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An Assessment of the Impact of Latvian New Common Agriculture Policy: Transition to Climate Neutrality

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***Abstract* – Agriculture ranks among the key sectors responsible for substantially rising greenhouse gas (GHG) emissions. The increase in emissions contributes to the adverse effects of climate change, including threats to biodiversity, the potential for extreme weather events, elevated sea levels, and alterations to ocean currents. The European Union's Common Agricultural Policy (CAP) is a comprehensive framework that aims to achieve sustainability and advance the agricultural sector's journey towards climate neutrality by addressing social, economic, and environmental goals. The study aims to evaluate Latvia's Common Agricultural Policy Strategic Plan (CAP SP) and to evaluate the impact of the policy. The goal of the study is to determine which objectives are more likely to succeed based on the overall state of Latvia's agricultural sector and by evaluating the provided information in Latvia's CAP. The assessment of the CAP SP reveals that there are clear and specific metrics in place for the high-impact goals, particularly those related to addressing climate change and managing resources. According to the TOPSIS analysis, the climate change (SO4) and environmental care (SO5) objectives demonstrate the most significant impact. Objectives associated with European Union policies, such as the National Energy and Climate Plan, European Green Deal, and Farm to Fork strategy, are more likely to succeed than objectives not connected to these or similar policies.**

***Keywords* – Climate neutrality goals; common agricultural policy; composite sustainability index; evaluation of impact; TOPSIS analysis.**

1. INTRODUCTION

Traditional agricultural practices have historically relied on using resources like soil, water, and energy. Thus, the agricultural sector must adapt and implement sustainable practices that positively impact food production [1], [2]. Agricultural production is a global worry due to the fast and unparalleled population growth. It also significantly affects global food production, security, and the economy. The correlation between agriculture and climate change is multifaceted, as variations in weather patterns are the underlying reason behind ecological or environmental pressures [3]. Climate change is the root cause of food security's deterioration, visible through temperature rise, extreme weather increases and biodiversity changes [4]. The agricultural sector contributes to greenhouse gas (GHG) emissions and

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global warming. This impacts the environment and affects future generations' socio-economic growth and well-being [5], [6].

The Common Agricultural Policy (CAP) [7] supports farmers and ensures food security in Europe. The CAP of the European Union (EU) involves a collaborative effort between the farming community and the broader society and a partnership between Europe and its farmers. The policy's central aim is to assist farmers, enhance agricultural productivity, ensure a fair income for farmers, work towards achieving climate neutrality in agriculture and promote sustainable management of natural resources. Additionally, the policy seeks to encourage the preservation of rural landscapes and territories and promote employment opportunities in agriculture and related industries. Promoting employment opportunities in the agricultural sector is vital as farmers play a crucial part in the food production chain, even though their income does not reflect that [7]. Given these circumstances, the CAP needs to achieve its objectives of mitigating and reducing climate change's impact and promoting the agricultural sector's transition towards climate neutrality [8].

In addition to the CAP [7], the EU has introduced a series of policy measures to combat the problem of climate change. One such initiative is the European Green Deal [9], which was announced in 2019. This package aims to reduce GHG emissions by 55 % by 2030 (expressed about the emissions levels in 1990) and achieve climate neutrality by 2050. The European Green Deal encompasses a range of measures, including promoting renewable energy sources, improving energy efficiency, and adopting low-emission technologies [9]. Achieving zero net GHG emissions by 2050 is the most ambitious and demanding target set by the EU [10].

To address the requirements of each sector, the European Green Deal [9] must implement specific strategies. The Farm to Fork strategy [11] is one such approach that seeks to improve health, environment, and lifestyle. By ensuring that agriculture, fishers and aquaculture, and the food value chain play their part in achieving a climate-neutral EU by 2050 [11]. A new business model for farmers and foresters called Carbon Farming [12] is being promoted. This involves practices that remove carbon dioxide from the atmosphere and store it in the ground. Framers who adopt such practices will be rewarded through the CAP or other initiatives [13]. The Carbon Farming initiative concludes that Carbon farming can significantly contribute to climate change mitigation, and the European Commission acknowledges that Carbon farming is in its infancy and that there is a lot to be addressed. The European Commission highlights that Carbon farming can be promoted via the EU and national policies and private initiatives. In the years towards 2030, result-based Carbon farming pilots and, eventually, schemes should be settled by Member States and local governments. Therefore, the actual solutions for reducing emissions through improved farming practices should be defined for each region [14], [15].

Another promising area for farmers is circular bioeconomy. By embracing the opportunities presented by circular bio-refineries that produce bio-fertilizers, bioenergy, protein feed, and other products, farmers can help to achieve a climate-neutral economy while creating new job opportunities in primary production. To achieve sustainable and climate-neutral agriculture, there is a need to reduce the use of chemical pesticides. One goal of the Farm to Fork strategy is to reduce chemical pesticides by 50 % by 2030. The close relationship and shared goals between the CAP and Farm to Fork means that implementing practices that reduce the use of chemical pesticides in the CAP can prove advantageous in supporting the transition [13].

In addition to the Farm to Fork strategy, several other European strategies are pertinent to the shift towards sustainable agriculture. Still, each approach emphasises a different aim to help agriculture achieve its environmental, social and economic goals. The Long-Term Vision for Rural Areas initiative focuses on societal problems [11]; the EU has set its sights on stimulating discussions surrounding the future of rural areas and their role in society. As part

of this initiative, a vision for rural areas by 2040 is presented, and opinions will cover challenges such as demographic change, connectivity, low-income levels, and limited access to services [16].

The Soil Strategy and Biodiversity Strategy focus on environmental problems. The Soil strategy is centred around improving soil health. This strategy is directly connected with the European Green Deal and Farm to Fork strategies while also supporting the objectives of the Biodiversity Strategy [11]. It aims to create measures that will protect and restore soil, as well as actions that will promote sustainable use of soil. The strategy has established a vision and goals for achieving healthy soils by 2050. In addition, the strategy proposes the implementation of the new Soil Health Law by 2023, aimed at ensuring fair competition and a high standard of environmental and health protection [17]. The EU has developed a biodiversity strategy for the year 2030, a comprehensive and ambitious plan with long-term goals to protect nature and prevent the deterioration of ecosystems. This strategy is also connected with the European Green Deal and Farm to Fork strategies [18].

The CAP (2023–2027) has ten main objectives, of which three are directed at the environment and climate change [19]; the EU aims to reduce GHG emissions in the agricultural sector by implementing measures such as the use of mitigation technologies, improved soil management, biomass production, reduction of fossil fuel usage, and minimising agricultural production losses and waste. The agricultural sector is particularly susceptible to climate change, and its economic sustainability is directly linked to its ability to adapt. Therefore, the EU's efforts to combat climate change in agriculture are crucial for agricultural sectors' sustainability [20]. From 2023 to 2027, every EU member state must develop its own CAP Strategic Plan (SP). Latvia's Ministry of Agriculture has established several strategic guidelines that will form the basis for implementing practical actions. These guidelines aim to enhance the value of agricultural production by ensuring competitiveness, increasing agricultural income, driving economic growth in rural areas, fostering innovation, preserving biological diversity, and combating climate change, all while ensuring consumers have access to high-quality, locally sourced food [21].

Even though Latvia has developed CAP SP and set objectives that must be achieved by the end of 2027 [22], it is still being determined if the developed policy will achieve the objectives. This study assesses and determines if the policy can achieve the main objectives and help the agricultural sector move towards climate neutrality.

2. METHODOLOGY

2.1. Approach to the Study

The Multicriteria Decision-Making analysis method was used to evaluate the impact of Latvian CAP SP (2023–2027). The methodology includes:

1. Assessment of CAP SP objectives;
2. Identification of indicators to assess the policy's objectives;
3. Expert survey development to evaluate the specific objectives in relation to each indicator, assessment of each indicator weight;
4. Ranking impact of policy's objectives using TOPSIS;
5. Prioritization of objectives (low, moderate and high impact);
6. Development of composite sustainability index;
7. Normalization of indicator scores;
8. Score weighting;
9. Score aggregation.

2.2. Policy Objective Assessment

The assessment was conducted to evaluate the Latvian CAP SP from 2023 to 2027. The policy has set ten main objectives, and each objective has specific needs that must be met to achieve it. Interventions have been assigned to each need to facilitate its accomplishment and, in turn, achieve the objective. The interventions are categorised into groups contributing to different fields, such as knowledge, rural development, climate risk reduction, etc. To assess the policy's effectiveness, quantitative achievable results have been established for each of the ten main objectives, including SO1 – Ensure fair income; SO2 – Increase Competitiveness; SO3 – Rebalance power in the food chain; SO4 – Climate change action; SO5 – Environmental care; SO6 – Preserve landscapes and biodiversity; SO7 – Support generational renewal; SO8 – Vibrant rural areas; SO9 – Protect food and health quality; XCO – Foster knowledge, innovation and digitalisation [23].

The quantitative achievable results are determined within the CAP SP for each of the main objectives (SO1–SO9, XCO) [23].

The CAP SP provided quantitative results that must be achieved; for each objective, there are specific quantitative indicators with corresponding values that need to be attained by a particular period – 2025, 2027, and 2029. These periods were selected as reference points; starting in 2024, every EU country will have to present an annual performance report that evaluates policy effectiveness. In 2025, the European Commission will conduct an initial review of the CAP SP performance, and if it is insufficient, specific follow-up measures must be incorporated into the policy. In 2027, The European Commission will conduct the second performance review for all the CAP SP; 2029 is the final reference point since the overall target values are summarised at this specific period [22], [23].

2.3. Identification of Indicators for Objective Assessment

To evaluate the CAP SP, it is essential to choose indicators that can depict the policy's impact and with chosen indicators, it must be possible to assess all objectives (SO1–SO9, XCO). Indicators must show the policy's effectiveness, and selected indicators must be able to compare. The chosen indicators were selected from OECD indicators of better regulation and studies regarding indicators that can be used to assess agriculture. These indicators were chosen based on the possibility that they can be used to evaluate the CAP SP.

The identified indicators for CAP SP are as follows: I1 Possible side effects – describe the policy's alignment with climate neutrality and possible contradictions with other policies; I2 Transparency – depicts the transparency of decision-making for the policy; I3 Objectivity – if the objective is based upon on different involved parties perspectives; I4 Specificity – the action plan is specific and developed to the particular policy; I5 Quality, sustainability – the policy's objectives and interventions are connected and will lead to sustainability, various factors have been considered when developing the policy; I6 Consistency with EU objectives for sustainable agriculture – the CAP SP alignment with EU objectives; I7 Feasibility of measures – objectives are realistic and can be achieved; I8 Measurability of results – it is possible to evaluate the outcomes of the policy; I9 Long-term sustainability – the policy is sustainable and can be integrated into existing policy systems (Table 1).

TABLE 1. INDICATORS FOR POLICY'S ASSESSMENT

No.	Indicator	Description
I1	Possible side effects [24], [25]	Prevent any possible negative impacts, and this objective aligns perfectly with the fundamental principles of climate neutrality without conflicting with the principles of sustainable development. Moreover, the policy measures do not contradict other policies.
I2	Transparency [24], [26]	The decision-making process and regulatory framework are characterised by transparency, meaning they are open and accessible to the public. Any attempts by lobbyists or influential persons to influence decision-making are disclosed and made public.
I3	Objectivity [24], [27]	Measures have been proposed based on their potential to help attain the objectives of addressing climate change. The perspectives of different parties involved have been considered and extensively deliberated upon.
I4	Specificity [24], [27]	An action plan that is specific and well-justified has been developed, considering the opinions of relevant stakeholders and the general public. The plan is easy to understand and implement and can be adjusted.
I5	Quality, sustainability [24], [27]	The policy aims to achieve specific performance indicators, and its impact is expected to extend beyond a single measure, leading to positive outcomes that promote future sustainability. The policy has been developed considering various factors, including environmental, social, economic, institutional, and financial aspects.
I6	Consistency with EU objectives for sustainable agriculture [28]	How well do the measures implemented by the CAP SP align with the EU goals for sustainable agriculture, which include promoting environmentally sustainable practices, enhancing rural livelihoods, promoting sustainable farming systems, and reducing GHG emissions.
I7	Feasibility of measures [29]	Are CAP SP measures feasible and realistic based on available resources and institutional capacity? This includes an assessment of the potential costs and benefits of the measures.
I8	Measurability of results [25]	To what extent is it possible to evaluate the outcomes of CAP SP measures, given the presence of dependable data sources, monitoring and assessment mechanisms, and benchmarks that can be used to gauge the effectiveness of the measures.
I9	Long-term sustainability [30]	How well can agricultural policies be sustained in the long term, regarding their ability to address systemic problems and integration into existing policy systems. This would depend on how well CAP SP can fit into a long-term and coherent strategy to achieve the goals set by the EU for sustainable agriculture.

2.4. Development of Expert Survey

The CAP SP was evaluated by industry experts and scientists with a high-level understanding of agricultural policy and its implementation. Seven experts participated in this survey. The evaluation provided by the experts was grounded on their multi-year observations of the agricultural sector. In the expert survey, a table with quantitative and qualitative achievable results was provided that experts used to evaluate each objective about each indicator. The qualitative and quantitative achievable results were gathered from Latvia's CAP SP [23]. Indicators were assessed based on the Severity rating scale [31], on a scale from one to five. A score of one shows a very low performance, a score of two shows low

performance, a score of three indicates average performance, a score of four shows high performance, and a score of five represents very high performance and significantly impacts policy.

Before constructing a complex sustainability index, it is essential to normalise the data to facilitate fair comparison indicators and policy. Data must undergo a normalisation process to compare and combine different indicators. The min-max normalisation method standardises and compares indicators on a common scale. This method's results are presented using a scale from zero to one.

Indicator weighting took place in the survey after experts evaluated the objectives concerning indicators. The indicator importance was obtained from the expert assessment of indicators. The nine indicators were assessed and given priority. The total weight of all indicators should be 100 %. When each indicator was weighted, the weights were assigned the same, and the total weight for all indicators had to be one. The expert survey results were gathered, and the assessment was done using TOPSIS.

3. RESULTS AND DISCUSSION

3.1. TOPSIS Analysis

Using TOPSIS analysis, the impact analysis was conducted for the CAP SP objectives. Based on the results of TOPSIS, it was found that the most significant weight was given to the feasibility of measures (0.16), long-term sustainability (0.14), and measurability of results (0.13), lower weight was assigned to quality, sustainability (0.11), objectivity (0.10), consistency with EU objectives for sustainable agriculture (0.10), and the lowest weights were allocated to specificity (0.09), transparency (0.08) and possible side effects (0.08). After the results were obtained from TOPSIS, the defined objectives were divided into three groups based on their impact. The groups are assigned as follows: the first group (high impact group) is allocated to the objectives which have scores above 0.70 to 1.00, the second group (moderate impact group) is assigned to objectives which have scores from 0.40 to 0.70, and the third group (low impact group) is allocated to the weakest policy objectives with a score from 0.00 to 0.40.

According to impact scores, the objectives were classified into three groups; the results show that two out of ten objectives were rated with a high impact score, thus placing these objectives in a high-impact group, which includes objectives SO4 and SO5.

The fourth objective (SO4) focuses on contributing to climate change mitigation. The agricultural sector is a significant contributor to GHG emissions, so it is crucial to implement sustainable farming practices to reduce emissions. The primary objective is to enhance carbon sequestration in the soil and reduce GHG emissions by promoting environment-friendly technologies and practices [20]. The aim is to enhance Latvia's agricultural sector's climate resilience by fostering awareness and understanding of sustainable farming practices among farmers and foresters. This includes encouraging climate change mitigation efforts and equipping farmers with the necessary skills to adapt to changing environmental conditions [23].

The fifth objective (SO5) aim is to implement efficient management of natural resources. Numerous activities and factors threaten the well-being of soils in Europe, necessitating policy interventions to address the issue. These threats are soil erosion, soil organic matter decline, biodiversity loss, contamination, etc. [32]. The primary weakness in Latvia's soil management is outdated and ineffective melioration systems, leading to poor functionality and a high risk of fertiliser runoff. Additionally, the country's soil monitoring systems are

inadequate, with limited data available for various quality indicators. To achieve the desired objectives and goals, supportive interventions will be implemented to encourage sustainable and environmentally friendly management of soil, water, and air [23].

SO4 objectives impact score is 0.88; the objectives aim to contribute to climate change mitigation and adaptation, promoting carbon sequestration and reducing GHG emissions. This result could be explained by the fact that the most significant percentage of funding has been assigned to environmental objectives defined in the Latvian CAP SP. As well as it could be accounted for the fact that environmental objectives such as climate change mitigation, reduction of GHG, carbon sequestration, and use of renewable energy are part of the NECP objective No. 7, 'Efficient use of resources and reduction of GHG emissions in agriculture' [23], thus it reinforces the objectives implementation success and contributes to the overall objective achievement to both of the policies about agriculture.

The second highest score is for objective SO5 (0.76); the objective aims to promote sustainable development and efficient management of natural resources. As a significant amount of attention is focused on climate change mitigation and adaptation, the CAP SP focuses on new practices and technology implementation, which could also contribute to the efficient management of natural resources and provide the success of the SO4 objective. That includes practices such as minimal tillage, zero tillage, strip tillage, use of organic fertilisers, fertiliser management, efficient use, etc. Adopting new practices and technologies may hurt productivity and thus impact the farmer's income. Also, the attention has to be directed towards the policymakers and their research regarding the new practices and technologies, as the implementation could cause unintended consequences, such as an increase in pest population or a change in soil microbial composition.

Most objectives are placed in the moderate impact group based on their impact scores. The moderate impact group includes objectives such as XCO promotion of innovation, digitalisation and knowledge (0.65), SO9 adaptation to societal demands regarding food and health (0.61), SO1 promotion of sufficient farm income and resilience (0.60), SO6 halting and restoring biodiversity loss (0.60) and SO2 strengthen the orientation of farms to the market and increase competitiveness (0.45).

The first objective (SO1) of the CAP SP focuses on ensuring viable farm income. Although there has been a decrease in the gap between the average income of the EU's agricultural sector and that of the overall economy in recent years due to labour migration, the income of the agricultural industry is still considerably lower [33]. Farmer's income in Latvia is highly dependent on changes in weather and market prices, resulting in significant fluctuations. Overall, the average income of farmers in Latvia is lower than that of the broader economy. In particular, farmers in the Latgales and Vidzemes regions experience lower incomes due to poor soil quality and shorter growing seasons. Furthermore, Latvia's average agricultural income is considerably lower than the EU's [23].

The second CAP SP objective (SO2) focuses on increasing competitiveness by increasing the focus on research, technology, and digitalisation. To address the challenges of a world with limited resources and uncertain climate conditions, it is imperative to enhance agricultural productivity sustainably to keep up with the rising demand [34]. Latvia faces several challenges that impede the growth and development of small and medium-sized farms. These challenges include a lack of access to sufficient funding and production resources, which makes it difficult for farmers to adopt new technologies. Enhancing competitiveness in small and medium-sized farms is crucial, leading to the growth of new farms and creating jobs in rural areas. To increase the participation of inhabitants in the agricultural sector, a combined financial instrument will be introduced to provide financial aid for farmers [23].

The sixth objective (SO6) focuses on halting and reversing biodiversity loss. Due to economic pressures, there has been a significant increase in agricultural lands, resulting in the disappearance of landscape elements. The limited understanding of organic farming has led to the abandonment and neglect of perennial meadows, which are ecologically valuable due to their low-intensity use and diverse plant species. To address the loss of biodiversity, there is a need to promote awareness of the importance of protecting biological diversity and to take steps to increase it [35]. Latvia has placed significant emphasis on preserving landscape elements and protecting biodiversity. These elements play a crucial role in improving the quality of the environment by enhancing natural resources and mitigating climate change [23].

The ninth objective (SO9) is to promote food sustainability and health [31]. Latvia aims to enhance its capacity to meet the public's demand for healthy, safe, nutritious, and sustainably produced food. The country also seeks to reduce food waste and improve animal welfare by addressing antimicrobial resistance [23].

The tenth objective (XCO) aim is to foster and share knowledge, innovation, and digitalisation. Modernising agriculture and rural areas can offer digitalisation, innovation, and knowledge-sharing opportunities. However, a significant challenge to achieving this goal is more experience, knowledge, and interest in sustainable and GHG emission-free farming. To address this, there is a need for collaboration between scientists and the private sector to provide farmers with appropriate technologies and practices. Consultations with new and experienced farmers can enhance their understanding and knowledge of sustainable farming [23].

The horizontal objective XCO result may be explained by the fact that the majority of farmers and people who work in the agricultural sector have low professional knowledge level, and a large percentage (82.5 %) of farmers in Latvia are over the age of 45 and 65 [36], this may cause a problem; older farmers are more resistant to change, and would like to continue to use traditional farming practices. In addition, digitalisation and the use of innovation can cause a loss of conventional farming practices. Based on the objective's aim, evaluating the objective implementation's success is more challenging, as it is harder to assess the increase in farmer's knowledge and an overall understanding of sustainable agriculture practice use. SO9 and SO1 objective results can be explained based on the fact that agriculture is dependent on weather conditions and climate; the price of crops can fluctuate based on these aspects; it is hard to adapt to societal demands and improve the farmer's income as weather conditions are out of farmer's control. SO2 objective significantly focuses on small and medium-sized farms and their owners; most farms in Latvia and the EU are small or medium-sized. It is essential to improve their viability, as they are necessary for rural development by offering job opportunities and providing maintenance of rural areas [37] (Fig. 1).

Four of the ten CAP SP objectives are placed in the low-impact group. SO3 improve the farm position in the value-added chain (0.33), SO8 promote employment, growth, gender equality, and rural development (0.21), and SO7 attract and supports young farmers to promote sustainable business in rural areas (0.06).

The third objective (SO3) focuses on strengthening the position of farmers in value chains. It aims to improve the position of farmers in value chains through several measures. This includes promoting cooperation among farmers, enhancing synergies within value chains, supporting the development of market-driven production models, fostering research and innovation, and increasing market transparency [38]. In Latvia, there is a shortage of capable leaders who can motivate farmers to collaborate in marketing their produce, efficiently manage farmers' associations, and establish joint initiatives, which is a significant hindrance

to the development of cooperation. Cooperatives or producer organisations lack the funds to offer appropriate remuneration to skilled and experienced leaders. As a result, finding and retaining qualified leaders becomes a challenge for these organisations [23].

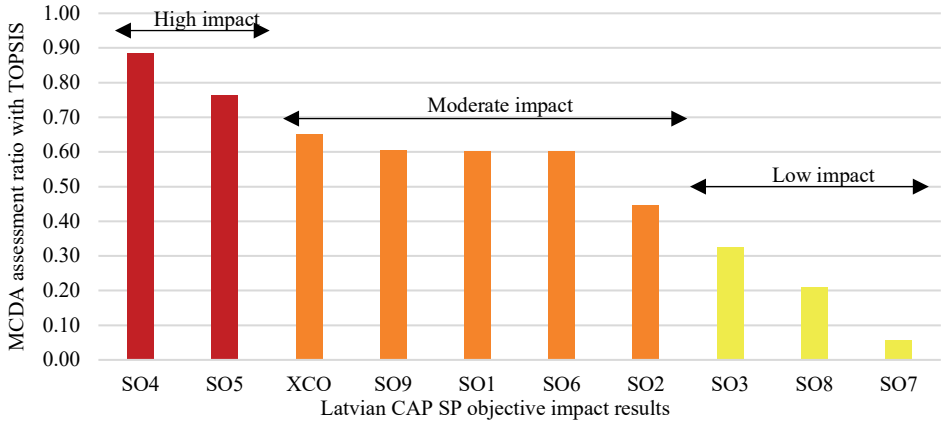


Fig. 1. CAP SP objective impact results.

The seventh objective (SO7) aims to support structural change and generational renewal. New farmers are more willing to learn and adopt innovations and are typically more motivated and determined than their experienced counterparts. However, the challenge facing these new farmers is their need for more practical knowledge and expertise in agricultural management. Additionally, agriculture is not viewed as a highly prestigious profession, discouraging younger generations from pursuing it as a source of income [39]. Latvia plans to incentivise new farmers by offering them additional financial support, which will be available right from the start of their operations and throughout their production period. This move aims to attract young farmers and encourage them to take up farming as a profession [23].

The eighth objective (SO8) aim is to promote growth and equality in rural areas. The goal is to encourage the development by creating more job opportunities, achieving gender equality, and promoting circular bioeconomy and sustainable forestry. However, rural areas are often considered less favourable for living and limited in growth due to insufficient financial support from municipalities, which leads to people preferring to live in urban areas. This overpopulates cities while rural areas struggle to survive [40].

The result for the SO2 objective can be based on the fact that it is not entirely possible to determine if the CAP SP could achieve this objective, as the policy has set few quantitative achievable results that, to some extent, could show if the implemented objective could be fulfilled. Still, the values are shared with other objective quantitative possible outcomes, and the general information regarding this objective needs to be included in the policy [23]. It is also proven that there could be disbelief that this objective could be accomplished entirely based on the past CAP SP results. Based on the past CAP SP for EU countries, there was a reoccurring flaw related to payments for small and medium-sized farms; after the assessment of past period CAP SP in Poland [41], Sweden [42], Italy [43] in Latvia [23], it was concluded that it is easier for more giant farms and particularly for farms that are located in well-developed areas to gain the funding that CAP SP provides, causing inequality between farmers. Smaller and medium-sized farms in Latvia cannot attract enough funding and production resources. Thus, these farms need help to afford new technologies or workers [23].

SO3 objectives aim to promote cooperation among producers; it may lead to negative consequences such as fewer larger producers will gain more power, but smaller producers won't be able to make an impact, thus increasing the gap between smaller and bigger producers, as smaller producers will not be able to compete with them. SO8 objective has the second lowest impact score of the ten objectives. This objective focuses on the equality and promotion of rural development. The lowest impact score is for objective SO7; the objective aims to attract young farmers and promote business development in rural areas. The objectives SO7 and SO8 go hand in; as the generation of working Latvian farmers ages, it is necessary to attract young people and young farmers to positively impact rural development and increase the farmer's prestige in the work field. In the CAP SP, parallels have been drawn between digitalisation, an increase in innovation and an increasing number of young people interested in working in the agricultural sector. Putting emphasis on innovation or digitalization could increase the interest of young people. Still, it should be pointed out that farming and being a farmer are not seen as prestigious, and the support for young farmers is not enough for young people even to consider the possibility of working in this sector. CAP SP provides limited funding to young farmers [23] to obtain land and technology. Young farmers face problems based on their lack of experience and knowledge. Thus, it is essential to increase knowledge sharing between farmers, but it could be challenging based on the competition that farmers face between each other locally or globally.

3.2. Composite Sustainability Index

Based on the multi-criteria analysis results, the composite sustainability index was developed. The indicator with the highest impact on sustainability is long-term sustainability, followed by the feasibility of measures and the measurability of results. Less impactful sustainability indicators are consistency with EU objectives for sustainable agriculture, quality and sustainability, and objectivity. The least impactful sustainability indicators are specificity, transparency and possible side effects. The findings indicate that the most significant sustainability score, which refers to the sustainability level of the ongoing policy implementation or progress, is achieved by the subsequent policies: XCO promotion of innovation, digitalisation and knowledge (0.78), SO4 contributing to climate change mitigation and adaptation, promoting carbon sequestration and reduction of GHG emissions (0.77), SO5 promote sustainable development and efficient management of natural resources (0.76) (Fig.2). For these objectives the highest impact scores are formed by long-term sustainability (0.12), followed by the feasibility of measures (0.11) and measurability of results (0.11). The lowest impact scores for these objectives were for specificity (0.06), possible side effects (0.05) and transparency (0.05).

The same similarities can be observed for the lowest impact score objectives. SO7 to promote attraction and support for young farmers, promote sustainable business in rural areas (0.55), SO8 promote employment, growth, gender equality, and rural development (0.58), the lowest sustainability index scores are for indicators such as transparency (0.04), possible side effects (0.04) and specificity (0.04). It can be concluded that the most crucial sustainability indexes are for indicators such as long-term sustainability, measures' feasibility and results' measurability. Long-term sustainability is rated with the highest sustainability index; it is crucial for the objectives and their practice implementation to successfully provide movement towards long-term sustainability. The agricultural sector's environmental impact contributes to climate change, increasing GHG emissions and atmospheric carbon; implementing measures that decrease these impacts makes it possible to halt climate change and improve its sustainability.

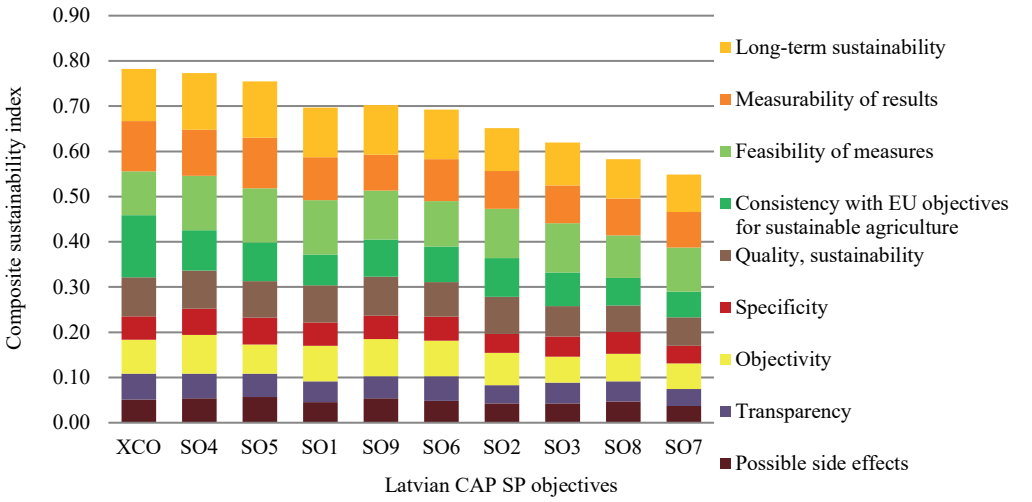


Fig. 2. Composite sustainability index of CAP SP objectives.

4. CONCLUSIONS

The assessment shows that high-impact objectives have a clear set of measures detailed in the CAP SP and that the objectives focusing on climate change mitigation and smart use of resources have higher funding than others. Also, the objectives connected with different EU policies, such as the European Green Deal and Farm to Fork strategy, can achieve a higher success rate than those not associated with other policies. Objectives must have measurable outcomes that can be evaluated through quantitative and qualitative results to determine their level of achievement. To comprehensively assess the effectiveness of a policy, policymakers should contemplate incorporating measurable quantitative achievable results for objective measures.

In Latvian CAP SP, there has been a definition of objectives and measures to provide development of sustainable agriculture. Although there has been a definition of the goals that need to be achieved, based on the results, it is visible that the policy needs more depth in some aspects. Four objectives have a high risk of failing as their impact score depicts that these objectives need more concrete measures and there is less possibility of achieving them.

The objectives with the lowest impact scores were SO2, SO3, SO8 and SO7. The objectives are harder to assess based on their success possibility, as they are linked with other objectives, and their success rate is impacted based on further objective success. As well as, there are linkages between objectives such as SO8 with SO7 and XCO, which can cause false understanding and reliance on other objectives. The objectives must be connected, and their success rate should be based on their standalone impact and sustainability.

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REFERENCES

[1] Bosello F., *et al.* Chapter 5 - Economy-Wide Impacts of Climate Mitigation and Adaptation Strategies Across European Regions. *Adapting to Climate Change in Europe* 2018:245–271. https://doi.org/10.1016/B978-0-12-849887-3.00005-8
[2] Edwards W., Duffy P. Farm Management. *Encyclopedia of Agriculture and Food Systems* 2014:100–112. https://doi.org/10.1016/B978-0-444-52512-3.00111-X
[3] Saxena R., *et al.* The role of artificial intelligence strategies to mitigate abiotic stress and climate change in crop production. *Visualisation Techniques for Climate Change with Machine Learning and Artificial Intelligence 2023:273*–293. https://doi.org/10.1016/B978-0-323-99714-0.00006-6
[4] Kiran T.M., *et al.* Carbon sequestration potential of sustainable agricultural practices to mitigate climate change in Indian agriculture: A meta-analysis. *Sustainable Production and Consumption* 2023:35:697–708. https://doi.org/10.1016/j.spc.2022.12.015
[5] Ibrahim M. A., Johansson M. Combating climate change – What, where and how to implement adaptive measures in the agriculture sector of Öland, Sweden, considering the constraints of carrying capacities and risk of maladaptation. *Land Use Policy* 2022:122:106358. https://doi.org/10.1016/j.landusepol.2022.106358
[6] Asian Development Bank Institute. Climate Change in Asian and the Pacific 2012.
[7] European Commission. Agriculture and rural development [Online]. [Accessed 10.03.2023] Available: https://agriculture.ec.europa.eu/common-agricultural-policy/cap-overview/cap-glance_en
[8] Pe'er G., Lakner S. The EU's Common Agricultural Policy Could Be Spent Much More Efficiently to Address Challenges for Farmer, Climate, and Biodiversity. *One Earth* 2020:3(2):173–175. https://doi.org/10.1016/j.oneear.2020.08.004
[9] Nagel N. O., *et al.* Impacts of green deal policies on the Nordic power market. *Utilities Policy* 2023:80:101475. https://doi.org/10.1016/j.jup.2022.101475
[10] Fetting C. The European Green Deal. ESDN Report. Vienna: ESDN, 2020.
[11] Boix-Fayos C., de Vente J. Challenges and potential pathways towards sustainable agriculture within the European Green Deal. *Agricultural Systems* 2023:207:103634. https://doi.org/10.1016/j.agsy.2023.103634
[12] European Commission. Technical Guidance Handbook: Setting up and implementing results-based carbon farming mechanisms in the EU (2021). Brussels: EC, 2021.
[13] European Commission. Farm to Fork Strategy. Luxemburg: EC, 2020.
[14] Gancone A., Pubule J., Blumberga D. Valorization methodology for agriculture sector climate change mitigation measures. *Environmental and Climate Technologies* 2021:25(1):944–954. https://doi.org/10.2478/rtuect-2021-0071
[15] Bumbiere K., *et al.* Development and Assessment of Carbon Farming Solutions. E*nvironmental and Climate Technologies* 2022:26(1):898–916. https://doi.org/10.2478/rtuect-2022-0068
[16] European Commission. Rural development – long-term vision for rural areas [Online]. [Accessed 10.03.2023] Available: https://ec.europa.eu/info/law/better-regulation/have-your-say/initiatives/12525-Rural-development-long-term-vision-for-rural-areas_en
[17] European Commission. Soil strategy for 2030 [Online]. [Accessed 10.03.2023]. Available: https://environment.ec.europa.eu/topics/soil-and-land/soil-strategy_en
[18] European Commission. Biodiversity strategy for 2030 [Online]. [Accessed 10.03.2023]. Available: https://environment.ec.europa.eu/strategy/biodiversity-strategy-2030_en
[19] European Commission. Key policy objectives of the CAP 2023-27 [Online]. [Accessed 10.03.2023] Available: https://agriculture.ec.europa.eu/common-agricultural-policy/cap-overview/cap-2023-27/key-policy-objectives-cap-2023-27_en
[20] European Commission. CAP Specific Objective: Agriculture and Climate Mitigation. Luxemburg: EC, 2019.
[21] European Comission, IMPLEMENTING DECISION OF THE COMMISSION (11.11.2022) which approves the Latvian 2023-2027 of the CAP strategic plan regarding Union support financed by the European Agricultural Guarantee Fund and European Agricultural Fund for Rural Development CCI: 2023LV06AFSP001 [Online]. [Accessed 10.03.2023]. Available: https://www.zm.gov.lv/lv/media/5361/download?attachment (in Latvian).
[22] European Commission. The Common Agricultural Policy: 2023-27 [Online]. [Accessed 10.03.2023]. Available: https://agriculture.ec.europa.eu/common-agricultural-policy/cap-overview/cap-2023-27_en
[23] Ministry of Agriculture Republic of Latvia. Latvijas Kopejais Lauksaimniecibas politikas strategiskais plans 2023.-2027. gadam (Latvia's Common Agricultural Policy Strategic Plan for 2023-2027) [Online]. [Accessed 10.03.2023]. Available: https://www.zm.gov.lv/lv/latvijas-kopejas-lauksaimniecibas-politikas-strategiskais-plans-2023-2027gadam (in Latvian)
[24] Balode L., *et al.* How to Assess Policy Impact in National Energy and Climate Plans. *Environmental and Climate Technologies* 2021:25(1):405–421. https://doi.org/10.2478/rtuect-2021-0030
[25] ODYSEE-MURE. Successful Energy Efficiency Policies Tool [Online]. [Accessed 25.02.2023]. Available: https://www.measures.odyssee-mure.eu/successful-efficiency-measures-tool.html#/methodology
[26] Warren P. Demand-Side Management Policy: Mechanisms for Success and Failure. London: UCL Energy Institute, 2015.

[27] European Commission. Better regulation Toolbox. 2017.[Online]. [Accessed 25.03.2023] Available: https://commission.europa.eu/law/law-making-process/planning-and-proposing-law/better-regulation/better-regulation-guidelines-and-toolbox_en
[28] European Commission. Technical Handbook on the Monitoring and Evaluation Framework of the Common Agricultural Policy 2014-2020. Brussels: EC, 2017.
[29] OECD. Towards a set of indicators for tracking progress on policy coherence for sustainable development (PCSD) at the national level. Paris: OECD, 2018.
[30] Bathaei A., Streimikiene D. A Systematic Review of Agricultural Sustainability Indicators. *Agriculture* 2023:13(2):241. https://doi.org/10.3390/agriculture13020241
[31] European Commission. CAP Specific Objective: Health, Food & Antimicrobial Resistance. Luxemburg: EC, 2018.
[32] European Commission. CAP Specific Objective: Efficient Soil Management. Luxemburg: EC, 2018.
[33] European Commission. CAP Specific Objective: Ensuring Viable Farm Income. Luxemburg: EC, 2018.
[34] European Commission. CAP Specific Objective: Increasing Competitiveness. Luxemburg: EC, 2019.
[35] European Commission. CAP Specific Objective: Biodiversity and Farmed Landscapes. Luxemburg: EC, 2019.
[36] Ministry of Agriculture Republic of Latvia. Horizontal target. Modernize agriculture and rural sectors, in agriculture and rural areas by promoting and sharing knowledge, innovation and digitalisation, and encourage farmers to learn them by improving access for this purpose for research, innovation, knowledge exchange and training. Situation analysis. [Online]. [Accessed 10.03.2023]. Available: https://www.zm.gov.lv/lv/media/5481/download?attachment (in Latvian).
[37] European Parliament. Small farms' role in the EU food system. Brussels: EP, 2022.
[38] European Commission. CAP Specific Objective: Farmer Position in Value Chains. Luxemburg: EC, 2019.
[39] European Commission. CAP Specific Objective: Structural Change and Generational Renewal. Luxemburg: EC, 2019.
[40] European Commission. CAP Specific Objective: Jobs and Growth in Rural Areas. Luxemburg: EC, 2019.
[41] Kiryluk-Dryjska E., Więckowska B., Smolińska K. Winners and Losers of the CAP's rural Development Policy in Poland. *Agriculture* 2022:12(5):676. https://doi.org/10.3390/agriculture12050676
[42] Manevska-Tasevska G., *et al.* Exploring the regional efficiency of the Swedish agricultural sector during the CAP reforms – multi-directional efficiency analysis approach. *Land Use Policy* 2021:100:104897. https://doi.org/10.1016/j.landusepol.2020.104897
[43] Ciliberti S., Frascarelli A. The role of CAP in enhancing farm incomes: the redistributive effect of direct payments in Italy. *Proceedings of the 147th Seminar European Association of Agricultural Economists* 2015. https://doi.org/10.22004/ag.econ.212244