



The Relationship Between Technological Policy and Environmental Policy Making in the European Union

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Abstract

The Fourth Industrial Revolution has made innovations faster, more efficient, and more accessible than ever before. Technology is also increasingly interconnected, as we witness the merging of the digital, physical, and biological realms. On the other hand, today's world faces threats that are becoming increasingly complex and significant. Environmental crises and environmental degradation can be considered one of these threats, and this threat can endanger human life. The European Union and its member states, realizing this issue, have been pursuing appropriate environmental planning since the 1960s. This article, using a descriptive and analytical method, seeks to explain how technological policies and environmental policies are related in the European Union. The results of this study show that to date, the technological programs and policies of the European Union have included the Lisbon Strategy, the Europe 2020 Strategy, the European Framework and Horizon 2020 Program, and the environmental programs and policies of the European Union have included the European Environmental Action Plan (resource efficiency, biodiversity, chemicals, waste, air, water, forests and soil), the European Green Deal, the circular economy, sustainable transport, clean energy transition and environmental operational programs. Finally, the link between technological and environmental policies in the EU represents a joint effort to create a more sustainable and resilient future, and these strategies work in tandem to facilitate sustainable economic and environmental development in the EU. It is noteworthy that the Russia-Ukraine war has prompted a review of the EU policy framework, leading to significant changes in its strategic priorities—a topic that will be discussed in detail in the following sections.

Keywords: *Environment, Technological Policy, Environmental Policy, European Green Deal, European Union*

Introduction

The only known place in the universe for life is the Earth, and this uniqueness shows its importance and necessity. Over the past decades, it has become clear that the Earth's environment has been fragile. Technological progress and digital transformation have created new competitive conditions on Earth, human life, and the global economy. This development process, called the Fourth Industrial Revolution, provides important opportunities for humanity, and incorrect policies in formulating and building them also cause environmental destruction. In today's world, the importance of paying attention to the environment has advanced to the point that the right to a healthy environment is being discussed all over the world. Because environmental destruction is directly related to threats to human life and human survival. Since the growth of the global economy and the excessive consumerism of human societies have faced an imbalance in production, distribution and consumption, and the growth of the population and the improper interaction of humans with our environment around them have increased the world's attention to the planet and its environmental issues more than ever before, and since the 1960s, environmental issues have gained a place in global politics. On the other hand, with the acceleration of the Fourth Industrial Revolution, innovations are becoming faster, more efficient, and more accessible than before. New technologies are making social changes possible by affecting the economy, values, identities, and possibilities of future generations. The European Union has begun to strengthen its economic and social structure and increase its competitiveness in the face of the new world order that is rapidly developing and emerging with technology. Therefore, the technological and environmental policies of the European Union are worthy of consideration and are of great importance.

This article aims to examine the technological policies and environmental policies of the European Union in general, using official and reliable documents, and to clarify the relationship between these two policies based on the information collected. Finally, the impact of the Russia-Ukraine war on the quality of these policies is discussed.

Research Method

This research uses a descriptive-analytical method and uses library resources (government and other documents) to examine technological policies and environmental policies in the European Union, and also to explain the relationship between these two important issues. In this research, an attempt is made to describe technological policies and environmental policies in the European Union in the first stage. In the second stage, the relationship between technological policies and environmental policies in the European Union is clarified. In the third stage, the impact of the Russia-Ukraine war on the quality of technological and environmental policies in the European Union is discussed.

Advanced Technology and Technological Policies of the European Union

There is no definitive and scientific definition of advanced technology that is accepted by everyone. However, attempts have been made by different authors in literature, economics, political science, marketing, business, and management to provide different definitions. However, products with advanced technology It is defined as products with high research and development, such as aerospace, computers, medical products, scientific instruments, and electrical machinery (World Bank, 2020). Advanced technology is developing rapidly and is an important factor in the development of countries. Advanced technology products are generally smaller, lighter, more reliable, and more efficient, and are easily accessible. Most advanced technology products are researched and developed in large universities, research centers, large companies, and public facilities. An important factor for the development of advanced technology is capital. Individuals can come up with their ideas for advanced technology, but capital is needed to make these ideas practical and productive. In order to understand the purpose and general framework of the advanced technology policy pursued by the European Union today, it is useful to look at the basic principles of this policy.

Within the framework of technological development in the European Union, large and important strategies, projects, and programs have been implemented. The main strategies, programs, and projects created for long-term innovation and technological development in the European Union are the Lisbon Strategy, the Europe 2020 Strategy, the European Strategic Information Technology Program (ESPRIT), the European Agency for Technology Cooperation (EUREKA), and the Cooperation Program (COST). The EU also supports scientific and technological studies within the framework of Framework Programs. The most important aspect of the framework program is that it provides integration and coordination between EU research and technological development Programs (Single European Act, 1987). Another EU Program is the European Research Area. In September 1999, Philippe Bosquin, Commissioner for Research in the European Commission, introduced the concept of the European Research Area (Lawn, 2002). Accordingly, by examining the situation of the EU in the field of research and development, it was stated that a more comprehensive approach should be followed for the optimal use of research and development resources. The main objective of this Program was to promote research and innovation by better using available resources to increase the competitiveness of the EU worldwide. These developments are a turning point in the creation of EU high-tech policies and in setting their objectives. Furthermore, the Lisbon Summit held in 2000 is important for the common technology policy of the European Union. At this summit, the aim is for the European Union to achieve sustainable growth with better employment and social cohesion by acquiring competitive and knowledge-based characteristics in the world by 2010. Also, the Sixth Framework Program, covering the years 2002-2006, aims to increase the competitiveness of the European Union in the world, especially in the United States and Japan, and to move towards advanced integration in the field of science and technology. The long-term strategies and Programs of the European Union for innovation and technological development are as follows:

Lisbon Strategy

One of the main lines of the European Union's technology policy is the decisions expressed as the Lisbon Strategy. It is a growth and employment strategy that was put forward after the extraordinary meeting of the European Council on 23-24 March 2000. The Lisbon Summit has an important place in terms of the common science and technology policy of the European Union. The strategy was set to achieve objectives such as preparing for the transition to a knowledge-based economy, creating new policies for the information society, and research and development. However, accelerating structural reforms for competitiveness and innovation, completing the internal market, modernizing the European social model, investing in human resources, combating social exclusion, and maintaining a healthy outlook and positive growth expectations in the economy by applying appropriate macroeconomic policies can also be considered in this strategy. This strategy, which uses structural indicators to formulate, monitor, and evaluate development policies, is designed to transform the European Union economy into the most competitive and dynamic economy in the world. The vision of this strategy aims to measure the success of policies implemented in the European Union by comparing them with other major economies. In other words, it aims to compare the success of other competing economies, such as the United States and Japan, with the success of the European Union economy (European Parliament, 2000).

Within the framework of this strategy, the European Union has set 3% of GDP as one of its tangible targets for research and development (Rodriguez, 2003). According to the basic vision of this strategy, if the European Union wants to compete with the United States, it must first accept and correct the following decisions (Rodriguez, 2003):

- The EU's economic growth rate is generally lagging behind that of the United States.
- The EU economy is not as dynamic and job-creating as its main competitors, especially the United States.
- Unemployment in the EU has grown unacceptably and, in addition to the economic losses it causes, it also creates a social problem that makes many people feel excluded from society.

After these determinations, the Lisbon Strategy focuses on the reasons for the fundamental weaknesses of the EU economy. First of all, the EU economy cannot adequately meet the needs of entrepreneurship, and the number of new small and medium-sized enterprises joining the economy remains limited. Insufficient participation of new SMEs in the economy hurts job creation. Insufficient employment makes it difficult to combat unemployment (Rodriguez, 2003). In addition, one of the major weaknesses of the European Union is the lack of R&D activity. Infrastructure and indicators such as the share of national income for R&D activities, use and access to the Internet, which will form the basis of R&D activities, are also behind the United States (Kook, 2004). When the actions foreseen within the scope of the Lisbon Strategy and the results achieved at the end of 2010 are briefly examined, it cannot be said that the European Union has achieved the expected goals (Oliver, 2011). The European Union, realizing issues such as the rapidly developing technology in recent years, the decline in productivity in the EU economy due to the aging population in a globalizing world, felt that it was losing its competitive power. According to the evaluations carried out by the European Commission on the Lisbon Strategy, the project has a very complex structure with The objectives have become multidimensional (European Commission, 2010).

Europe 2020 Strategy

The European Union has decided to create a new strategy in order to develop and activate the strategies it has implemented in the past. Since the global financial crisis occurred in 2008 and obstacles to achieving the goal set in the Lisbon Strategy have emerged, the Union has developed the Europe 2020 Strategy based on the Lisbon Strategy, taking into account the global financial problems. One of the important issues in the implementation of the EU 2020 Strategy is smart growth based on growth. The following were announced by the European Commission in 2010 as the main priorities in the framework of this strategy in order to create advanced employment, productivity, and social cohesion, which are: smart growth, sustainable growth, and inclusive growth (European Commission, 2010).

According to this strategy, the economic objectives to be achieved in 2020 are as follows (ibid):

- Increase the employment rate of the population aged 20-64 to 75 %.
- Achieve the target of allocating 3% of GDP to research and development.
- Reduce the early school leaving rate to 10%, and increase the proportion of university graduates aged 30-34 to at least 40%.
- Reduce the number of EU citizens living below the national poverty line by lifting 20 million people out of poverty.

The initiatives needed to achieve these goals are as follows (ibid):

Smart growth

Smart growth considers knowledge and innovation to be the key to future growth and aims to transform innovative ideas into economic growth, job-creating products and services by improving the quality of education in the EU, strengthening research studies, and facilitating knowledge transfer. The initiatives being developed in this area are: The Innovation Union initiative in the field of innovation; the Youth on the Move initiative in the field of education, vocational training, and lifelong learning; and the Digital Agenda for Europe initiative in the field of the digital society.

Sustainable growth

Sustainable growth is defined as the efficient use of energy and resources, and sustainable and competitive economic growth. This approach places the EU in a position to prevent environmental degradation, protect biodiversity, and prevent the waste of resources in a low-carbon and resource-constrained world. The initiatives are as follows: in the field of climate change and clean and efficient

energy use, the Resource Efficient Europe initiative; and in the field of competitiveness, the Industrial Policy for the Globalization Era initiative.

Inclusive growth:

Inclusive growth aims to create high-quality jobs, invest in talent, combat poverty, and modernize the labor market in order to manage change and create a harmonious society. Under this heading, leading initiatives are: the “Agenda for New Skills and Jobs” initiative in the field of employment and skills; and the “European Platform against Poverty” initiative in the field of combating poverty (Roth and Thum, 2010).

Given that innovations affect the economic development of countries, it is important for countries to invest in R&D and support innovative ideas. Innovation investments and support are a major source of sustainable efficiency and efficient use of resources (Roth and Thum, 2010).

According to the information obtained from the World Bank database, it is observed that the ratio of research and development expenditure to GDP in the European Union is increasing, and, according to the data of 2018, some countries have reached a certain level despite being behind the 2020 target. It is observed that in addition to the 3% target at the European Union level, member states set a national target of more than 3% according to their strategies (such as Denmark, Austria, and Sweden). When assessing the 3% target for Europe 2020, Denmark, Sweden, Finland, Austria, Germany, Slovenia, and Belgium can be stated as successful countries among the European Union countries (Falk, 2009). With the publication of the Lisbon Strategy in 2000 and the Europe 2020 Strategy established in 2010, the European Union member states have set the necessary policies to change to a production system in which technology, innovation, and research and development are at the forefront. Increasing the share of advanced technology in export products is an important measure of innovation in production efficiency (ibid.).

EU Framework Programs

Research and development have always been a key pillar of EU policy-making. This has been particularly emphasized in the Lisbon Strategy and the Europe 2020 Strategy, where scientific and technological development not only helps to increase the competitiveness of companies but also plays an important role in creating jobs and improving the quality of life.

The EU Framework Programs for Research and Development are designed to make Europe the most dynamic and competitive information society in the world. They are designed to align the scientific, technological, and research policies and activities of the Member States. They provide a platform for developing research capacities, transferring technology, and driving future innovation through international partnerships, relying on extensive cooperation between universities, industry, and public institutions.

History of the Framework Programs

The first Framework Program (1984–1987) was launched in 1984. These programs served not only as a planning tool but also as a financial instrument to support the competitiveness of the Member States and respond to economic crises (Reillon, 2017).

The second Program (1987–1991) was designed with an emphasis on transforming the European Union into a society based on science and technology (Commission of the European Communities, 1986).

The third Program (1990–1994), adopted in 1989, focused on priorities such as supporting basic and applied research, strengthening university-industry links, encouraging private sector investment, coordinating national strategies, and cooperating with third countries (Reillon, 2017).

The fourth Program (1994–1998) was adopted in April 1994 with a budget of €13.1 billion. At this stage, specific Programs were implemented in a structured and coordinated manner (ibid.).

The fifth Program (1998–2002) was set up with a budget of €13.7 billion based on the principles of “flexibility” and “concentration” (ibid.).

The sixth Program (2002–2006) was designed to increase the impact of the Programs on scientific development and support advanced technologies, innovation, and the alignment of European research (ibid.).

The seventh Program (2007–2013) sought to consolidate research initiatives to achieve the goals of the Lisbon Strategy (Kim and You, 2019).

The eighth Program, or Horizon 2020 (2014–2020), as the framework for research and innovation of the European Union, pursued three key objectives: scientific excellence, industrial leadership, and response to societal challenges. Within this framework, a budget of €24 billion was allocated for the area of “scientific excellence” and €30 billion for the area of “social change”. Among its important objectives are to encourage cooperation between European researchers, invest in key technologies, support climate change-related actions, and increase the productivity of Europe’s young population (ibid.).

The ninth European Horizon 2021-2027 Program started in January 2021 and will continue until 2027. The main objectives of this Program include strengthening the scientific and technological bases of the European Union, increasing innovation capacity and competitiveness, and meeting the priorities of European citizens in line with sustainable economic and social models (Bahrke & Grammenou, 2020).

The Framework Programs are the most prestigious research and innovation Programs of the European Union and are expected to continue to support the formation of cutting-edge studies in the fields of science, technology, and innovation today and in the future. Perhaps one of the most important objectives in these processes is to increase the awareness of the European public in the fields of science, technology, and innovation, as well as to ensure the effective participation of citizens in these processes. In conclusion, it can be said that, about the framework programs implemented in the European Union, these processes have been successfully maintained.

Horizon Europe

This policy, with a budget of over €95 billion, will direct research and innovation funding within and beyond Europe’s borders to tackle key global challenges, including climate change, pollution, biodiversity loss, the digital transition, and population ageing. Horizon Europe, through the European Research Council, will continue to strongly support research at the frontiers of knowledge. Created by the Marie Skłodowska-Curie Action to support research in the European Research Area, it will encourage more young people to pursue research careers and invest in world-class research infrastructure (Horizon Europe Strategic, 2024).

As the EU’s flagship research and innovation Program, Horizon Europe can play a vital facilitating role, providing the financial resources to support this transition. Excellence in Science, as the first pillar of the Horizon Europe program, supports frontier research and valuable scientific ideas. This title forms a team of the best European and non-European researchers and equips them with world-class research skills and infrastructure (Reuil, & Others, 2024).

EU Environmental Policies

Paying attention to environmental issues from the perspective of human life security and a transformative factor for human societies has already been of interest to the European Union. In this section, we can recall authors such as Carpenter and Ruskin who said: Given the first and second industrial revolutions and the wars of empires and the boundless destruction of the environment, we will have an environmentally unfriendly and unpleasant future (Newman, 2015). In the twentieth century, the environmental activities and actions of the European Union increased, and in this regard, we can mention the multitude of regional, local, bilateral, and multilateral environmental treaties and agreements, such as

the European, Stockholm, Rio, and Bonn environmental conventions. Environmental actions and trends in the European Union caused structural and institutional changes in this region, in which we can mention issues such as changes in the basic law, the creation of protective organizations, regulatory institutions, budgeting, and financial issues (Asproudis and Khan, 2019). Finally, the seriousness and importance of the environmental issue have advanced to such an extent that environmental movements have become one of the most active and prominent social movements and pressure groups on European governments (McBride, 2022). The environmental climate and atmosphere formed in the European Union is even present in the education and attitudes of young people and adolescents, and it can also be said that the "European Union Environmental Action Plan" can be a valuable model for how to adopt strategies, provisions, and implement the European Green Deal. The European Union's environmental action has been able to keep this region away from environmental crises and destruction to a large extent. Research and studies show that the main objectives of the European Union Environmental Action Plan have been achieved, and its strategies have been well implemented (Integra Consulting, 2021). The European Union considers environmental destruction and environmental threats as one of the main factors threatening peace, and in this regard, they have developed and organized various and systematic programs and measures to prevent and control environmental destruction. The main and fundamental goal is to improve the quality of the environment, protect human health, and promote international tools and programs to solve global and regional environmental problems. In the 1970s and 1980s, the focus was on traditional environmental issues such as protecting species and improving air quality by reducing emissions. Now, the emphasis is on a systematic approach and the connection between different issues and their global dimension. This means moving from treatment to prevention of environmental crises and environmental degradation. Since the late 1970s, the European Union has had more than 200 different pieces of legislation on environmental protection (The European Commission, 2014).

Since the mid-1970s, the European Union has guided its environmental policies with action plans, which have sought to set priorities. One of the plans adopted by the European Parliament and the Council of the European Union in 2013 was the 2020 Action Plan. Through these policies and programs, they seek to encourage growth that is proportionate to low-carbon resources, ensuring people's health and well-being (The European Commission, 2014).

The European Union Environment Action Plan (EUEAP) sets out a long-term environmental strategy to address the challenges ahead and the growing ecosystem risks they pose. It provides a comprehensive approach to the environment and paves the way for a competitive and green economy while preserving the Union's natural resources and the health of current and future generations. (Council of the European Union, 2022)

Years	Main focus
1973–2012	Protecting natural resources, controlling pollution, and harmonizing national environmental policies
2013–2020	Green economy, protecting natural capital, human health, and better enforcing environmental laws
2021–2030	Achieving a healthy and sustainable environment by 2050, supporting the European Green Deal

The EU's environmental strategy, implemented in the form of the EU Environment Action Program, has two interrelated policies and several actions on different issues. The two main policies are:

Resource Efficiency

In order to address the challenges, the European Commission has made resource efficiency one of the main principles of its 2020 strategic plan. This means producing more value with less input, using resources sustainably, and managing them more efficiently throughout the life cycle. In late 2011, the

Member States adopted the European Resource Efficiency Roadmap. The Roadmap emphasizes the need for fundamental changes in personal, social, and political behavior and includes milestones in different policy areas to achieve a European economy within 40 years that provides a high standard of living with fewer negative impacts. Resource efficiency seeks to decouple economic growth from resource use and moves the economy towards high productivity, sustainable use of resources, and more value with less input, and minimizing their impact on the environment (EC, 2014).

Ecological Diversity

In 2011, a few months after the global agreement on an ambitious global agenda in Nagoya, the European Union adopted the Ecological Diversity Strategy. The strategy aims to halt biodiversity loss and ecosystem degradation in the Union by 2020, restore biodiversity where feasible, and increase Europe's contribution to the global fight against biodiversity loss (EC 2014).

In addition to these two related policies, other issues are also worth discussing:

Chemicals

To ensure the safety of chemicals, protect the environment, and promote competitiveness, the European Union has one of the most advanced chemical legislations in the world, known as the Registration, Evaluation, Authorization and Restriction of Chemicals (REACH). Chemicals manufactured in or imported into the EU must be registered with the European Chemicals Agency, based in Helsinki. Otherwise, they may not be sold in the EU. Companies are responsible for assessing and managing the risks associated with chemicals used or sold within the EU, and for issuing safety warnings on how to handle these chemicals. This strategy is a key part of the European Green Deal and its efforts to achieve the zero pollution goal, and aims to protect human health and the environment from hazardous chemicals (Directorate General for Environment (European Commission), 2020).

Waste

Each person in Europe consumes around 16 tons of materials per year, of which 6 tons remain as waste, and half of this is landfilled. Although waste generation is inevitable, the European Commission's message is one of reuse and recovery. Landfill tax and disposal fee schemes can be effective in this regard (ibid.).

Air

Over the past 20 years, the European Union has managed to reduce the amount of pollutants. Despite these advances, air pollution remains one of the most important environmental concerns in Europe. The assessment shows that despite continuous improvements, air quality standards are still breached across the EU, with concentrations significantly higher than the latest WHO recommendations. (European Environment Agency, 2023)

Water

In recent decades, the European Union has pursued a comprehensive policy to ensure the quality of Europe's water. In principle, this policy has addressed health concerns. European water legislation includes the cleaning of all rivers, lakes, coastal waters, and groundwater. Member States must review the state of these waters and come up with plans on how to clean them up. (European Commission, 2022)

Forests

Forests are being destroyed at an alarming rate. The EU has called on countries to halve the rate of forest destruction by 2020 and to halt it completely by 2030. The EU is working with timber-exporting countries to improve forest governance. EU legislation in this regard minimizes the risks of illegally planted trees being sold within the EU (European Commission, 2021). Forests have always played a

crucial role in our economy and society, creating jobs, providing food, medicine, materials, clean water, and other vital resources. For centuries, forests have been a thriving center of cultural heritage, crafts, traditions, and innovation. But they are just as important in the past as they are in the future. Forests are a natural ally in adapting to and combating climate change and will play a vital role in making Europe the first carbon-neutral continent by 2050 (ibid.).

Soil

Paying attention to land is a global need, and the European Union believes that the United Nations Convention to Combat Desertification plays a key role in this regard. The European Union is committed to solving this challenge at the domestic and global levels. Within the Union, land degradation issues are an inseparable part of policy areas such as soil protection, water resources management, promoting sustainable forestry, and encouraging sustainable agriculture, and are among the EU's policies in this regard. The European Union is in a more favorable position compared to other regions and countries in the world, and a review of the EU's environmental policies also shows that the Union is highly sensitive to environmental issues and has various programs in the field of preventing environmental degradation (ibid.).

The European Green Deal and Its Differences from Previous Policies

The European Green Deal is a set of political and legal measures of the European Commission with the main objective of restoring the European environment by 2050, with the possibility of extension. It is also a fundamental objective for achieving the EU's 2030 target of reducing greenhouse gas emissions by at least 30% and at most 50% compared to 1990 levels (EU Commission 2018). This agreement includes a prior review of all laws before they are adopted, from an environmental perspective and with due regard for environmental issues, as well as the introduction and adoption of new laws on the economy, sustainable technology, and biodiversity (2019 EU Commission). The President of the European Commission, Ursula von der Leyen, has said that the European Green Deal will be like putting a man on the moon, because it will make Europe the first leading continent in terms of climate recovery and climate sustainability (The Parliament magazine, 2019). On December 13, 2019, the European Council approved the European Green Deal at the request of the European Commission, with only one vote against by Poland, and finally, on January 15, 2020, the European Parliament also approved it. The European Union aims to achieve the concept of zero carbon within a twenty-year goal and that the Union can become the first climate-neutral regional bloc in the world by 2050 (2020, UNIDO). Also, this agreement has detailed plans in the financial and budgetary areas and does not rely only on government and Union investments, but on private investments and Non-governmental technologies are concerned (2022, European Commission). In addition, the European Union must spend at least 30 billion euros per year from 2020 to 2030 to achieve its goals in this agreement (2020 EU Commission COM). This is currently being achieved.

The distinction of the European Green Deal from the previous environmental policies of this Union lies in its content and how it is implemented. Understanding the goals and content of this new environmental policy requires understanding the past of the environmental issue in Europe, as well as a critical review of previous policies. In fact, the trump card of this new policy is to use the efficient features of previous policies and remove obstacles and failures in the past regarding the environment. The provisions of the European Green Deal are actually a selection of the efficient items of the European Union's Environmental Action Plan, along with new immediate strategies and operational plans in the form of case and macro policies in the short, medium, and long term. These plans are implemented in three strategic stages, including the first stage of determining strategies and estimating. The roadmap is the second stage of specialized actions and the adoption of case-specific policies, and the third stage of reviewing the process is the adoption of new and long-term strategies.

Relationships between technological policies and environmental policies in the European Union

Technology has had a profound impact on the environment. On the one hand, technology can be used to reduce pollution and protect natural resources. On the other hand, technology can also cause pollution and environmental degradation. With the development of new technologies, new opportunities and challenges have been created for the environment, so measures must be taken to use the opportunities to reduce the negative impacts of technology on the environment and to avoid the challenges to protect the environment. According to the above explanations, the relationship between technological policies and environmental policies in the European Union is based on the effort for sustainable development and reducing the negative environmental impacts of technologies. Technological policies usually work towards innovation and improving efficiency, while environmental policies focus on conserving natural resources and reducing pollution. The European Union is trying to link these two areas so that new technologies can help improve the environment while facilitating economic growth. Overall, these two strategic areas in the European Union are designed to reinforce each other and help achieve environmental and economic goals.

Lisbon Strategy:

This strategy was created in the early 2000s to increase the competitiveness and economic growth of the European Union. Its main goal was to make the European Union "the most dynamic and competitive knowledge-based economy in the world". At that time, attention to sustainable development and environmental protection was raised as one of the key details. The strategy sought to increase innovation and environmentally friendly technologies that would help improve the environmental situation. However, the strategy has gradually paid more attention to environmental challenges and the need for sustainable development.

Europe 2020 Strategy

As a comprehensive plan for sustainable and smart growth, the Europe 2020 Strategy includes targets for reducing greenhouse gas emissions, increasing the use of renewable energy, and improving energy efficiency. The strategy clearly shows how technological policies can help achieve environmental goals. For example, investing in green and innovative technologies can help reduce negative impacts on the environment.

EU Framework Programs

These Programs include research and innovation projects that can help solve environmental challenges. They focus in particular on clean technologies, resource management, and biodiversity. Projects under the Framework Programs seek to strengthen international cooperation in the field of environment and technology to achieve the goals of reducing pollution and preserving natural resources.

EU Green Deal

This deal is considered a comprehensive proposal to make Europe the first carbon-neutral continent. All of the Programs mentioned can help achieve the goals of the Green Deal, as they try to focus on the economic transformation towards a "green economy" and reducing negative environmental impacts.

Horizon Europe

As the largest EU research and innovation Program with a budget of over €95 billion for the period 2021-2027, this program is considered the main pillar of achieving environmental, climate, and sustainability goals in the EU. Horizon Europe is the scientific, innovative, and implementation arm of the EU's environmental policies. Without the support of these Programs, achieving goals such as carbon neutrality by 2050, reducing emissions, preserving biodiversity, and the green transition would not be

possible. In short, Horizon Europe, as the most important EU research and innovation Program, can play a vital facilitating role, as it provides the financial resources, implementation framework, and innovation pathways needed to support this transition (green transition) (Reuil, & Others, 2024).

In the EU, the relationship between technology policy and environmental policy is linked to several key aspects:

- The EU has set sustainable development as its main objective. For this reason, technology policies should be designed to help protect the environment and develop green technologies.
- Technology policies include encouraging research and development in clean technologies, such as renewable energy, sustainable transport, and waste management. These technologies help reduce negative environmental impacts.
- The European Union tries to control and reduce the negative impacts of technologies on the environment by establishing strict rules and standards for technologies, including in the areas of pollution and energy consumption.
- Active participation of stakeholders in the policy-making process, including various actors such as technology industries, NGOs, and universities. This interaction helps to create innovative solutions that respond to environmental protection goals.
- Technology policies can help create new job opportunities in green and sustainable sectors. Therefore, environmental policies may also be strengthened as technology develops.

The Russia-Ukraine War and Its Impact on the Quality of Technological Policy and Environmental Policy of the European Union

On February 24, 2022, Russia launched a large-scale war against its western neighbor (Ukraine), and this invasion is considered the largest conventional attack against Europe since World War II. This war, which can be referred to as a new crisis, made the economic, political, social, and technological realities and weaknesses of the European Union more visible than ever before. The Ukraine war has had many consequences for the European Union, which has led to the divergence of the Union and, subsequently, to a decrease in its power in the international system. This issue has been due to the deepening of the gaps within the Union, the vacuum of strong leadership, and the different positions of the members regarding this war (Kastey and Leonard, 2023).

Nevertheless, the Russia-Ukraine war has had a significant impact on the revision of policies and strategies related to energy issues in the European Union. The EU has traditionally relied on energy imports from Russia, but the current disruptions in the supply of natural gas, oil, and coal have created unprecedented challenges for the region, challenges that have now forced the EU to urgently pursue a path of energy diversification. At the same time, the war has strengthened diplomatic and economic cooperation with alternative energy suppliers, including Norway, the United States, and North African countries, to reduce dependence on Russian sources. In this regard, the EU has adopted bold policies to promote energy efficiency and reduce consumption to increase its resilience to possible future shocks from supply disruptions (Shoukat, & Yaseen, 2023).

According to the above description, the Ukrainian war has also had multi-layered effects on the EU's technological and environmental policymaking, accelerating some policymaking processes and sometimes reversing the process of producing clean technologies. One of the major concerns of the European Union before the war was its energy dependence on Russia, which has taken important steps in this regard since the war began, and the European Union has increased its focus on renewable and clean energy (solar and wind), and this performance has been in line with the goals of the European Green Deal (Atamanenko and Piddubnyi, 2023).

The Russia-Ukraine war has been a turning point in the technological and environmental policymaking of the European Union. This war caused the European Union to move faster towards energy independence, to review and strengthen its environmental and technological policies, to focus on the

resilience and security of technology supply chains, and to expand international cooperation in line with environmental and technological goals (Falkner, 2023). At the same time, challenges such as a temporary return to fossil fuels and increasing energy costs may have temporarily affected the quality and coherence of some policies. But in the long term, the war has reinforced the EU's sustainable and technological orientation.

Consequences of war and disruption of policymaking (increased arms spending and reduced environmental spending)

Wars and military conflicts, especially at the international level, have profound effects on government policymaking. One of the most important of these effects is the disruption of budgetary balance and the shift in policy priorities from sustainable development to military security. The war between Russia and Ukraine also caused the European Union to reconsider its policies. For example, the European Union reduced the spending it had allocated to long-term goals such as digital transformation, green innovation, or combating climate change and paid more attention to issues such as increasing defense and security budgets, ensuring short-term energy security, and providing military and humanitarian aid to Ukraine. Similarly, the Horizon Europe and Green Deal programs, which included support for technological and environmental innovations, faced budget constraints and reduced resources, and policy priorities shifted to the areas of "national security" and "economic resilience" against geopolitical shocks (European Commission, 2023).

Policymaking area	Before war	After war
Clean Energy	High	Medium (temporary reduction)
Defense and Security	Medium	Very high
Technological Innovation	High	Medium or below
Military/Humanitarian Assistance	Low	High
Environment and Climate	High	Medium (with delay)

Conclusion

As a result of the progress of science and technology since the last quarter of the 20th century, countries and companies have been forced to compete with the whole world. The experienced process deeply affected those who could not keep up with the competition and change. The European Union is one of the powers with the most advanced welfare and technological investment in the world and is trying to integrate science and technology policies with many framework programs, in particular the Lisbon Strategy and the Europe 2020 Strategy. In general, these strategies and programs work in a way that is aligned with each other to facilitate sustainable, economic, and environmental development in the European Union.

The European Union has also implemented several environmental policies, including programs for environmental protection, natural resource management, and biodiversity. The European Green Deal, as a comprehensive plan to achieve carbon neutrality by 2050, emphasizes innovation and sustainable technologies. The pact seeks to create a sustainable and climate-resilient economy.

The EU's technology policies focus in particular on green innovations that can help reduce negative impacts on the environment. These innovations include renewable energy technologies, sustainable transport, and smart management of natural resources. For example, investing in solar and wind energy technologies not only helps reduce dependence on fossil fuels but also reduces greenhouse gas emissions.

Various strategies, such as the Lisbon Strategy and Europe 2020, seek to create synergies between economic growth and environmental protection. This synergy means that economic and

environmental goals can be achieved at the same time by using new technologies. For example, the development of clean technologies can lead to the creation of new jobs and sustainable economic growth.

The European Green Deal, as a comprehensive framework, aligns technological and environmental policies. The pact seeks to build a sustainable and climate-resilient economy and emphasises the importance of innovation and sustainable technologies. This integrated approach will help the EU achieve its long-term goals of sustainable development and environmental protection.

Finally, the link between technological and environmental policies in the EU reflects a common effort to create a more sustainable and resilient future. By continuing to invest in green and innovative technologies and implementing integrated policies, environmental and economic goals can be achieved, and global challenges can be addressed. This approach is not only good for the environment but will also contribute to economic growth and social well-being.

The Russia-Ukraine war was a turning point in the EU's technological and environmental policy-making. It has accelerated the EU's move towards energy independence. At the same time, challenges such as the temporary return to fossil fuels and rising energy costs may have temporarily affected the quality and coherence of some policies. For example, the EU increased its spending on arms production and reduced its spending on environmental protection after the war. But in the long term, the war has strengthened the EU's sustainable and technological orientation. Despite significant progress, some challenges need to be addressed. These include the need to provide sufficient financing for innovative projects, create appropriate infrastructure, and ensure cooperation between EU member states.

Recommendations

- a) Develop strong enforcement guarantees for superpowers and major countries that cannot in any way violate environmental treaties and laws in line with their innovative and technology-driven industrial, economic, military, and political activities.
- b) Superpowers and developed countries should also have comprehensive and sustainable cooperation with developing countries and help them with their development costs, based on reducing environmental pollution.

In addition to the above issues, the following are briefly proposed:

- 1) Design clean and low-carbon technologies as a policy priority.
- 2) Encourage the development and application of technologies with near-zero carbon emissions (such as renewable energy, electric transportation, and smart agriculture).
- 3) Develop legal requirements for comprehensive environmental impact assessments before approving or developing any new technology.
- 4) Establish environmental performance indicators in technological policies.

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