WILL CHANGES IN THE COMMON AGRICULTURAL POLICY BRING A RESPECTFUL APPROACH TO ENVIRONMENT IN EU COUNTRIES?

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Under the 2014–2020 Common Agricultural Policy (CAP), the existence of two pillars is maintained and the link between them is strengthened. Regulation (EU) No. 1307/2013 provides a new system of direct payments. The system consisting of the decoupling of agricultural aid from production (partial decoupling) and the provision of general income support, which came into force in 2003, is being transformed into a system in which single farm payments are replaced by a seven-component system of multi-purpose payments: basic payment per hectare, greening component, additional payment to young farmers, redistributive payment, additional income support in areas with natural handicaps, coupled support, voluntary simplified scheme for small farmers. There are three measures related to greening payments: crop diversification: the farmer must grow at least two different crops; preservation of existing permanent grasslands; the creation of an area of ecological interest corresponding to at least 5% of the arable land of a holding over 15 hectares (excluding permanent grassland and perennial crops). The new CAP aims to increase agriculture's contribution to the EU's environmental and climate objectives, provide more focused support for smaller farmers and allow Member States greater flexibility to adapt measures to local conditions.

Keywords: Common Agricultural Policy, greening payments, sustainable development, digitalization, precision agriculture

Introduction

Agriculture and the agri-food sector are important in eyes of the Europeans. One of the key policies in this area of the economy is the Common Agricultural Policy (CAP). The main aims of the policy are to:

- ensure a decent standard of living for farmers through income support and market measures,
- ensure sustainable rural development according to the needs of each Member State (European Commission, 2020).

The proposal of a Common Agricultural Policy (CAP) for the period 2023–2027 delivers a fairer, greener and more performance-based CAP that aims to secure a sustainable future for European farmers, provide more targeted support to smaller farms and allow Member States more flexibility to adapt measures to local conditions. The CAP reform process started in 2018, when the European Commission published its initial proposal, and was adopted by the Council and the European Parliament in October 2020. A key feature of this new policy is the introduction of strategic plans at Member State level, which will allow national governments to tailor CAP provisions to the needs of their farming communities in partnership with relevant stakeholders. This policy is the most environmentally ambitious to date in the field of environment and climate, with a quarter of direct payments reserved for organic farming practices.

Materials and methods

In aiming to further contribute to the sustainable development of agriculture, food and rural areas, the general objectives of the future CAP focus on the economic viability, resilience and income of farms, on improving environmental and climate performance, and on strengthening the socio-economic fabric of rural areas. In addition, promoting knowledge, innovation and digitalisation in agriculture and rural areas is a cross-cutting objective.

The new CAP will also pursue these specific objectives:

a) to promote viable incomes and resilience of farms on EU territory (to support food security);
b) to strengthen market orientation and increase competitiveness, including a stronger focus on research, technology and digitalisation;
c) to improve the position of farmers in the value chain;
d) to contribute to climate change adaptation and mitigation, as well as to the use of renewable energy;
e) to promote sustainable development and efficient management of natural resources such as water;
f) contribute to the conservation of biodiversity, improve ecosystem services and conserve habitats and landscapes;
g) attract young farmers and facilitate entrepreneurship in rural areas;
h) promote employment, growth, social inclusion and local development in rural areas, including the bio-economy;
i) improve the response of EU agriculture to food and health requirements of society, including food safety, nutrition and sustainability, as well as animal welfare.

Results and discussion

Member States are required to allocate 30% of Pillar 1 payments to provide additional support for four schemes that would be optional for farmers (organic farming, permanent grassland, areas with natural constraints and linear landscape features) to further promote climate action and sustainable management of natural resources.

Finally, as in other sectors, agricultural and rural areas can make better use of new technologies and knowledge, in particular digital technologies.

Promoting environmental care, climate action and contributing to achievement of the Union's environmental and climate objectives are high priorities for the future of the Union's agriculture and forestry sector. As outlined in the Communication on 'The Future of Food and Farming', new rural value chains such as renewable energy, the burgeoning bio-economy, the circular economy and eco-tourism can offer promising potential for growth and job creation in rural areas and thus enhance the delivery of environmental outcomes. Member States should set up voluntary organic schemes for farmers under direct payments in the CAP strategic plans, which should be fully coordinated with other relevant interventions. They should be defined as a payment provided either as a reward for encouraging and providing public goods through agricultural practices beneficial for the climate and the environment or as compensation for the introduction of such practices. In either case, they should reflect efforts to improve the environmental and climate performance of the CAP and should therefore be designed to go beyond the mandatory requirements anchored in the conditionality system. Member States may choose to establish organic schemes for farming practices such as improved management of permanent pastures and landscape features and organic farming. These schemes may also include 'entry level schemes', which may be conditional on the adoption of more ambitious rural development commitments Member States should provide payments to farmers and other land managers who voluntarily undertake management commitments that contribute to climate change adaptation and mitigation and to the protection and improvement of the environment, including water quality and quantity, air quality, soil, biodiversity and ecosystem services, including voluntary commitments in relation to Natura 2000 and the promotion of genetic diversity. Support for management commitments may include premiums for organic farming for conversion and maintenance of organic areas; payments for other types of interventions in favour of environmentally friendly production systems, such as agroecology, soil conservation agriculture and integrated production; forest-environment and climate services and forest protection; premiums for forests and the establishment of agroforestry systems, animal welfare; protection of genetic resources, their sustainable use and development.

The global food system must become more sustainable. Digital agriculture – digital and geospatial technologies to monitor, assess and manage soil, climatic and genetic resources – illustrates how to meet this challenge so as to balance the economic, environmental and social dimensions of sustainable food production stated Basso and Antle (2020).

To reflect the importance of combating climate change in line with the EU's commitments to the implementation of the Paris Agreement as well as the UN Sustainable Development Goals, the proposal for a new CAP will contribute to mainstreaming climate protection in the Union's policies and to achieving the budget-wide target of 25% of expenditure contributing to climate objectives. Thanks to CAP measures, 40% of the total CAP financial envelope is expected to go towards climate and environmental objectives.

Barrett and Rose (2020) deal with a technological advancement which is seen as one way of sustainably intensifying agriculture. Scholars argue that innovation needs to be responsible but it is difficult to anticipate the consequences of the 'fourth agricultural revolution' without a clear sense of which technologies are included and excluded. The major aims of this paper were to investigate which technologies are being associated with the fourth agricultural revolution, as well as to understand how this revolution is being perceived, whether positive or negative consequences are given equal attention, and what type of impacts are anticipated.

According to the Ehlers et al. (2022) in the paper Scenarios for European agricultural policymaking in the era of digitalisation, digitalisation affects the agri-food sector and its governance. However, what digitalisation of the sector will imply for future agricultural policymaking remains unclear. The objective of the study is to develop and evaluate explorative scenarios of digitalisation in the agri-food sector of Europe that are explicitly relevant to agricultural policy. Ehlers notes that existed four scenarios of digitalisation of the agri-food sector were developed for Europe in 2030. They comprise of:

1. digitalisation of the sector following current directions at current rates as a baseline scenario,
2. strong digitalisation of a regulatory government,
3. use of autonomous farming technology,
4. digitalised food business.

These explorative scenarios entail various gaps in achieving European agricultural policy goals.

On the Toward a Sustainable Food System for the European Union points out Davies (2020) who also points out the Alongside interconnected issues such as climate change, biodiversity loss, urbanization, and population growth, the unsustainable nature of our food system is one of the most significant challenges facing humanity. It negatively affects the environment by generating significant emissions and pollutants affecting air, water, and soil quality, as well as our own health.

The emergence of the "4th Industrial Revolution," i.e. the convergence of artificial intelligence, the Internet of Things, advanced materials, and bioengineering technologies, could accelerate socioeconomic insecurities and anxieties or provide beneficial alternatives to the status quo. In the post-Covid-19 era, the entities that are best positioned to capitalize on these innovations are large firms, which use digital platforms and big data to orchestrate vast ecosystems of users and extract market share across industry sectors. Nonetheless, these technologies also have the potential to democratize ownership, broaden political-economic participation, and reduce environmental harms. Wang, Wu and Chiles (2022) indeed, the Industry 4.0 paradigm aims to integrate digital technologies into business processes to raise productivity levels and to develop new business models. Accordingly, digital technologies play a similar role in the precision agriculture domain, and the purpose of this paper is to understand if the technologies at the basis of these two paradigms are the same or not (Trivelli et al., 2019).

The transition from primitive to digital is given with road maps covering agricultural and industrial revolutions at four stages on timeline. Digital agriculture combined under precision agriculture and Agriculture 4.0 are handled based on domains covering monitoring, control, prediction, and logistics. Digital technologies are explained with application examples such as the Internet of Things (IoT), cloud computing, big data, artificial intelligence, decision support systems, etc. Wearable sensor technologies, real-time monitoring systems tracking whole conditions of animals in livestock, the IoT-based irrigation and fertilization systems that help enhance the efficiency of irrigation processes and minimize water and fertilizer losses in agricultural fields and greenhouses, blockchain-based electronic agriculture, and solutions based on drones and robotics that reduce herbicide and pesticide use are handled systematically (Dayioglu, 2021).

Finger et al. (2019) noted that precision farming enables agricultural management decisions to be tailored spatially and temporally. Site-specific sensing, sampling, and managing allow farmers to treat a field as a heterogeneous entity. Through targeted use of inputs, precision farming reduces waste, thereby cutting both private variable costs and the environmental costs such as those of agrichemical residuals. At present, large farms in developed countries are the main adopters of precision farming. But its potential environmental benefits can justify greater public and private sector incentives to encourage adoption, including in small-scale farming systems in developing countries. Technological developments and big data advances continue to make precision farming tools more connected, accurate, efficient, and widely applicable. Improvements in the technical infrastructure and the legal framework can expand access to precision farming and thereby its overall societal benefits.

Duncan et al. (2021) promoters of precision agriculture champion how big data analytics, automated equipment, and decision-support software will optimize yields in the face of narrow margins and public concern about farming's environmental impacts. At its core, however, the idea of farmers leveraging digital infrastructure in their operations is not new, as agronomic research in this vein has existed for over 30 years. Contemporary discourse in precision ag tends to favour emerging digital technologies themselves over their embeddedness in longstanding precision management approaches. Also, according to these authors concerning the definitions, history, goals, adoption, uses, and impacts of precision agriculture. We then synthesize these in a discussion of the extent to which digital tools are believed to displace farmer decision-making and whether digital agriculture addresses the biophysical heterogeneity of farm landscapes or land itself has become an "experimental technology" – a way to advance the general development of artificial intelligence.

Precision agriculture or precision farming is a farming management concept using digital techniques for monitoring and optimising agricultural production processes. Although it does not constitute an autonomous technological field of large-scale application, precision agriculture, based on a number of technologies coming from outside the agricultural sector, raises significant legal and socio-ethical questions. With rapid technological developments in big data analytics and cloud computing propelling the 'precision agriculture' phenomenon, an assessment is needed of the suitability of the EU legal framework to cope with the ethical and regulatory challenges that the digitisation and automation of farming activities may pose in the years to come. Among other things, the collection and processing of data within this management framework is expected to cause major shifts in roles and power relations. The key question is to what extent, for what goals and for whose benefit precision agriculture will be used. Technology in itself is neither good nor bad, it is the way in which it is used that determines the effect. Thus, the main challenge is to develop a framework that can cope with the potential threats to the privacy and autonomy of individual farmers in a pragmatic, inclusive and dynamic manner.

Georeferencing technologies, such as the global positioning system (GPS) and mapping via geographical information systems (GIS), are key elements of many PF applications. These technologies allow the use of guidance systems and controlled traffic during field operations such as tillage, harvesting, and application of inputs such as nitrogen, seeds, and pesticides. Because no further skills or new machinery are needed to make use of geo-referenced technologies, Weersink et al. (2018) refer to them as embodied-knowledge technologies. However, geo-referenced information is especially powerful in reaching efficiency, gains if used in conjunction with other sensors to provide georeferenced maps of yield, salinity, or other measurable environmental traits, but also by simply reducing overlap during field operations.

Precision farming according Finger et al. (2019) enables agricultural management decisions to be tailored spatially and temporally. Site-specific sensing, sampling, and managing allow farmers to treat a field as a heterogeneous entity. Through targeted use of inputs, precision farming reduces waste, thereby cutting both private variable costs and the environmental costs such as those of agrichemical residuals. At present, large farms in developed countries are the main adopters of precision farming. But its potential environmental benefits can justify greater public and private sector incentives to encourage adoption, including in small-scale farming systems in developing countries. Technological developments and big data advances continue to make precision farming tools more connected, accurate, efficient, and widely applicable. Improvements in the technical infrastructure and the legal framework can expand access to precision farming and thereby its overall societal benefits.

Table 1 Four scenarios of digitalisation of Europe's agri-food sector in 2030 relevant to agricultural policy, described with values of drivers grouped in categories

Category of driver	Driver	Scenarios (described with values of drivers*)			
		light digitalisation	autonomous technology	digital food business	digital regulation
Data and its infrastructure	data openness	medium	high	low	low
	data control	spread across actors	technology providers	food companies	government
	providers of digital infrastructure	public-private	public-private	public-private	government
Acceptance	farmers' technology acceptance	medium	high	medium	low
	social acceptance	medium	high	medium	low
	willingness to share data	low	high	medium	low
Knowledge and learning	farming skills	high	low	medium	low
	digital literacy	medium	high	medium	low
	inequality for farmers	low	medium	high	high
	innovation rate	low	high	medium	low
Policy	policy style	reactive	proactive	proactive	reactive to proactive
	dominant power	farmers and government	technology providers	food companies	government
	food system perspective	farm focus	farm focus	food supply chain focus	farm focus
	spatial and temporal resolution of digitalisation	coarse	fine	fine on food issues	fine

*The different shades of grey of the cells represent different manifestations of individual drivers across scenarios (light and dark grey are the two extremes and medium grey is a middling value of a driver)

Global change will alter the supply of ecosystem services that are vital for human well-being. To investigate ecosystem service supply during the 21st century, we used a range of ecosystem models and scenarios of climate and land-use change to conduct a Europe-wide assessment. Large changes in climate and land use typically resulted in large changes in ecosystem service supply. Some of these trends may be positive (for example, increases in forest area and productivity) or offer opportunities (for example, "surplus land" for agricultural extension and bioenergy production). However, many changes increase vulnerability as a result of a decreasing supply of ecosystem services (for example, declining soil fertility, declining water availability, increasing risk of forest fires), especially in the Mediterranean and mountain regions.

Wheeler and Von Braun (2013) consider climate change that it could potentially interrupt progress toward a world without hunger. A robust and coherent global pattern is discernible of the impacts of climate change on crop productivity that could have consequences for food availability. The stability of whole food systems may be at risk under climate change because of short-term variability in supply. However, the potential impact is less clear at regional scales, but it is likely that climate variability and change will exacerbate food insecurity in areas currently vulnerable to hunger and undernutrition. Likewise, it can be anticipated that food access and utilization will be affected indirectly via collateral effects on household and individual incomes, and food utilization could be impaired by loss of access to drinking water and damage health. The evidence supports the need for considerable investment in adaptation and mitigation actions toward a "climate-smart food system" that is more resilient to climate change and influences on food security. Alekseeva et al. (2021), Nemchenko et al. (2020) notes that digital technologies will significantly change the quality of technological process control and decision-making at all levels. The real prospects of the domestic agricultural sector in the direction of digital transformation include the transition to a qualitatively new level of use of agro-industrial technologies – "smart agriculture", including precision farming, smart farms and others, using elements of artificial intelligence. Eastwood et al. (2019) in your article notes, that precision farming enables agricultural management decisions to be tailored spatially and temporally. Site-specific sensing, sampling, and managing allow farmers to treat a field as a heterogeneous entity. Through targeted use of inputs, precision farming reduces waste, thereby cutting both private variable costs and the environmental costs such as those of agrichemical residuals. At present, large farms in developed countries are the main adopters of precision farming. But its potential environmental

Table 2 Agricultural policy gaps and strategies to address them in the four scenarios of agricultural digitalisation

Scenario	Gaps compromising achievement of agricultural policy goals	Key strategies to address gaps	Key stakeholders of strategy	Examples of policy goals and technologies involved
Light digitalisation	poor digital infrastructure	crosscutting technological and institutional data generation and exchange infrastructure for policy monitoring and implementation	government digital industry	protecting the environment through digital monitoring of farming impacts
	limited capabilities of farms to use digitalisation for policy response	programme to facilitate adaptation of farms to digitalisation	government agricultural advisory and education services	supporting production capacities through user-friendly farm management software
Autonomous technology	limited integration of digital technologies	technological and institutional infrastructure including protocol standards to integrate data from autonomous equipment for monitoring and concerted policy action	government digital industry	providing food along seamless digital traceability systems
	back-up for risks of autonomous technology	technological and environmental risk response and prevention	government digital industry	supporting production capacities through offline back-up technology
	special policy issues autonomous technology cannot address	programme for special cases	government	protecting the environment with help of citizen-science apps and databases
	lacking attention to social issues, farmers' knowledge and farm-led innovation	programme to support farmer wellbeing and competencies	government farming bodies	supporting production capacities through farm-led co-production of algorithms
Digital food business	lacking attention to policy goals is not in the interest of food business	parallel programmes for responding to residual policy issues	government	providing fibre through integrated databases that localise fibre-based food waste
	distributional issues and market concentration that disempower farms	govern issues of mutual public and food business concern, address market concentration and terms of trade of food business vis-á-vis farms	government food business	social support through integrated databases for farmer hardship identification
Digital regulation	lacks flexible response to novelties and unforeseen events	programme for flexible response to emerging and sudden environmental and technological issues such as mistakes in algorithms	government where feasible, digital industry	providing food of needed quantity and quality with help of digitalised supply and demand forecasts
	non-standard policy issues centralised digital regulation does not address	parallel programme for special cases	government where feasible, digital industry, farming bodies and non-governmental organisations	ensuring animal welfare with help of digital veterinary exchange service
	lacks support of innovation	program to support capacities of farms to innovate and produce	government digital industry farming bodies	supporting production capacities through digital farm innovation hacking portals

benefits can justify greater public and private sector incentives to encourage adoption, including in small-scale farming systems in developing countries.

Ehlers et al. (2022) identified four scenarios of agricultural digitalisation, which are summarised in Table 2.

Conclusion

According to survey of Europeans, Agriculture and CAP a large majority of Europeans (92%) say they are in favour of the EU continuing to make subsidy payments to farmers for carrying out agricultural practises beneficial to the climate and environment. A national analysis reveals that at least 8 in 10 respondents in all 27 EU Member States are in favour of the continuing to make subsidy payments to farmers for carrying out agricultural practises beneficial to the climate and environment. This proportion is the highest in Croatia (98%) and Cyprus and Portugal (both 97%) and the lowest in Austria and Romania (both 87%). Slovakia has 92% (European Commission, 2020). The European Union's long-term priority is the protection of biodiversity, ecological practices and animal welfare. Despite the CAP's efforts and focus to date, agricultural ecosystems continue to deteriorate, biodiversity is declining and greenhouse gas emissions from agriculture remain high, and rural areas have difficulty remaining viable. Effectively aligning sustainable agriculture, multifunctional agroforestry and long-term prosperity with the EU's climate and biodiversity goals is the goal of the CAP, which is also supported by the Government of the Slovak Republic when it approved the Strategic Plan (SP) of the Common Agricultural Policy (CAP) for the years 2023–2027 (www.mpsr.sk, 2022). Farmers' interests and environmental protection can only be mutually reinforcing and achieved through the CAP, which is in line with the EU's strategies – Green Agreement, Biodiversity Strategy and at the same time in line with the Paris Agreement.

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