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EU POLICIES ON HUMAN SECURITY, ENVIRONMENTAL SUSTAINABILITY, STRATEGIC FORESIGHT, AND DIGITAL TRANSITION IN EU CANDIDATE COUNTRIES: MOLDOVA AND UKRAINE

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Introduction. The relationship between theoretical and conceptual frameworks has not been fully investigated in recent debates regarding European Union (EU) governance, human security, environmental sustainability, and strategic foresight. From this perspective, this paper addresses the evolving nature of European governance in the field and the dynamic framework of the collection, analysis, and monitoring of EU policies, which demonstrates that the central objective of the study is based on empirical analysis and interaction with annual policies.

Aim and tasks. This study aims to develop a matrix model for analysing the EU Strategic Foresight Reports (EU SFR Reports) released by the European Commission (EC) from 2020-2023. Since this research is based on reports published annually by the European Commission, the research plan develops an analysis matrix covering and monitoring annual reports. The study will also collect the most significant theoretical and scientific knowledge from specialised literature in the last five years.

Results. The analysis results revealed a focal dynamic of some topics in human security, environmental sustainability, and strategic foresight by quantifying, reporting, and evaluating diagrams, interpreting data, and monitoring concepts. An important part of the analysis focuses on how the two EU candidate countries for the European Union (Moldova and Ukraine) have employed legislative lines and directions regarding the relational nexus between human security, environmental sustainability, and strategic foresight.

Conclusions. In conclusion, it should be noted that empirical monitoring of the four European Commission reports for 2020–2023 (EU SFR) provides valuable findings regarding the impact of European policies, effectiveness, and institutional commitments, as well as the functional terms of security design, sustainability, and strategy. These results provide a standard for assessing future policies and demonstrate the importance of EU policies in influencing candidate countries' strategic vision and governance.

Keywords: European Union, human security, environment, sustainability, SFR reports.

1. Introduction.

The development of a set of common policies and measures in terms of security, sustainability, and strategic foresight is a significant objective of community space. The use of periodic reports represents a systematic engagement in managing and analysing the implementation of policies at the EU governance level and the member state level. The field of security and sustainability analysis comprises a complete set of provisions and systematic rules for impact assessment, including strategic reports and mechanisms for monitoring and evaluating the benefits for European citizens, as well as the assessment of some key concepts within the annual publications of the EU SFR Report (2020) collection by the European Commission. In this framework of analysis, the present study focuses on developing a matrix model for the analysis of the essential topics of European governance within the four annual reports published from 2020-2023.

The four reports adopted and published in the period 2020-2023 are documents of vital importance for European governance that both dimension strategic forecasts in different sectors but engage and monitor community resilience in a quadruple dimension, considering crisis management, geopolitical dimension, green transition, and digitisation. The fundamental elements of the four reports encourage a strategic direction implemented in the long term, oriented towards inclusion, efficient governance, and the common strengthening of the resources and capabilities of the member states. The central themes of the reports adopted by the European Commission (EC) share the culture of responsibility, as they include mechanisms for projecting human security, integrating policies to ensure environmental sustainability, and capitalising on the principles of strategic foresight.

These reports stimulate the principles of open strategic governance focused on social resilience and the dimensions of foresight in environmental sustainability and human security. In this framework for sizing the strategic vision, the 2020 report published on 9 September 2020 proposes a framework for monitoring and supervising European policies designed to focus on both sectoral indicators, as well as the management of digital resilience, green resilience, and ecological resilience (EU SFR Report, 2020). The report published on 29 June 2021 by the European Commission (EU SFR Report, 2021) projects a vector of analysis of the role of digital hyperconnectivity and emerging technologies for European governance. This report innovates in three ways.

The first connects climate change, biodiversity, and public health scenarios.

The second direction prioritises the analysis of the consequences of the COVID-19 pandemic, demographic projections, and a multidimensional vision regarding the global leadership of the EU. The third perspective particularises the democratic governance model and focuses on the role of EU security and stability.

The third report published by the European Commission on 29 June 2022 (EU SFR Report, 2022) focuses on the geopolitical challenges to European security and the short-term and long-term consequences of Russia's aggression against Ukraine. The report published in mid-2022 has an essential role in projecting both the EU's reflections and strategies in the new geopolitical context, but also in individualising the EU's ten areas of action and commitment, focusing on the dynamics of the energy sector, digitalisation, diversification of supply and sales market goods, inclusion and social cohesion, performance of the education sector, data security, and technological and cyber security standards.

The fourth report, published on 6 July 2023 (EU SFR Report, 2023), monitors the community space's social, political, geopolitical, and economic transformations, and reports the strategic orientations in sustainability and the well-being of European citizens. The report carried out an analysis of geopolitical and geo-economic developments in the context of Russia's war against Ukraine, detailing the main social and political patterns of the current global space: the strategic partnership of the European Union with the United States of America, the dynamics of the investment sector, the dynamics of the field of alternative intelligence, the digital transition, and energy transition.

The aim and tasks of the study focus on four main approaches: (1) monitoring and investigating the annual strategic forecast reports developed and adopted by the European Commission in the period 2020-2023; (2) analysis and reporting of progress in achieving sectorial objectives involving periodic monitoring (annually at the level of each report) and continuous monitoring through the operational investigation of the key indicators specified at the level of human security, environmental sustainability, and strategic foresight; (3) monitoring and analysis of relevant topics using tabular formats for each annual report; (4) reporting and analysing keywords with a high frequency of use at the level of each annual report by using diagrams to visualise the results in tabular formats in order to facilitate the understanding of the annual strategic planning of the European Union; and (4) exploring the main objectives and implementation measures of the digital transition in the EU candidate countries Moldova and Ukraine.

To provide an overview of contemporary developments in the field of study, the first step is to identify the trends in recent and relevant specialised literature. This stage of the research has the role of monitoring important trends, as well as identifying the possible shortcomings of the current research in the study of the analytical-conceptual nexus between human security, environmental sustainability, and strategic foresight, and selecting the most relevant methods of collection, monitoring, and analysis of research data.

2. Literature review.

The European Commission's focus on human security and environmental sustainability during the period that coincided with the COVID-19 pandemic and the war in Ukraine was expressed in its Strategic Foresight Reports 2020-2023 forged under the legal form of Communications from the Commission to the European Parliament and the Council.

In 2020, the Strategic Foresight Report titled 'Strategic Foresight – Charting the Course towards a More Resilient Europe" allies the quadruple resilience dimensions of the social and economic, geopolitical, green, and digital factors (European Commission, 2020; Parthie, 2020).

Further, the 2021 Strategic Foresight Report entitled "The EU's capacity and freedom to act" aligns the challenges and curtailments that could constrain EU potencies, such as environmental issues, digital and technological innovation, obstructions to European democracy and demographic alteration, and counteracts with ten territories that could expand global and strategic policymaking (European Commission, 2021).

Moreover, the 2022 Strategic Foresight Report entitled "Twinning the green and digital transitions in the new geopolitical context" communicates the Commission's will to turn from constraints to synergists the "energy, food and security" issues cropped up by the war in Ukraine and other shifts in the geopolitical frame (European Commission, 2022). In 2023, the European Commission communicated its strategic vision of stimulating "climate neutrality and sustainability" while enhancing EU's "open strategic autonomy and economic security" in its 2023 Strategic Foresight Report entitled "Sustainability and People's wellbeing at the Heart of Europe's Open Strategic Autonomy" (European Commission, 2023).

Academic interest in the European Commission's strategic foresight highlights the lexicon of implications for policymaking and monitoring (Zwaan & Schoenefeld, 2024), assuming multi-dimensional security, accelerated digitalisation, and sustainable development (Ratcliffe, 2019). The substance of geopolitical evolution relates to the presumption of linking supply chains of essential or strategic resources for the EU in the context of the COVID-19 pandemic and war in Ukraine (Müller, 2023). Hence, this geopolitical context was styled as a "window of opportunity" to confront climate change and other environmental questions by enacting a "twin green and digital transition" through substantial policy options at multiple governance ranks in different types of synergism (Diodato et al., 2023; Müller et al., 2023; Gao, 2024).

These policy agenda preoccupations have stimulated the conversations and research on the EU's regulatory options for "digital sovereignty" and cybersecurity concerns, also raising the question of EU policy and "AI sovereignty" (Farrand & Carrapico, 2022; Olimid et al., 2024a; Mügge, 2024).

In the current context, the EU's economic growth depends on the EU's technological and digital transformation, which can enhance regional competitiveness (Capello & Caragliu, 2024; Olimid et al., 2024b; Mora et al., 2022). Therefore, the achievement of "open strategic autonomy" is determined by the relationship between the digitalisation agenda and European security (Csernatoni, 2022; Miró, 2022).

Multiple implications have resulted from connecting education and research governance to digital innovation and business (Leceta & Könnölä, 2020). At the same time, the issue of digital transition coupled with social and demographic constraints (Olimid et al., 2024c) has created conditions for substantive discussions on welfare and wellbeing supranational policy design and national responses (Pasi & Misuraca, 2020). Academic discussions on digital governance have also addressed different education policy alternatives (Williamson, 2015), including finances, innovation, and future-driven (Williamson & Komljenovic, 2022), some propelling intelligence assumptions and policy choices to address "digital disinformation" (Pherson et al., 2020), and online content monitoring and control of EU public policy options (Flonk et al., 2024).

The European Commission's adoption of the Digital Services Act in 2020 has fuelled the vocabulary of conversations around the EU's purposed state of digital sovereignty (Turillazzi et al., 2023; Falkner et al., 2024). Digital transition markers have been modelled to predict regional development (Capello et al., 2023) or diplomatic and foreign EU relations (Carver, 2024).

3. Methodology.

The study is based on an analytical and documentary framework retrieved from the EUR-Lex database during the period October 1, 2024-October 10, 2024. A legislative analysis of the four documents published annually (EU SFR Report, 2020; EU SFR Report, 2021; EU SFR Report, 2022; EU SFR Report, 2023) provided a complementary analysis of the recent debates in the specialised literature regarding the monitoring mechanisms of European governance and the increased interest in the nexus between human security, environmental sustainability, and strategic foresight.

3.1. Selection of EU strategic foresight thematic areas and keywords.

The thematic scope for selecting documents from the EUR-Lex legislative database was limited to the four reports adopted by the EC in strategic foresight. In the first phase of the research carried out between October 1, 2024, and October 10, 2024, the study selected the four legislative documents to be analysed as follows:

The first report, entitled "Strategic Foresight – Charting the course towards a More Resilient Europe", centres on the connected analysis of resilience factors in European society with a multidimensional framework of strategic foresight of the European Commission agenda in the social, geopolitical, green dimension and digital sector spheres (European Commission, 2020).

The second report, entitled "The EU's capacity and freedom to act", focuses on the innovative character of the cross-sectoral agenda proposed by the European Commission with a three-dimensional approach: climate change, digital hyperconnectivity and transformations of governance and democratic governance models (European Commission, 2021).

The third report entitled "Strategic Foresight Report Twinning the Green and Digital Transitions in the New Geopolitical Context", engages two dimensions of the convergence between the green and the digital transition in the new geopolitical framework of the 2020s, namely: digitalisation of energy, ecological transport, urbanisation, climate neutrality and resilience of the EU agricultural sector (European Commission, 2022).

The fourth report, entitled "Sustainability and People's well-being at the Heart of Europe's Open Strategic Autonomy", has a multi-categorical framework for reporting and strategic forecasting in the field of sustainability and well-being through the fundamental association of three concepts: "open strategic autonomy", "sustainable economy" and "economic security" (European Commission, 2023).

To visualise the networks of relevant concepts exposed by the four reports, the study will use two software programs:

1) For the selection of relevant topics in order to decrease the frequency of appearance, the study will use the Wordcounter.net program employing the "keyword density" tool for a single selected word (Tables 1, 2, 3, and 4);

2) The visualisation of the quantifying charts of the first 15 keywords using Sample Diagram 1. General model matrix for the research and analysis of the EU SFR Reports 2020-2023 and individual visualisation for EU SFR Report 2020 (Figure 2), EU SFR Report 2021 (Figure 3), EU SFR Report 2022 (Figure 4), EU SFR Report 2023 (Figure 5);

3) For the visualisation of concept networks and analytical-conceptual nexus configuring the words selected according to the first method, the research display charts provided by Mermaid Live Editor v11.3.0, to highlight summary and summary charts for each annual report (Figure 6, 7, 8, and 9).

3.2. Configuration of the EU strategic foresight matrix model.

The matrix model of the key concepts is based on diagrams visualised using Mermaid Live Editor (2023) software, version v11.3.0. The matrix model visualises four quadrants of analysis for each EU strategic foresight report selected by delineating the following four levels: high engagements (Q1-quadrant 1 and Q2-quadrant 2), low engagement (Q3-quadrant 3), and high reach (Q4-quadrant 4) as follows (Sample Diagram 1):

(1) High engagement: Two analytical-conceptual nexus as follows: Q1-quadrant 1, in the upper left part of the matrix model and Q2-quadrant 2, in the upper right part of the matrix model which expresses a higher frequency and a more pronounced occurrence in the input fields of human security analysis, as well as environmental sustainability (high engagement).

(2) Low engagement expressing the analytical-conceptual nexus, as follows: Q3-quadrant 3, in the lower left part of the matrix model, represents a lower frequency (strategic foresight – Q3, low reach), and Q4-quadrant 4, in the lower right, expresses a potentially more pronounced occurrence in the output areas of the analysis, such as projected shares of policies and challenges and connectivity and resilience (potential high reach-Q4).

The proposed model visualises a matrix that includes a set of four quadrants. The first two quadrants have highly relevant topics (human security and environmental sustainability). At the same time, the last two describe topics with low relevance in the spheres of strategic foresight and implementation of policies and low engagement, as well as topics that employ a high-reach trend in connectivity and resilience.

This analysis model explores the different frequencies of representation and appearance of key topics in each annual report selected for analysis. The model is based on a thematic analysis arranged at the level of the four quadrants as follows: Q1-human security, Q2-environmental sustainability, Q3-strategic foresight and policies and Q4-connectivity and resilience (Sample Diagram 1):

The reason for choosing two research and analysis tools, Wordcounter.net and Mermaid Live Editor, is based on a double approach to the process of examination, monitoring, and analysis of the annual strategic forecasting reports adopted by the European Commission.

The choice of Wordcounter.net was based on the need for an objective selection of keywords according to the descending order of their frequency of appearance in each report. The results generated by Wordcounter.net helped us highlight the relevant words for deepening and understanding the structure, context, and meaning of each analysed report. In the second part of the research, the results of the Wordcounter.net analysis are used in the diagrams created and visualised with the help of the Mermaid Live Editor software tool, which highlights the flow diagrams through the interactive and interconnected visualisation function of the four quadrants.

3.3. Criteria for selecting keywords and the coding scheme used in the thematic analysis.

Wordcounter, therefore, proves to be a valuable and necessary tool for configuring the descending order of appearance of words within the selected legislative documents EU SFR Reports 2020-2023 that were adopted, approved and made available to the public.

Rendering the raw data in Tables 1-4 for the first 15 words in descending order of appearance provides accuracy and transparency for the analysis and interpretation phases of the research data. Therefore, the selection criterion is descending rendering in order of the frequency of appearance of the words in the four reports EU SFR Report 2020-2023.

In the second stage of the research, the Mermaid Live Editor version v11.3.0 platform, a digitally available diagram editor with interactive visual editing, was used:

1) Context of the diagram image generated with JavaScript from the panel code after editing the code.

2) The results are visualised using the flow charts in the panel by accessing the "Pan & Zoom" option for each EU SFR Report adopted in the period 2020-2023 (panel on the right to configure and view the flow chart).

The writing code for each of the four diagrammatic analysis quadrants arranged for each selected legislative document is displayed on the left side of the configuration panel. The configuration of the writing codes for each of the four quadrants of the panel of each diagram (visualised in Figures 6, 7, 8, and 9) is achieved by arranging the words resulting from the WordCounter analysis on a two-dimensional grid.

The two-dimensional grid has an X-axis and Y-axis representation variable for each quadrant, namely Q1, Q2, Q3, and Q4.

For a concrete and transparent visualisation of the analysis results, based on the criteria provided, the research identifies and configures conceptual and data trends, revealing and prioritising the four quadrants that configure the theme of European policies, namely Q1-human security with impact in the sphere of protecting and guaranteeing the rights and freedoms of the individual; Q2-the nexus among environmental sustainability, green transition, and the digital transition; Q3-strategic foresight and policies, a theme that reveals the European Commission's short-, medium-, and long-term plans and the disposition of concepts and strategies in this field; and Q4-connectivity and resilience which configures cooperation, collaboration, connectivity, resilience, and sustainability policies employed by the European Commission within the EU SFR Reports 2020-2023.

The motivation for choosing these methods configures the two stages of research. In the first stage, the Worcounter.net platform was used for the research, which circumscribes the method of evaluation and quantitative quantification of the research in two main phases:

1. After inserting the text of the selected legislative document into the Eur-lex database, this tool judiciously and transparently displays the number of words that appear with high frequency within the text.

2. For the accuracy of the research, they used the research results for the occurrence of a single word, for which we associated the numerical variable entitled "keyword density x1", which means a numerically rated frequency of occurrence with a single occurrence (=1).

3. The configuration and numerical rendering of the research results using data quantified by the Wordcounter platform are presented in Tables (Table 1, 2, 3, and 4).

4. Quantification of the results from the first stage of the research helped us configure the qualitative analysis because we configured the flow charts visualised with the help of Mermaid Live Editor version v11.3.0.

4. Results.

4.1. Wordcounter.net analysis on EU strategic foresight thematic areas and keywords.

The first part of the research identified the main keywords that would later highlight the thematic areas resulting from the analysis with the help of the Wordcounter.net program.

The analysis results for keywords (the first column of each table) will be highlighted numerically, in descending order, of their appearance within each EU SFR Report during 2020-2023 (the 2nd column of each table). The third column of the tables quantifies the number of occurrences quantitatively, calculated as a percentage of the total number of words in the document. For each report, only nouns and adjectives will be retained for the analysis (e.g. "noun" or "adjective").

Thus, for a relevant quantification of the number of keywords, the study selected the first 15 keywords for each report inserted in descending order.

In this context, to quantify the results of the frequency of occurrence of keywords the study will use the tool provided by the Wordcounter.net platform entitled: "keyword density x1" that is the density of occurrence related to a single noun or single adjective. Wordcounter.net scanned the selected documents, classified the text and provided quantitative, numerical and objective descriptions. The keyword nouns and adjectives later operated in the study were automatically chosen through conceptual analysis, resulting in semantic statistics that manifest the frequency of utilised concepts' occurrences in the four EU SFR Reports.

At this stage, the study aimed to establish and quantify the presence and frequency of words in the selected texts. Stating the frequency and quantitatively assessing the weight of each word in the text allows for the identification of certain themes and underlines further qualitative research.

Wordcounter.net thus covered the documents deployed and conveyed the number, frequency, and occurrence of individual words within the texts.

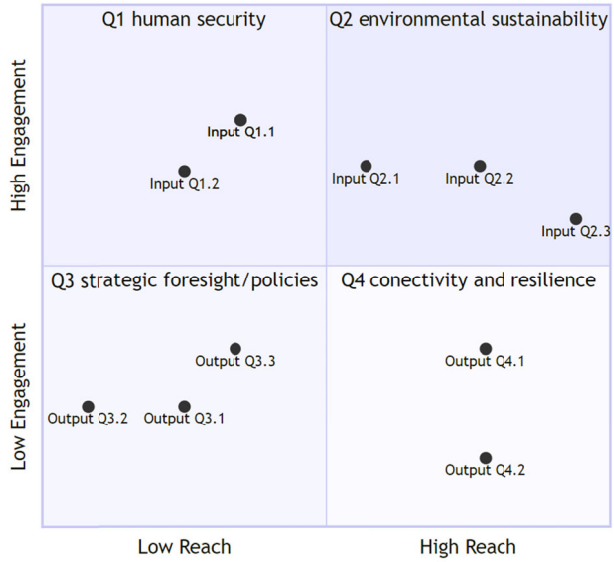

Fig. 1. General model matrix for the research and analysis of the EU SFR Reports 2020-2023.

In this context, the quantified results in the first two tables (Tables 1 and 2) related to the EU SFR Report (2020) and EU SFR Report (2021) employ an interdisciplinary perspective of the nexus between human security, environmental sustainability, and strategic foresight. The strategic and forecasting dimensions of the two tables associate knowledge and practical assessments, but also a framework of convergence regarding the semantic field of the concept of resilience to which it associates an inventory of structural and functional lexical concepts such as foresight "strategic" - 78 occurrences (Table 1, EU SFR 2020), "foresight" - 70 occurrences (Table 1, EU SFR 2020), "capacities" - 35 occurrences (Table 1, EU SFR 2020), "development" - 22 occurrences (Table 2, EU SFR 2021).

The linguistic selection of the policy evaluation ordered by the results of the Wordcounter.net analysis centres on other key concept classes regarding the acceleration of development such as: "change" - 20 occurrences (Table 2, EU SFR 2021); cooperation" - 20 occurrences (Table 2, EU SFR 2021); "challenges" - 24 occurrences (Table 2, EU SFR 2021). The third set of keywords relates to human security, environmental sustainability and strategic foresight such as: "economic" - 57 occurrences (Table 1, EU SFR 2021); "economy" - 42 occurrences (Table 2, EU SFR 2020); "transition" - 32 occurrences (Table 1, EU SFR 2020); "financial" - 17 occurrences (Table 2, EU SFR 2021); "health" - 24 occurrences (Table 2, EU SFR 2021); "security" - 21 occurrences (Table 2, EU SFR 2021); "food" - 16 occurrences (Table 2, EU SFR 2021).

Table 1. Quantifying the frequency of occurrence of keywords in the EU SFR Report (2020).

No	Keyword	Numerical quantification	Percentage quantification
1.	"resilience"	87	3%
2.	"strategic"	78	2%
3.	"foresight"	70	2%
4.	"economic"	57	2%
5.	"green"	57	2%
6.	"global"	57	2%
7.	"crisis"	48	1%
8.	"Europe"	46	1%
9.	"covid"	45	1%
10.	"economy"	42	1%
11.	"technologies"	39	1%
12.	"climate"	37	1%
13.	"jobs"	36	1%
14.	"capacities"	35	1%
15.	"transition"	32	1%

Source: based on the Wordcounter.net (2024).

Table 2. Quantifying the frequency of occurrence of keywords in the EU SFR Report (2021).

No	Keyword	Numerical quantification	Percentage quantification
1.	"global"	56	3%
2.	"technologies"	38	2%
3.	"energy"	29	1%
4.	"climate"	25	1%
5.	"challenges"	24	1%
6.	"health"	24	1%
7.	"development"	22	1%
8.	"security"	21	1%
9.	"market"	21	1%
10.	"economy"	20	1%
11.	"cooperation"	20	1%
12.	"change"	20	1%
13.	"financial"	17	1%
14.	"food"	16	1%
15.	"USA"	16	1%

Source: based on the Wordcounter.net (2024).

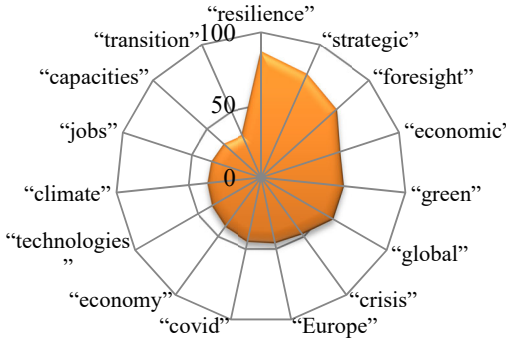

Fig. 2. Quantifying chart of first fifteen keywords in EU SFR Report 2020̀.

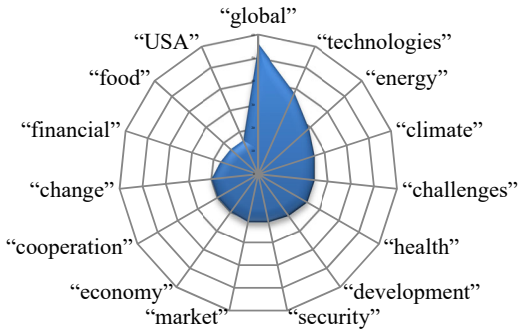

Fig. 3. Quantifying chart of first fifteen keywords in EU SFR Report 2021.

Considering the general framework of the research methodology, Figure 2 and Figure 3 graphically present the results of the Wordcounter.net analysis of the top fifteen keywords from the EU SFR Report (2020) (Figure 2) and the EU SFR Report (2021) (Figure 3).

Table 3 and Table 4 individualise relevant conceptual-linguistic particularities within the EU SFR Report (2022) and EU SFR Report (2023).

The two tables above designate and describe:

1) the complexities and social varieties that associate lexical-conceptual variations in the sphere of sustainability and security, such as: "sustainable" - 20 occurrences (Table 3, EU SFR 2022), "sustainability" - 16 occurrences (Table 3, EU SFR 2022); "sustainability" - 37 occurrences (Table 4, EU SFR 2023); "sustainable - 31 occurrences (Table 4, EU SFR 2023);

2) the institutional and strategic governance by approaching a set of key concepts that reflect sectoral and political norms as follows: “GDP” - 26 occurrences (Table 4, EU SFR 2023), “consumption - 23 occurrences (Table 3, EU SFR 2022); “production” - 18 occurrences (Table 3, EU SFR 2022); “skills” - 17 occurrences (Table 4, EU SFR 2023), “digitalisation” - 13 occurrences (Table 3, EU SFR 2022); “income” - 15 occurrences (Table 4, EU SFR 2023); “policies” - 12 occurrences (Table 3, EU SFR 2022).

The second perspective developed by Table 3 and Table 4 reflects an interdisciplinary field connecting the field of digitisation and transition with the area of knowledge and European values by using the following keywords: “wellbeing” - 15 occurrences (Table 4, EU SFR 2023); “life” - 17 occurrences (Table 4, EU SFR 2023), “states” - 15 occurrences (Table 4, EU SFR 2023), “people” - 13 occurrences (Table 4, EU SFR 2023), “needs” - 14 occurrences (Table 4, EU SFR 2023). Considering the general framework of the research methodology set out in point III.2., Figure 4 and Figure 5 graphically present the results of the Wordcounter.net (2024) analysis of the first ten keywords in the EU SFR Report (2022) (Figure 4) and EU SFR Report (2023) (Figure 5).

Table 3. Quantifying the frequency of occurrence of keywords in the EU SFR Report (2022).

No	Keyword	Numerical quantification	Percentage quantification
1.	“transitions”	39	2%
2.	“twinning”	25	1%
3.	“consumption”	23	1%
4.	“geopolitical”	20	1%
5.	“sustainable”	20	1%
6.	“transition”	19	1%
7.	“environmental”	19	1%
8.	“production”	18	1%
9.	“transport”	16	1%
10.	“emissions”	15	1%
11.	“investments”	15	1%
12.	“sustainability”	16	1%
13.	“market”	14	1%
14.	“development”	13	1%
15.	“digitalisation”	13	1%

Source: based on the Wordcounter.net (2024).

Table 4. Quantifying the frequency of occurrence of keywords in the EU SFR Report (2023).

No	Keyword	Numerical quantification	Percentage quantification
1.	“sustainability”	37	2%
2.	“sustainable”	31	2%
3.	“GDP”	26	%
4.	“life”	17	1%
5.	“skills”	17	1%
6.	“economy”	16	1%
7.	“wellbeing”	15	1%
8.	“action”	15	1%
9.	“states”	15	%
10.	“income”	15	1%
11.	“transitions”	14	%
12.	“needs”	14	1%
13.	“impacts”	14	1%
14.	“people”	13	1%
15.	“policies”	12	1%

Source: based on the Wordcounter.net (2024).

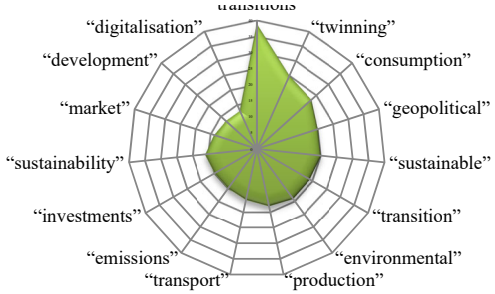

Fig. 4. Quantifying chart of first fifteen keywords in EU SFR Report 2022.

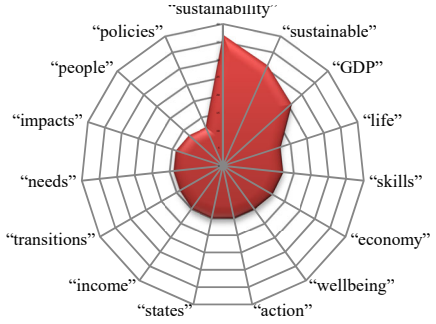

Fig. 5. Quantifying chart of first fifteen keywords in EU SFR Report 2023.

4.2. Visualization of the conceptual diagrams using the Mermaid Live Editor (v11.3.0).

The results obtained converge towards the configuration of the four quadrants at point 3.2, , where Figure 1 approximates the quantitative diagram in Figure 6, released for the EU SFR Report 2020 as follows:

a) Quadrant Q1 (human security) concentrates the conceptual-analytical field of the following topics: "strategic", "resilience", "Europe", "foresight", "economic";

b) Quadrant Q2 (environmental sustainability) focuses on three related topics as follows: "green", "technologies", "climate";

c) Quadrant Q3 (strategic foresight/policies) focuses on three central topics from the sphere of social and community governance: "transitions", "capacities", "jobs";

d) Quadrant Q4 (connectivity and resilience) formulates an ambivalent framework focused on two fundamental topics in the sphere of social action and current societal challenges: "crisis" and "covid".

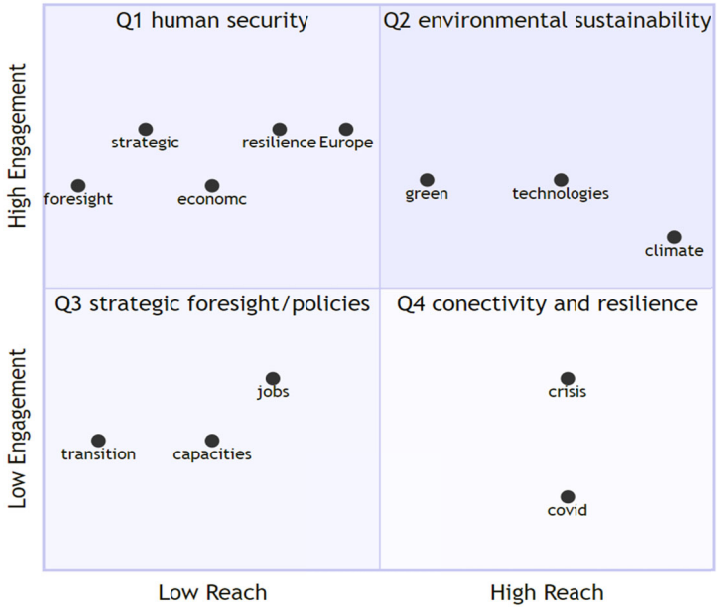

Fig. 6. Visualization of the quadrant chart for the EU SFR Report 2020 using Mermaid Live Editor (v11.3.0 – mermaid.live).

Source: based on Mermaid Live Editor (2023).

Figure 7 released for the EU SFR Report 2021 presents the quantifying chart of the first twelve keywords in the EU SFR Report 2021 and associates fundamental topics in the human security sphere such as the perspective of technologies and energy sectors. In the area of environmental sustainability, governance frameworks reflect the spectrum of investors and environmental governance, climate health here including development. The last two quadrants related to strategic foresight, connectivity and resilience have four frontal topics that connect financial and food policy, cooperation, the European common market and citizens' needs.

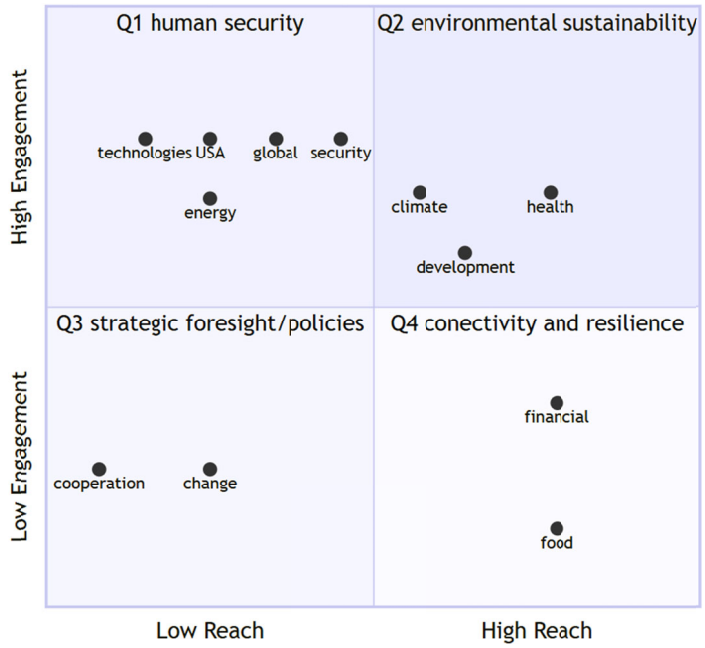

Fig. 7. Visualization of the quadrant chart for the EU SFR Report 2021 using Mermaid Live Editor (v11.3.0 – mermaid.live).

Source: based on Mermaid Live Editor (2023).

Figure 8, released for the EU SFR Report 2022, is based on the four quadrants assumed at point 3.2 of the research and complements the framework of human security with that of sustainability, forecasts and resilience (see Figure 8. Visualization of the quadrant chart for the EU SFR Report 2022 using Mermaid Live Editor (v11.3.0 – mermaid.live).

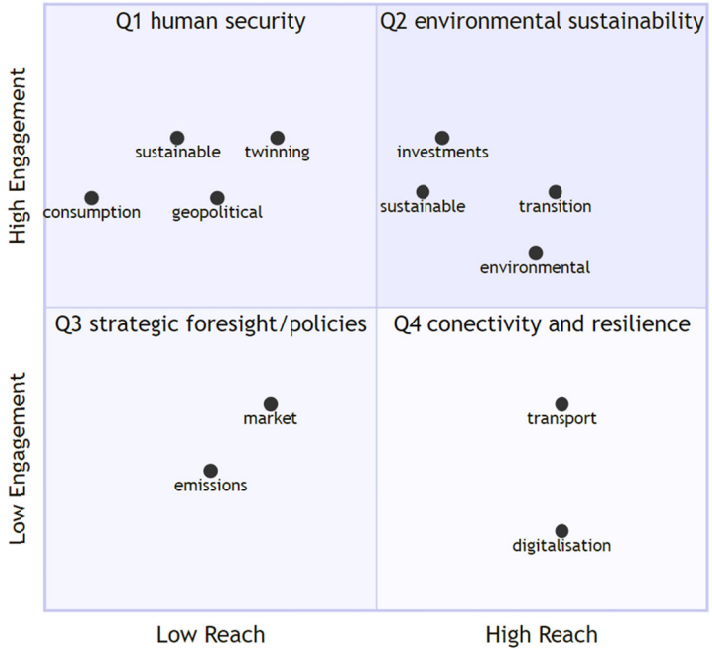

Fig. 8. Visualization of the quadrant chart for the EU SFR Report 2022 using Mermaid Live Editor (v11.3.0 – mermaid.live).

Source: based on Mermaid Live Editor (2023).

The visualisation and monitoring of the topics related to Figure 8 allow an in-depth understanding of the conceptual and theoretical nexus of European governance in the matter of the digital agenda, the role of collaboration and cooperation at the level of the states, as well as the need to configure a unitary approach mechanism to approach the green transition and the digital transition by individualising the following four quadrants:

1. Quadrant Q1 (human security) connects social aspects, community governance, and the social status of the citizen, as well as social sustainability, geopolitical, twinning perspectives, and professional skills.

2. Quadrant Q2 (environmental sustainability) adopts a multidimensional framework that associates aspects related to the role of social action, transition and environmental governance.

3. Quadrant Q3 (strategic foresight/policies) has the role of individualising two scenarios regarding the market governance, emissions and management of policies at the level of the member states.

4. Quadrant Q4 (connectivity and resilience) reflects a two-categorical framework centred on the degree of expectation of citizens, the community level, and the impact of economic governance, transport policies, and digital transition.

Figure 9 centres the quantifying chart of the first eleven keywords in the EU SFR Report 2023, configuring the central role of sustainability and social life in analysing the Q1 quadrant dedicated to human security. The Q2 quadrant facilitates a complex relational nexus that highlights the three pillars of environmental sustainability following the three-dimensional context related to the economy, GDP and the importance of social action.

The conceptual trajectory of the Q3 quadrant highlights the role of social actors, the importance of decision-making and the institutional governance of the member states, and the framework for the implementation of European policies. The last quadrant (Q4) configures the spectrum of social needs and expectations and the role of income in social and organisational connectivity and resilience.

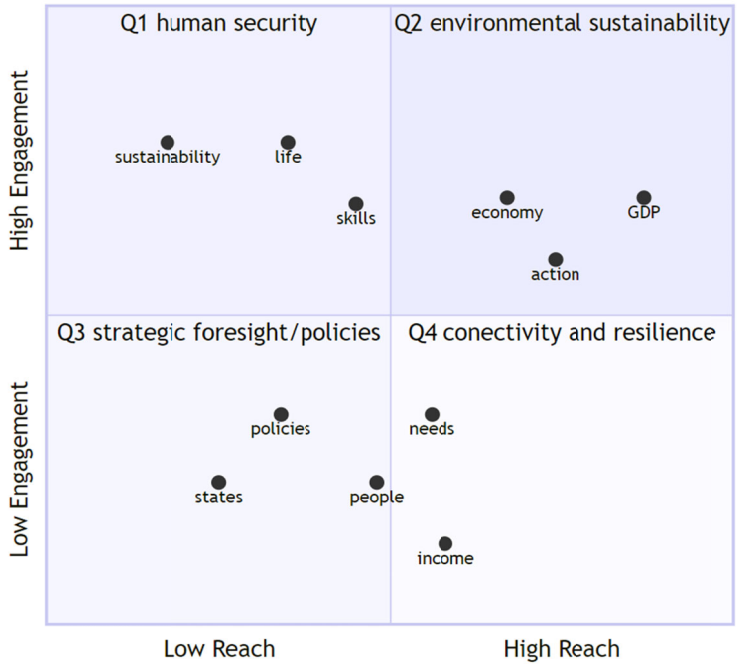

Fig. 9. Visualization of the quadrant chart for the EU SFR Report 2023 using Mermaid Live Editor (v11.3.0 – mermaid.live).

Source: based on Mermaid Live Editor (2023).

5. Relational nexus between human security, environmental sustainability and strategic foresight in Moldova and Ukraine.

The EU framework dedicated to digital transformation and harmonization at the level of the digital policy sector provides for an initiative entitled EU4Digital, which includes a package of measures and financial instruments for the countries of the Eastern Partnership in areas such as the telecommunications sector, eTrust, cross-border mechanisms and measures for digital market and skills, eTrade and eHealth services, ICT domain and activities, Start-up initiatives (EU4Digital, 2024b).

The program provides areas of activity for the candidate countries of the European Union, Moldova, and Ukraine. It sets crucial reform measures in the digital sector to improve and expand digital services. In this context, the adopted measures complete the regulatory framework provided by the decision adopted in April 2022 in Decision (EU) 2022/563 (European Union, 2022) and the Moldova Growth Plan (MGP) as adopted on October 9, 2024 (European Commission, 2024).

The MGP engages a framework of initiatives, actions and implementation measures aimed at accelerating development in the strategic sectors of the economy, economic governance and market competitiveness, social capital, green transition and digital transition within the EU4Digital program, but also generates a plan of measures adapted of access to the community market based on trade facilitation, sustainability, resilience, connectivity and data security (European Commission, 2024).

For Ukraine, the DT4UA program implemented from November 2022 to April 2025 (EU4DigitalUA, 2024a) is intended to improve public services and data exchange to enhance the sustainability of e-government infrastructure. The program aims to enact the connectivity of public services and institutional resilience in the electronic service provision sector. An essential aspect of the program concerns data security and services offered by state institutions, as well as harmonization and compliance with EU standards.

One of the most recent initiatives of the European Parliament, Regulation (EU) establishing the Ukraine Facility adopted on February 29, 2024 (European Union, 2024) focuses on the three defining aspects of the nexus of policies and implementation mechanisms for stability and macro-financial assistance, security and cooperation.

This recently adopted legislative framework also employs other directions aimed at promoting and strengthening economic sectors, as well as cyber-security risks and assessments [Regulation (EU), 2024/792, Recital (29) and Recital (37)], digital transformation [Regulation (EU), 2024/792, Article 3(2)(d)(j) and Article 11(7)(b)], strategic investment in peace and stability [Regulation (EU), 2024/792, Recital (27)], climate resilience [Regulation (EU), 2024/792, Recital (31)], financial resilience and support [Regulation (EU), 2024/792, Recital (1), Recital (10),], resilience and assistance against disinformation [Regulation (EU), 2024/792, (37)], environmental sustainability and resilience [Regulation (EU), 2024/792, Recital (41) and Article 3(1)(b)], resilience of the infrastructure [Regulation (EU), 2024/792, Article 3(2)(b)].

The challenges in the process of implementing the EU4Digital initiative in Moldova and Ukraine in the digital technologies and sustainability sector focus on three analysis clusters:

The first challenge analysis cluster refers to the role of decision-makers and the legislative, technical and strategic measures aimed at data access, green transition and digital transition in Moldova and Ukraine in accordance with the community requirements for harmonization to the single European digital market.

The second cluster of challenges focuses on the security risks generated by the geopolitical context and the war in Ukraine. At the same time, this cluster of analysis and assessment of the challenges of the EU4Digital initiative refers to institutional solutions and the development of sectoral digital economy policies. Thus, the challenges primarily target the operational and functional capacity of the systems and facilities in the two countries, the regime of economic governance, and the stage of social, economic and political reforms.

The third cluster engages the challenges regarding implementing programs and projects evaluated within EU4Digital, such as the "Dream Reconstruction Ecosystem for Accountable Management" (DREAM), a program developed during 2023-2024. DREAM was evaluated within the eTrust domain of the EU4Digital initiative for Ukraine and targeted the digital transition sector, IT services, and system operability and functionality (EU4Digital, 2024b).

For the Republic of Moldova, the essential challenges are mainly related to the implementation of the "Strategy for Digital Transformation of the Republic of Moldova", a strategy initiated for the period 2023-2030, but also to the stage of evolution and development of priority programs in the field such as "Moldova Innovation and Technology Park" (EU4Digital, 2024a). In this context, the challenges of the interoperability of the data system require the promotion of a complex of coordinated measures related to the digital transition and sustainability provided by the EU4Digital initiative for the two candidate countries: Moldova and Ukraine.

Therefore, challenges relating to differences in the use of digital technologies and sustainability policies encountered in implementing policy initiatives under the EU4Digital in Moldova and Ukraine can be met with solid governance partnerships and increased institutional connections.

6. Conclusions

This study created conditions to propel the inception of a research layout of the EU Strategic Foresight Reports communicated by the European Commission (EC) throughout 2020-2023. This research connects the inspection of the Strategic Foresight Reports adopted as Communications by the Commission to the European Parliament and the Council and the literature that analyzed the ramifications of these documents during the selected period. Hence, this study examines the Commission's strategic, long-term, annually determined policy goals. The analysis considers the four communications from the Commission to the European Parliament and the council-styled Strategic Foresight Reports for 2020-2023.

Consequently, the limitation of the study stems from the shortage of strategic foresight reports before 2020. Hence, the results obtained could not be compared to the preceding data. However, the four commission communications deployed during 2020-2024 mark institutional foreknowledge and EU governance commitment towards the digital transition and environmental sustainability binomial.

Moreover, the limits of the choice of the two methods can be framed within the scope of the selection of the number of words; for a relevant, compact, the research configures the quantified results are configured by rendering the raw data for the first 15 words as frequency of appearance in each EU SFR Report 2020-2023 within the Wordcounter.net analysis.

A second perspective of the methodological limits is represented by the lack of research carried out in the field in the previous period on the topics of the European Commission's EU SFR 2020-2023 reports, but also by the lack of recent comparative research of some sectoral policy reports in the last mandate of the European Commission.

In this context, although some articles and studies analyse, quantify, and analytically and statistically monitor other European sectoral policies, there are no quantification studies and analysis of European reports from the last five years in the fields of human security, environmental security, and strategic foresight, which use two or more methods of research and validation of the results. The methodology involved purposeful documentation in the EUR-lex database, identifying and labelling the recurrent concepts and phrases with the Wordcounter.net application, and finally, the conceptual connection and lineament disposition coordinated by the Mermaid Live Editor application.

The potential or future adaptations of the model are encouraged by the matrix model's analysis, interpretation, and rendering, as well as by explicit rendering and visualization. The primary data are presented, and the rendering and configuration of the four tables provide orientation and guidance for the analysis of other political sectors at the level of European governance, as well as support models and analysis for future research in the field of sectoral policy.

The matrix model represents a rendering and visualization model through examples. The four-quadrant flowcharts are laid out in a logical order as follows: the text in quadrant Q1 lays out the visualization of the concepts in the upper left quadrant, Q2 exposes the visualization for the upper right quadrant, Q3 exposes the concepts configured in the lower left quadrant, and Q4 quadrant renders the exposes the concepts in the lower right quadrant.

The discussion phase acknowledged and explained the overtone research results of certain motifs subject to human security, environmental sustainability and strategic foresight through a thorough study of the resulting entanglements and corollaries reproduced in Mermaid Live Editor's monitoring concept quadrant.

This research also draws inferences on the significant policy decisions of certain candidate countries for the European Union in human security, environmental sustainability, and strategic foresight. The theoretical and methodological contributions of the research encourage the use of two research methods: at least one quantitative method and one qualitative method for monitoring, analyzing, and interpreting the field of policy analysis.

The practical applications of the present study also engage and motivate future research, and the possibility of contextualizing other sectors of European policies or other types of reports generated at the EU's institutional governance level. The study of the four reports indicates the direction of European policies referencing human security, environmental sustainability, resilience, economy, and strategic foresight. It establishes an innuendo of organizational engagement, institutional governance, and responsibility for European security, strategic continuity, public policies.

The analysis of human security, environmental sustainability, and strategic foresight in candidate countries Moldova and Ukraine focused on the EU4Digital policy instruments and program activities assumed for Eastern Partnership countries. To conclude, the reports' scrutiny quantitatively and qualitatively reproduces the presence of certain themes, such as human security, environmental sustainability, digital transformation, and strategic foresight, at the centre of the EU policy agenda. Twinning the green and digital transition appears at the core of EU policy, highlighted by the strategic maintenance of the position towards environmental sustainability, cybersecurity, and EU digital emancipation.

REFERENCES

Capello, R., & Caragliu, A. (2024). Digital transition in a turbulent world: European regional growth opportunities in 17 years' time. Economics of Innovation and New Technology, 1–19. https://doi.org/10.1080/10438599.2024.2393202

Capello, R., Caragliu, A., & Dellisanti, R. (2023). Integrating digital and global transformations in forecasting regional growth: The MASST5 model. Spatial Economic Analysis, 19(2), 133–160. https://doi.org/10.1080/17421772.2023.2278514

Carver, J. (2024). More bark than bite? European digital sovereignty discourse and changes to the European Union's external relations policy. Journal of European Public Policy, 31(8), 2250–2286. https://doi.org/10.1080/13501763.2023.2295523

Csernatoni, R. (2022). The EU's hegemonic imaginaries: From European strategic autonomy in defence to technological sovereignty. European Security, 31(3), 395–414. https://doi.org/10.1080/09662839.2022.2103370

Diodato, D., Huergo, E., Moncada-Paternò-Castello, P., Rentocchini, F., & Timmermans, B. (2023). Introduction to the special issue on "The twin (digital and green) transition: Handling the economic and social challenges." Industry and Innovation, 30(7), 755–765. https://doi.org/10.1080/13662716.2023.2254272

EU4Digital. (2024a). The EU4Digital Initiative. https://eufordigital.eu/discover-eu/the-eu4digital-initiative/

EU4DigitalUA. (2024b). DT4UA. https://eu4digitalua.eu/en/dt4ua-en

EUR-Lex. (2024). Access to European Union law. https://eur-lex.europa.eu/legal-content/en/all/?uri=com%3a2021%3a750%3afin

European Commission. (2020). Communication from the Commission to the European Parliament and the Council 2020 Strategic Foresight Report entitled: "Strategic foresight – Charting the course towards a more resilient Europe," COM/2020/493 final, Brussels, 9.9.2020. https://eur-lex.europa.eu/legal-content/en/txt/?uri=celex%3a52020dc0493&qid=1727696945908

European Commission. (2021). Communication from the Commission to the European Parliament and the Council 2021 Strategic Foresight Report entitled: "The EU's capacity and freedom to act," COM(2021) 750 final, Brussels, 8.9.2021. https://eur-lex.europa.eu/legal-content/EN/ALL/?uri=COM%3A2021%3A750%3AFIN

European Commission. (2022). Communication from the Commission to the European Parliament and the Council 2022 Strategic Foresight Report entitled: "Strategic Foresight Report Twinning the green and digital transitions in the new geopolitical context," COM/2022/289 final, Brussels, 29.6.2022. https://eur-lex.europa.eu/legal-content/en/txt/?uri=celex%3a52022dc0289&qid=1658824364827

European Commission. (2023). Communication from the Commission to the European Parliament and the Council 2023 Strategic Foresight Report entitled: "Sustainability and people's wellbeing at the heart of Europe's Open Strategic Autonomy," COM(2023) 376 final, Brussels, 6.7.2023. https://eur-lex.europa.eu/legal-content/EN/TXT/HTML/?uri=CELEX%3A52023DC0376

European Commission. (2024). Communication from the Commission to the European Parliament, the Council, the European Economic and Social Committee and the Committee of the Regions, COM(2024) 470 final, Brussels, 9.10.2024. https://neighbourhood-enlargement.ec.europa.eu/

European Union. (2022). Decision (EU) 2022/563 of the European Parliament and of the Council of 6 April 2022 providing macro-financial assistance to the Republic of Moldova. Official Journal of the European Union, L 109, 6–12. https://eur-lex.europa.eu/eli/dec/2022/563/oj

European Union. (2024). Regulation (EU) 2024/792 of the European Parliament and of the Council of 29 February 2024 establishing the Ukraine Facility. Official Journal of the European Union, L 2024/792. Retrieved from http://data.europa.eu/eli/reg/2024/792/oj

Falkner, G., Heidebrecht, S., Obendiek, A., & Seidl, T. (2024). Digital sovereignty - Rhetoric and reality. Journal of European Public Policy, 31(8), 2099–2120. https://doi.org/10.1080/13501763.2024.2358984

Farrand, B., & Carrapico, H. (2022). Digital sovereignty and taking back control: From regulatory capitalism to regulatory mercantilism in EU cybersecurity. European Security, 31(3), 435–453. https://doi.org/10.1080/09662839.2022.2102896

Flonk, D., Jachtenfuchs, M., & Obendiek, A. (2024). Controlling internet content in the EU: Towards digital sovereignty. Journal of European Public Policy, 31(8), 2316–2342. https://doi.org/10.1080/13501763.2024.2309179

Gao, X. (2024). The EU's twin transitions towards sustainability and digital leadership: A coherent or fragmented policy field? Regional Studies, 1–11. https://doi.org/10.1080/00343404.2024.2360053

Leceta, J. M., & Könnölä, T. (2020). EIT Digital: Leveraging ecosystems for international entrepreneurial innovation. Innovation: The European Journal of Social Science Research, 34(4), 454–474. https://doi.org/10.1080/13511610.2020.1842177

Mermaid Live Editor. (2023). Mermaid Live Editor (v11.3.0). https://mermaid.live

Miró, J. (2022). Responding to the global disorder: The EU's quest for open strategic autonomy. Global Society, 37(3), 315–335. https://doi.org/10.1080/13600826.2022.2110042

Mora, L., Panori, A., Deakin, M., & Ortega-Argiles, R. (2022). Digital meets smart: Towards a technology-enhanced approach to Smart Specialisation Strategy development. Regional Studies, 56(9), 1421–1428. https://doi.org/10.1080/00343404.2022.2091775

Mügge, D. (2024). EU AI sovereignty: For whom, to what end, and to whose benefit? Journal of European Public Policy, 31(8), 2200–2225. https://doi.org/10.1080/13501763.2024.2318475

Müller, M. (2023). The 'new geopolitics' of mineral supply chains: A window of opportunity for African countries. South African Journal of International Affairs, 30(2), 177–203. https://doi.org/10.1080/10220461.2023.2226108

Müller, M., Schulze, M., & Schöneich, S. (2023). The energy transition and green mineral value chains: Challenges and opportunities for Africa and Latin America. South African Journal of International Affairs, 30(2), 169–175. https://doi.org/10.1080/10220461.2023.2230957

Olimid, A. P., Georgescu, C. M., & Olimid, D. A. (2024a). Legal analysis of EU Artificial Intelligence Act (2024): Insights from personal data governance and health policy. Access to Justice in Eastern Europe, 7(4), 1–23. https://doi.org/10.33327/AJEE-18-7.4-a000103

Olimid, A. P., Georgescu, C. M., & Olimid, D. A. (2024b). Policy analysis of human factors and social innovation in EU EASI Programme Reports (2015–2022). Baltic Journal of Economic Studies, 10(3), 1–9. https://doi.org/10.30525/2256-0742/2024-10-3-1-9

Olimid, A. P., Georgescu, C. M., & Gherghe, C. L. (2024c). Communicating international politics narratives of security, democracy, and human rights in contemporary society: Indexing and analysis using online monitoring data. Frontiers in Sociology, 9, 1441787. https://doi.org/10.3389/fsoc.2024.1441787

Parthie, S. (2020). Opinion of the European Economic and Social Committee Communication on 'From the Commission to the European Parliament and the Council — 2020 Strategic Foresight Report — Strategic foresight — Charting the course towards a more resilient Europe,' COM(2020) 493 final, (2021/C 220/09). https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX%3A52020AE5345&qid=1727696945908

Pasi, G., & Misuraca, G. (2020). Welfare 2.0: Future scenarios of social protection systems in the digital age. Policy Design and Practice, 3(2), 163–176. https://doi.org/10.1080/25741292.2020.1770965

Pherson, R. H., Mort Ranta, P., & Cannon, C. (2020). Strategies for combating the scourge of digital disinformation. International Journal of Intelligence and CounterIntelligence, 34(2), 316–341. https://doi.org/10.1080/08850607.2020.1789425

Ratcliffe, J. (2019). "Imagine ahead - plan backwards": Melding critical infrastructure planning with strategic foresight. Journal of Mega Infrastructure & Sustainable Development, 1(3), 281–302. https://doi.org/10.1080/24724718.2021.1951485

Turillazzi, A., Taddeo, M., Floridi, L., & Casolari, F. (2023). The Digital Services Act: An analysis of its ethical, legal, and social implications. Law, Innovation and Technology, 15(1), 83–106. https://doi.org/10.1080/17579961.2023.2184136

Williamson, B. (2015). Digital education governance: Data visualization, predictive analytics, and 'real-time' policy instruments. Journal of Education Policy, 31(2), 123–141. https://doi.org/10.1080/02680939.2015.1035758

Williamson, B., & Komljenovic, J. (2022). Investing in imagined digital futures: The techno-financial 'futuring' of edtech investors in higher education. Critical Studies in Education, 64(3), 234–249. https://doi.org/10.1080/17508487.2022.2081587

Wordcounter.net. (2024). https://wordcounter.net

Zwaan, P., & Schoenefeld, J. J. (2024). Explaining different usages of policy monitoring in the EU. Journal of European Integration, 1–17. https://doi.org/10.1080/07036337.2024.2354490