighted, namely anticipatory management and backcasting.

Anticipatory management is considered to be an answer to the problem of a long-term policy-making in a situation where the future is “not only unknown, but also cannot be known, and is accompanied by normative and scientific uncertainties and conflicts”. (Vervoort and Gupta, 2018, p. 104). It derives from scenario planning and adaptive management (Quay, 2010, p. 506).

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<sup>5</sup> In this respect, the planned CAP would meet at least this initial demand for policy-making based on the paradigm of economics complexity.

<sup>6</sup> This problem was pointed out, among others, in a publication by Robert and Yoguella (2016).

The task of anticipatory management is not only to create forward-looking policies, but to create a system of data collection and analysis that will ensure the development of a long-term holistic policy that anticipates specific phenomena or trends. This means that data-driven anticipatory governance (Maffei, Leoni and Villari, 2020) must be developed. In this approach, we try to predict possible development scenarios and choose the right policy tools, which means that the foresight analysis work is undertaken.

The backcasting approach (already in use since the 1970s) is becoming increasingly popular among the creators of the long-term policy frameworks, especially those dealing with broadly defined climate and environmental issues. A.B. Lovins proposed the concept of “retrospective analysis” (Quist and Verfragt, 2006), and Robinson (2003) proposed the name of this approach in 1982. This is an approach to research on the future based on the creation of normative scenarios, where the starting point is the expected final state. Then, considering the current position of the system currently, the concept of a pathway from today’s place to the desired one in the future is created. This means that a specific set of policy instruments is developed to ensure that a certain state is reached.

Backcasting is also considered to be a planning technique in which “participants reconstruct a sequence of events that links future scenarios with immediate actions” (Perry, 2014, p. 5). Currently, this approach is used in research on various complex systems and problems, such as: sustainability (Holmberg, 1998), climate change (Van de Kerkhof, Hisschemller and Spanjersberg, 2002), environmental protection (Gordon, 2015) and the need for ecosystem services (Brunner, Huber and Grêt-Regamey, 2016). Backcasting is particularly useful for problems where the continuation of existing trends is not desirable or possible and where historical data are missing (Davis et al., 2016).

Backcasting is used in the practice of research carried out under Horizon 2020 in relation to rural development. However, this term is not always used. It is more often referred to as “imagining the desired future and looking for instruments to achieve a set goal”<sup>7,8</sup>.

These tools point to two fundamental elements that determine the quality of modern long-term policy-making. These are participation and data analysis. The participation of a broad representation of various stakeholder groups and/or experts is a fundamental factor allowing for a comprehensive coverage of various elements of

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<sup>7</sup> In one such project – the Sustainable Hub to Engage into Rural Policies with Actors (SHERPA) – a term “long-term visioning” was used (Kull, Refsgaard, Chartier and Salle, 2020). Another Horizon 2020 project refers to the foresight instrument ([www.polirural.eu](http://www.polirural.eu)). In a project implemented by the Institute for European Environmental Policy (outside Horizon 2020), however, a workshop on the vision of agriculture in 2100 called “working backward” was held. (IEEP, 2019, paragraph 18).

<sup>8</sup> It is worth mentioning the increasingly popular “nowcasting” approach to policy implementation. This is an approach taken from meteorology. It means forecasting events in the economy or in a given area for the nearest future. For this purpose, models based on current data obtained through the so-called Big Data (data from internet searches, financial transactions, etc.) are used, i.e. data collected outside the standard system of public statistics.

a given socio-economic and environmental system. On the other hand, a careful and extensive data analysis allows for an accurate identification and characteristics of the existing trends at different levels of analysis and for proposing instruments for which we have the greatest knowledge of their effectiveness and efficiency. However, the latter element still faces a barrier in the form of the current functioning of the public statistics system. It is still characterized by a slow delivery of data and its limited scope. This is particularly evident in the assessment of the current trends in changing environmental and climate characteristics of the monitored socio-economic systems. Despite the growing digitisation, it does not apply to public statistics to such an extent that it is possible to really base agricultural policy-making on the gathered knowledge and statistical data. It seems that today the problem of data availability and reliability is a significant factor that reduces public confidence in the accuracy of proposed state policy actions, including agricultural policy. In the case of the agricultural sector policy, other difficult issues include problems with the definition of the terms “farmer” or “active farmer”, as well as the income, which should be the basis for the analysis of the income situation of agricultural holdings.

### **Evaluation of the proposed EU strategy for agriculture**

This part of the article does not discuss all proposed changes in the functioning of the CAP presented by the EC in 2018. They have been widely presented in numerous publications<sup>10</sup>. The presentation of the strategic documents presented by the EC in 2020, mentioned in the introduction, was also abandoned. Such an approach is dictated by both the limitations as to the length of the article and the fact that the number of publications discussing the EC’s proposals is significant and is systematically growing.

The title of this chapter deliberately does not use the term “common agricultural policy”. This is caused by the assessment of the significance of CAP and European Green Deal proposals for the necessary transformation of agriculture and the whole EU food system.

The analysis of the specific objectives proposed for the CAP 2020+ and their comparison with the current set of CAP objectives indicates that in reality, the proposed changes are not ambitious, which means that already at the level of declared objectives, no real involvement of the CAP in implementing the European Green Deal is assumed. At this point, a fundamental question must be asked: how is the “Farm to Fork” strategy to be implemented if the proposed shape of the CAP 2020+ does not fit in with the ambitious objectives of this strategy at all?

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<sup>9</sup> With regard to this issue, it is worth considering where it actually comes from. According to Pupo d'Andrea and Romeo Lironcurti (2017), it stems from the lack of an answer to the question of why CAP direct payments should be used.

<sup>10</sup> A wide range of studies in this area, both the publications of the EC itself and other public agencies, as well as selected scientific publications can be found in the document prepared for the European Parliament’s Agriculture and Rural Development Committee “Information package on the post 2020 CAP reform” on the website: [https://www.europarl.europa.eu/RegData/etudes/IDAN/2019/629211/IPOL\\_IDA\(2019\)629211\\_EN.pdf](https://www.europarl.europa.eu/RegData/etudes/IDAN/2019/629211/IPOL_IDA(2019)629211_EN.pdf)

In order for the “Farm to Fork” strategy to be implemented through the CAP, not only the assumptions and objectives of the CAP 2020+, but also the instruments should be radically changed. This raises the question whether the implementation of the new CAP should not be further delayed. Until recently, it was expected that the implementation of the current CAP reform would start in 2021, but the additional delays related to the pandemic and the difficulties encountered by Member States in preparing their strategic plans make this deadline even more likely to be delayed. At the same time, it is worth considering whether, in order to ensure the implementation of the Farm to Fork strategy, the implementation of the new CAP should not be postponed even further and solutions should be introduced that are in line with the strategy.

Similarly, with regard to the biodiversity strategy, it can be stated that the proposed reform of the CAP is not adapted to the tasks assigned to agriculture under the objectives related to improving the state of biodiversity in the European Union.

Analysing the objectives of the CAP reform and the strategies related to the European Green Deal published by the EC, it can be concluded that they largely fit into the objectives of the anticipatory regulation. However, the question whether the ambitious and accurate objectives of the proposed strategies will be transposed into appropriate agricultural policy instruments that will make their implementation possible remains open.

The way in which the proposed strategies are built raises greater doubts. It seems that, despite numerous public consultations conducted by the EC, the preparation of solutions for EU policies does not involve the actual participation of various stakeholder groups. This is undoubtedly an extremely difficult task. However, the published strategies, although based on data and facts, do not seem to take into account the social consensus on the direction of development of the European Union. A debate on the desired vision of the EU in the context of the perceived challenges facing the entire EU would be a good solution to this problem. At present, however, this seems impossible. Nevertheless, it would be worth trying to develop such a vision, at least partially, for individual EU policies.

### **Summary**

The analysis focused on assessing the objectives and current strategic plans for the CAP. However, it is impossible not to indicate the main shortcoming of this policy at the moment, i.e. the gap between the declared and the desired transformation of the food systems in the EU and the instruments available to achieve these objectives. The basic instruments of the CAP are still the direct payments, which do not have any direct impact on the implementation of the transformation of the EU economy and do not promote the ecological efficiency of farms, and thus have no positive impact on the environment.

Among the non-budgetary problems with the implementation of ambitious pro-environmental objectives, the key issues seem to be the lack of response in the CAP to the problem of public trust and phenomena such as “free riding” or “the tragedy



of the commons". The strategic proposals of the EC and the objectives of the CAP reform do not include any proposals on how to deal with these problems. In reality, the proposed solutions may cause an increase in the frequency of these negative phenomena and the lack of social trust, as their legitimacy and expected benefits are not sufficiently explained to all interested parties.

It would be useful to bring the objectives, targets and instruments of the proposed strategies closer to EU citizens. It would be worthwhile to use a backcasting approach in the future to develop further development strategies. Already at the beginning of their implementation, a sufficient group of opinion-forming citizens and organisations should support the proposed solutions, seeing them as the right way to achieve the desired shape of agriculture and food system in the future.

At the same time, the system for monitoring agriculture and its environment should be intensively developed, so that the proposed actions are based on data and knowledge. This means that it is necessary to transform the traditional anticipatory management into a data-based anticipatory management, which is easier to implement in practice due to the rapid development of ICT systems.

There is still a lack of knowledge about how individual agricultural policy instruments actually affect agriculture and the environment, and what the interactions between various instruments are. These deficiencies further increase the need for data and research to identify the most appropriate agricultural policy instruments to achieve a given objective.

In conclusion, the analysed strategies aptly identify the necessary changes in the functioning of agriculture and the environmental policy objectives relating to this sector, but do not offer adequate tools to implement these objectives. Moreover, they do not demonstrate that they have been developed through a dialogue between different stakeholder groups, nor do they provide sufficient explanations of the rationale for taking such actions in the planned period. This lack of involvement of EU citizens in preparing and gaining support for the proposed objectives and actions may prove to be the greatest barrier to actually carry out the necessary transformation of food systems in the European Union.

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## PRZYDATNOŚĆ EKONOMII ZŁOŻONOŚCI DO TWORZENIA DŁUGOOKRESOWEJ POLITYKI ROLNEJ

### Abstrakt

*Tworzenie polityki rolnej staje się coraz trudniejszym zadaniem. Liczba czynników, które należy wziąć pod uwagę, systematycznie rośnie, jednocześnie następuje wzrost zróżnicowania potrzeb rolnictwa, jak i oczekiwań konsumentów i podatników. W tej sytuacji dotychczasowe podejście do kreowania polityki rolnej przestaje zdawać egzamin.*

*Ostateczny kształt wspólnej polityki rolnej (WPR) w nowych wieloletnich ramach finansowania Unii Europejskiej nie został jeszcze w pełni ustalony. Prace przedłużają się z wielu różnych powodów. Obecna Komisja Europejska wiele uwagi poświęca wyzwaniom środowiskowo-klimatycznym, proponując realizację strategii Europejski Zielony Ład. Jednym z kluczowych elementów tej koncepcji rozwojowej jest strategia „Od pola do stołu”, która wskazuje kierunki transformacji systemów żywnościowych w UE.*

*Pojawia się pytanie, czy zaproponowany kształt strategii UE wobec rolnictwa jest optymalny z punktu widzenia stojących przed tym sektorem wyzwań. Odpowiedzi na to pytanie może udzielić ekonomia złożoności, która oferuje podejście do tworzenia polityki bazujące na dostrzeżeniu złożoności systemów społeczno-ekonomicznych i ich specyficznej dynamiki wymagającej określonego ukształtowania podejmowanych przez państwo działań.*

*Celem artykułu jest prezentacja ekonomii złożoności jako podejścia odpowiedniego do tworzenia polityki rolnej w kontekście wielu zróżnicowanych wyzwań stojących przed tym sektorem oraz wskazanie, na ile obecnie tworzona polityka rolna uwzględnia wskazówki ekonomii złożoności.*

**Słowa kluczowe:** ekonomia złożoności, polityka rolna, systemy żywnościowe, wyzwania środowiskowo-klimatyczne, wspólna polityka rolna.

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