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Evaluation for innovation policies- case study of Polish subsidy program in EU perspective 2021-2027

Abstract

The study utilizes a qualitative case studies approach with the aim of empirically determining the evaluation approach in the European Funds for Modern Economy 2021-2027 (FENG), employing the frameworks developed by Haddad and Bergek (2023). This typology encompasses four evaluation approaches to innovation policy: the neoclassical perspective, which emphasizes market failures; the evolutionary-structural perspective, introducing behavioral additionality; the innovation system perspective, focusing on systemic failures; and the transformative innovation policy perspective, which addresses societal sector reconfigurations and transformational systems failures. By categorizing the evaluation plan of FENG, it identifies a dominance of neoclassical and systemic approaches, revealing potential biases and a lack of clarity in policy rationale in some instances. The FENG's research aligns with its focus on economic changes, emphasizing competitiveness and innovation rather than socio-technological transformation. By highlighting the limited transformative perspective, the study suggests that incorporating it into innovation policy evaluation could enhance Poland's preparedness for a just transition, steering towards more effective sustainable instruments.

Abstrakt

Artykuł prezentuje jakościowe studium przypadku planu ewaluacyjnego największego polskiego programu wsparcia innowacji pn. Europejskie Funduszy dla Nowoczesnej Gospodarki 2021-2027 (FENG), korzystając z typologii Haddada i Bergeka (2023). Ta typologia obejmuje cztery podejścia do ewaluacji polityki innowaccyjnej: perspektywę neoklasyczną, która kładzie nacisk na niepowodzenia rynkowe; perspektywę ewolucyjno-strukturalną, wprowadzającą aspekty behawioralne; perspektywę systemu innowacji, koncentrującą się na systemowych niepowodzeniach; oraz perspektywę transformacyjnej polityki innowacji, która zajmuje się rekonfiguracją systemów społecznych i systemowymi niepowodzeniami na rzecz transformacji. Poprzez kategoryzowanie planu ewaluacji FENG identyfikuje przewagę podejścia neoklasycznego i systemowego, ujawniając braki w uzasadnieniu polityki w niektórych przypadkach. Stosowane podejścia ewaluacyjne współgrają z naciskiem FENG na zmiany ekonomiczne, podkreślając konkurencyjność i innowacje, a nie transformację społeczno-technologiczną. Poprzez wskazanie ograniczonej perspektywy transformacyjnej, badanie sugeruje, że uwzględnienie jej w ocenie polityki innowacji mogłoby

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zwiększyć gotowość Polski do sprawiedliwej transformacji, kierując w stronę bardziej skutecznych instrumentów zrównoważonego rozwoju.

Introduction

In the public debate, we can observe a consensus that the foundations of modern economic development need to be transformed. Pressing climate and socio-economic problems point towards a turn towards sustainable development, which involves the introduction of new solutions. In the new paradigm of innovation policy, which addresses broad societal challenges, policymakers are given a large responsibility for setting or shaping the direction of socio-technical transitions (Bergek et al., 2022). In academic literature on innovation policy, this new focus on societal challenges has been conceptualized as directionality, which means promoting innovations that "contribute to a particular direction of transformative change" instead of promoting all innovations as inherently desirable (Weber and Rohracher, 2012), which was characteristic of former ideas for innovation policies.

Simultaneously, enhancing the effectiveness of interventions to boost the innovativeness of the economy can be achieved through an evidence-informed approach in designing and implementing interventions. This approach emphasizes that decision-makers should thoroughly acquaint themselves with a comprehensive set of information from diverse sources (e.g., evaluation) before making decisions (Krupnik et al., 2021). Evaluation allows for verifying the rationale and validity of assumptions outlined in the plan, identifying the most effective and efficient ways of implementation, and communicating to society the effects of actions financed from public funds (Górniak and Keler, 2008).

The aim of the study is to empirically analyze which evaluation approach the biggest Polish innovation scheme is embedded in. It provides a contribution in the application of evaluation frameworks for innovation policies developed by Haddad and Bergek (2023) as a tool to help plan coherent evaluation design for large innovation schemes.

The paper is divided into five parts, with the introduction being the first part. The second part refers to the literature on governance and evaluation for innovation policies. In the third methodological part, data about the context of case studies are provided. The last two parts present the results of analysis and conclusions, including the study's limitations.

1. Governance and evaluation in innovation policies

Schot and Steinmueller (2018) showed that the concepts used for innovation policy are rather evolutionary. They distinguished three frameworks that are still present in innovation policies. The first concept, called "Innovations for Growth," was born during the post-war institutionalization of government support for science. It was based on the assumption that innovations would contribute to

economic growth and that policy would merely correct market failures in the private delivery of new knowledge. The second framework, called "National Systems of Innovation," appeared in the globalizing world of the 1980s. It emphasizes that a country's competitiveness is shaped by national innovation systems for the creation and commercialization of knowledge. This concept focuses on building connections, clusters, and networks and stimulating learning between system elements. The third framework, called "Transformative Change," related to contemporary socio-environmental challenges, differs from the two previous frameworks. Transformation refers to the socio-technical change of the system (Schot and Steinmuller, 2018). Schot and Steinmueller describe an example of electric cars as the answer to mobility air pollution. In their opinion, a transformative innovation policy should not be limited to creating substitute solutions for current cars but should go further beyond the traditional transport paradigm and think about solutions where it will not be necessary to have a car. This type of policy requires the collaboration of a multitude of actors and multi-level collaboration (Kattel and Mazzucato, 2018) and in the literature, it is mostly called a transformative innovative policy (TIP) (Haddad et al, 2022).

Behind each framework, there is a different mechanism for their creation and implementation. Schot and Steinmuller (2018) demonstrate that changing approaches to programming innovation policies entail different political practices. Traditional innovation policy primarily focuses on the 'supply side' of innovation, targeting the activities of companies and universities (Schot and Steinmueller, 2018). In the new transformative innovation policy paradigm, a noteworthy shift occurs with a primary focus on sustainability and societal development, aligning with the Sustainable Development Goals (SDGs). This approach prioritizes these societal objectives over innovation and economic growth for their intrinsic value. While TIP is still expected to contribute to economic growth, Schot and Steinmueller (2018) suggest that growth should be viewed as a natural outcome of a more comprehensive development process. This shift underscores the increasing need for policymakers to adopt a more active role in shaping the future trajectory of technology and markets, especially in contrast to the conventional market failure approach (Köhler et al., 2019; Weber and Rohracher, 2012). Kattel and Mazzucato (2018) argue that "to tackle the grand challenges of the 21st century, innovation policy needs to shift from the existing support-and-measure approach (find market failure; fix it with a support instrument; and measure the impact) to innovation policy to lead-and-learn approach (create and shape markets with a variety of policy instruments with open-ended impact horizons, and learn through wider social engagement and coordination)." Weber and Rohracher's (2012) added a set of "transformational" systems failures, i.e., directionality, demand articulation, policy coordination, and reflexivity failures. Addressing such transformative failures requires even more complicated policy mixes than in the system approach and – in the context of innovation policy – even more complex innovation programs,

which combine and coordinate several types of policy instruments and activities with the overall aim of “jointly creating conditions conducive to achieving a so far unmet societal want or need” (Janssen et al., 2022, p. 1) and, thus, contributing to transitions in targeted societal sectors. While some innovation missions assume triple helix actors (i.e., state, universities, and enterprises) can address societal challenges (Mazzucato, 2018), others argue that solving such challenges necessitates the involvement of socio-technical networks related to consumption and end-use (Steward, 2012).

A shift in policy approach, particularly with transformative innovation programs, requires a distinct evaluation methodology. Existing frameworks used in analyzing traditional policies may not adequately capture the transformative nature of these programs. The challenge lies in integrating TIP’s thinking into evaluation practices, considering factors like directionality and system-level behavioral additionality. The directionality’s evaluation involves assessing how policy mixes influence the direction of socio-technical change, addressing societal needs and identifying acceptable development paths. Behavioral additionality evaluation goes beyond traditional input-output analysis to assess how policy generates transformative outcomes, contributing to sustainability transitions and societal goals in the long term (Haddad and Bergek, 2023).

The significance of institutions for transformation is frequently highlighted by various scholars, such as Geels (2004) or Fuenfschilling and Truffer (2014). In the governance perspective on transitions, Grin (2010) emphasizes transition agency by discussing agents' capacity to 'act otherwise' (drawing on Giddens) and induce institutional transformation by strategically navigating power dynamics. Institutional theory focuses on how organizations behave and how broader changes occur, considering overarching regulatory, normative, and cultural contexts. Formal institutions are often the outcome of policy processes at higher spatial scales (e.g., national or supra-national laws, regulations, and policy programs) (Dawley, 2014). Yet, regions are not ‘passively receiving and locally implementing policies’ (Matti et al., 2017). Institutions shape but also are shaped by the places they are embedded.

These ideas are crucial for understanding sustainability transitions, as highlighted by Fuenfschilling and Truffer (2014). Sustainability transitions involve dismantling existing structures (regimes) and building new configurations (niches), making institutional change pivotal. Incorporating institutional theory enhances our understanding of sustainability transitions, offering insights into structure and change, exploring actors and agency, inspiring new research, and analyzing interactions among actors, institutions, and materiality in driving change (Fuenfschilling and Truffer, 2014).

Haddad and Bergek (2023) explored the historical evolution of theoretical perspectives shaping innovation policy and their respective approach to evaluation in terms of, for example, what type of effects should be measured, at what level of analysis, and how measured effects could be attributed

to specific intervention. They encompassed the neoclassical, evolutionary-structural, and innovation system perspectives introduced by Chaminade and Edquist (2010). A recent addition, the transformative innovation policy perspective, has emerged as a supplementary approach, emphasizing innovation for broader societal goals such as Grand Challenges and Sustainable Development Goals. They indicated four types of evaluation approach to innovation policy:**The neoclassical perspective**, originating in the 1950s, centers on market failures, where input additionality gauges the extent to which public funding increases total R&D investments, and output additionality assesses whether the same outputs (e.g., patents, publications) would have occurred without public support.

1. **The evolutionary-structural perspective**, which evolved in the 1980s, introduces "behavioral additionality" to evaluate the policy impact on firms' actions and organizational changes. Behavioral additionality assesses changes in how firms organize and manage their R&D and innovation processes, expanding later to capture indirect effects like learning resulting from public support.
2. **The innovation system perspective,** emerging in the late 1980s, shifts the focus to systemic failures, leading to the development of complex policy initiatives such as cluster and sectoral policies. Evaluation challenges in this perspective include assessing changes in network composition and interactions after an intervention, understanding how specific policy instruments address structural system failures, and influencing key processes in targeted innovation systems.
3. **The transformative innovation policy perspective** builds upon these approaches but widens the scope to address societal sector reconfigurations. This perspective introduces "transformational systems failures," including directionality, demand articulation, policy coordination, and reflexivity failures. To address these transformative failures, complex innovation programs coordinate multiple policy instruments to jointly create conditions conducive to meeting societal needs, contributing to transitions in targeted societal sectors. Evaluations must consider how policy contributes to desired pathways in specific sectors, accounting for longer-term changes in behavior resulting in societal impacts. Furthermore, evaluating complex feedback loops between policy outputs, outcomes, and impacts becomes essential in explaining how specific interventions influence targeted systems.

4. Methodology

The study employs a qualitative case study approach to evaluate the largest Polish innovation support scheme. The rationale behind conducting this case study was exploratory, driven by the necessity to gain a deeper understanding of the complexity of innovation policy within a market context (Eisenhardt, 1989; Yin, 2003). This study primarily relies on desk research analysis of the publicly

available evaluation plan of **The European Funds for a Modern Economy Program 2021-2027** (FENG) from September 2023 (Polish Government, 2023). The study empirically tests which type of evaluation approach to innovation policy the Polish support scheme is embedded in, using the typology of Haddad and Bergek (2023).

The research delved into Poland's R&D support system, characterizing it as an Emerging Innovator performing at 62.8% of the EU average, as per the European Innovation Scoreboard 2023 (EC, 2023). Despite being a 'catch-up' country, Poland's innovation level and economic structure differ from more advanced OECD nations. The study highlights Poland's continuous investment in boosting entrepreneurs' R&D activity, with Polish enterprises' R&D expenditure (BERD) constituting 63.1% of gross domestic expenditure on R&D (GERD), equivalent to 1.44% of GDP in 2021. Although there was a 16.7% increase in spending compared to 2020, it still lags about 40% behind the EU average.

Notably, Poland relies heavily on European funds for its innovation policy, which offer a chance for Polish entrepreneurs to advance their companies through research, innovation, and new technologies. The study investigated the case of evaluation plan of FENG, which has launched its first call in February 2023, with a significant focus on enterprises of all sizes, business consortia, and collaborations with research organizations. FENG succeeds the Operational Program Smart Growth 2014-2020 (pol. Program Operacyjny Inteligentny Rozwój), bringing a budget of 37.1 billion PLN. Support scheme includes grants, financial instruments, capital, guarantees, and combined instruments with both repayable and non-repayable financing components[2].

The main goals of FENG include enhancing research and innovation capabilities, fostering the use of advanced technologies, boosting the competitiveness of small and medium-sized enterprises (SMEs), developing skills for smart specialization, industrial transformation, and entrepreneurship, as well as steering the economy towards Industry 4.0 and green technologies. The program comprises four priorities: 1. Support for entrepreneurs (SMART Path)[3], 2. Innovation-friendly environment[4], 3.

[2] Data abuout FENG from https://pfr.pl/blog/program-fundusze-europejskie-dla-nowoczesnej-gospodarki-2021-2027-feng-na-jakie-wsparcie-moga-liczyc-przedsiebiorcy-w-nowym-rozdaniu-srodkow-europejskich.html, last access 28.11.2023

[3] Of notable interest is the grant action under Priority 1, "Support for Entrepreneurs," known as the SMART path, with an allocated budget of nearly 10.67 billion PLN. This supports comprehensive projects, allowing entrepreneurs to integrate various innovation-related activities in a single funding application. For SMEs, funding applications must include at least one of two mandatory modules: R&D or innovation implementation. Up to seven different modules can be included in the application, with most supported as non-repayable grants. Additionally, there are optional five modules such as investments in R&D Infrastructure, enterprise digitization, internationalization, greening and employee skills development. These modules offer businesses flexibility in designing comprehensive projects tailored to their specific research, development, and innovation objectives, providing a strategic approach to secure funding.

[4] Priority 2 focuses on fostering an innovation-friendly environment by supporting projects strategically significant for the Polish economy. This includes expanding public research infrastructure, technology transfer, and commercialization from universities and institutes, strengthening the capacity of business environment institutions such as accelerators, clusters, research institutions, providing broad support for startups, and fostering the development of innovative enterprises through the Innovation Coach initiative.

Greening of businesses[5], 4. Technical assistance. FENG aims to increase economic productivity by incentivizing businesses to engage in R&D activities, particularly under Priority 1. The program strives to enhance the implementation of problem-driven research projects, especially through innovative partnerships and pre-commercial procurement. Other objectives include bolstering the Polish startup and venture capital markets, promoting collaboration among businesses through synergies between European and national support, and advancing the capabilities of the scientific sector, particularly in fostering collaboration with businesses and technology transfer.

The evaluation plan for FENG has been collaboratively developed by the Managing Institution (MI), Intermediate Bodies (IBs), and external partners invited to FENG. The plan outlines evaluations scheduled for the period 2023-2030, focusing on the purpose, thematic scope, methodological approach, institutional system, and resources necessary for the efficient execution of the evaluation process. It includes a list of evaluations posing research questions, guiding institutions in the FENG implementation system to seek answers from various sources. Key research areas include project selection system assessment, the validity and effectiveness of provided support, administrative burdens on applicants and beneficiaries, and the program's impact on innovation growth and macroeconomic indicators.

The evaluation will employ two main types: counterfactual evaluation, comparing intervention effects with a situation without intervention, and theory-based evaluation, conceptually assessing the theory of change and intervention logic to understand how and why specific results are achieved or will be achieved. The impact of FENG will be measured using indicators such as GDP, business sector expenditure on R&D as a percentage of GDP (BERD as % GDP), R&D expenditure as a percentage of GDP (GERD as % GDP), innovation-related expenditure by businesses as a percentage of GDP, and the proportion of entities investing in internal and external R&D activities. An econometric model will be employed to estimate FENG's potential impact on selected macroeconomic indicators.

5. Analysis

Evaluations from the FENG's evaluation plan were categorized based on their classification using the frameworks of innovation policy evaluation from Table 1.

[5] Priority 3 aims at greening businesses, supporting projects directly contributing to the goals of the European Green Deal, including climate neutrality, the green transformation of the economy, and sustainable development. The offerings for businesses include a green guarantee fund, ecological loans, and Important Projects of Common European Interest (IPCEI) projects. Additionally, innovative public orders for R&D work on technologies and products not yet existing in the market and desired for social and environmental reasons will complement these efforts. Under Priorities 2 and 3, entrepreneurs find non-repayable instruments supporting international market entry, technology transfer, and participation in EU projects. Entrepreneurs also find guarantee instruments and loans in collaboration with commercial banks. Key products include technological loans (combining loans with grants for innovation implementation) and ecological loans (for improving energy efficiency).

Table.1 Four approaches to innovation policy evaluation.

Approach	Neoclassical	Evolutionary	Systemic	Transformative
Policy rationale	Market failures	Not explicit	Structural and functional system failures	System failures + transformational failures
Level of analysis	Project/firm	Firm	System (national, regional, or sectoral innovation system)	System (sectoral socio-technical configuration)
Approach to additionality	Input & output additionality	Behavioural additionality	Behavioural additionality (adaptation to innovation systems not very well developed)	Behavioural additionality (adaptation to transitions not very well developed)

Source: Haddad and Bergek (2023)

Policy rationales in innovation policy are based on a set of theoretical assumptions regarding what drives innovation capabilities and performance, and how improved capabilities and performance lead to technological, environmental, social, and economic impacts, illustrating the high expectations regarding the effectiveness of innovation support measures (Edler et al., 2012). In the Haddad and Bergek (2023) typology, different types of failures are highlighted under policy rationales.

In the neoclassical approach, **market failures** occur when the allocation of goods and services by a free market is inefficient. This means that the market mechanism fails to deliver the optimal distribution of resources, often due to factors such as externalities, imperfect competition, information asymmetry, or public goods.

The evolutionary approach involves a gradual and continuous **process of adaptation and improvement**. It recognizes the importance of learning, path dependence, and the accumulation of incremental changes over time. The focus is on the dynamic evolution of technology and institutions.

The systemic approach to innovation policy considers the innovation process as part of a broader system, such as a national, regional, or sectoral innovation system. It emphasizes the **interconnectedness and interdependence of various actors, institutions**, and elements within the innovation ecosystem.

The transformative approach goes beyond addressing market or systemic failures and aims to bring about significant, radical changes in the innovation landscape. It focuses on addressing not only systemic failures but also **transformational failures**, seeking to drive fundamental shifts in technology, industries, or societal structures.

The other part of testing is additionality, which refers to the idea that the impact of a policy intervention goes beyond what would have occurred naturally in the absence of that intervention. It

assesses the extent to which a policy contributes to outcomes that would not have happened otherwise. There are different types of additionality, including input additionality (increased inputs like funding), output additionality (increased desirable outputs), and behavioral additionality (changes in behavior or activities). In the context of innovation policy, it involves examining whether the policy leads to changes in the behavior of innovators or participants in the innovation system.

Table 2. Analysis of FENG' evaluation plan according to evaluation framework for innovation policies

ID	Title	Policy rationale	Level of analysis	Approach to additionality	Framework classification	Justification
1	*Evaluation of the FENG project selection system (Stage I)*	No explicit	Projects/ firms	Input & output additionality	Neoclassical	Focus on input criteria of scheme
2	*Evaluation of the informational and promotional activities of FENG*	No explicit	Projects/ firms	Behavioural additionality	Evolutionary	Focus on enhancing of calls take up
3	*Study on the adequacy and effectiveness of selected actions in POIR and FENG related to supporting technology transfer, commercialization of R&D, and collaboration between science and business (Stage 1)*	Structural and functional system failures	Projects/ System	Behavioural additionality	Systemic	Focus on improvement of national innovation system
4	*Study on the adequacy of actions outlined in FENG concerning the implementation of Polish and foreign strategic documents*	Structural and functional system failures	System	Behavioural additionality	Systemic	Focus on potential impact of FENG on innovation system' improvement
5	*Establishment of a monitoring system for direct (microeconomic situation and beneficiary behavior) and indirect (impact on the economy and market) effects of aid programs*	No explicit	Projects/ firms	Input & output additionality	Neoclassical	Focus on schemes' output
6	*Mid-term evaluation*	No explicit	Projects/ System	Input & output additionality	Neoclassical	Focus on scheme's input and output
7	*Evaluation of support mechanisms for startups within FENG*	Market failures/ system failure	Projects/ firms	Input & output additionality	Neoclassical	Focus on scheme's input and output
8	*Evaluation of the implementation system of financial instruments within FENG*	Market failures/ system failure	Projects/ firms	Input & output additionality	Neoclassical	Focus on scheme's input and output

9	*Ex-post evaluation of FENG Stage I / Summing up PP PARP, PP NCBR, PP BGK 2021-2027*	Market failures/ system failure	Projects/ System	Input & output additionality	Neoclassical	Focus on scheme's input and output
10	*Evaluation of the effects of Action 4.2 in POIR and the progress of Action 2.4 in FENG, in the context of designing solutions for the perspective of 2027+*	Market failures/ system failure	Projects/ firms	Input & output additionality	Neoclassical	Focus on scheme's input and output
11	*Evaluation of the impact of FENG on the internationalization of Polish research units*	Structural and functional system failures	System	Behavioural additionality	Systemic	Focus on potential impact of FENG on innovation system' improvement
12	*Evaluation of the effects of FENG support on digitization, greening, and the development of competencies of enterprise employees (modular study)*	No explicit	Projects/ System	Input & output additionality	Neoclassical	Focus on scheme's input and output
13	*Ex-ante analysis of the possibilities of implementing projects in the field of innovation using financial instruments in the EU financial perspective 2028+*	Market failures/ system failure	Projects/ firms	Input & output additionality	Neoclassical	Focus on potential impact of FENG on innovation system' improvement
14	*Meta-evaluation of FENG*	Structural and functional system failures	Projects/ System	Behavioural additionality	Systemic	Focus on potential impact of FENG on innovation system' improvement
15	*Evaluation of the modular support system within the SMART path*	No explicit	Projects/ System	Behavioural additionality	Evolutionary	Focus on behavioral change of beneficiaries
16	*Evaluation of the effects of creating centers of scientific excellence in Poland*	Structural and functional system failures	Projects/ System	Behavioural additionality	Systemic	Focus on potential impact of FENG on innovation system' improvement
17	*Evaluation of the impact of FENG on sustainable development and accessibility*	No explicit	Projects/ firms	Behavioural additionality	Evolutionary	Focus on behavioral change of beneficiaries
18	*Evaluation of the effectiveness of internationalization support mechanisms within FENG*	Market failures	Projects/ System	Input & output additionality	Neoclassical	Focus on scheme's input and output/ counterfactual research

19	*Ex-post evaluation of FENG Stage II*	Structural and functional system failures	System	No explicit	Systemic	Focus on the context of intervention
20	*Study on the adequacy and effectiveness of selected actions in OPSG and FENG related to supporting technology transfer, commercialization of R&D, and collaboration between science and business (Stage 2)*	No explicit	System	Input & output additionality/ behavioural additionality	Systemic	Focus on potential impact of FENG on innovation system' improvement
21	*Evaluation of the impact of the usefulness of research results obtained in programs implemented by FNP*	Structural and functional system failures	Projects/ System	Input & output additionality/ behavioural additionality	Systemic	Focus on systemic change

Source: Own development

The FENG evaluation plan contains 21 planned studies between 2023 and 2030, covering ex-ante, ongoing, and ex-post analyses. Categorizing FENG's evaluation using frameworks for innovation policy evaluation reveals a dominance of neoclassical and systemic approaches. Almost half of FENG's evaluations were classified within the neoclassical framework, showcasing a significant focus on delivering expected input and output interventions according to the program's theory of change. This emphasis is primarily on efficiency, effectiveness, and the long-term sustainability of results. Notably, the ex-post evaluations, employing a counterfactual approach, are oriented towards measuring input and output additionality. However, there may be bias in the classification, as the descriptions do not indicate the policy rationale in 8 of the research studies.

In the second position, there is a systemic approach with 8 out of 21 evaluations, focusing on FENG's impact on the national innovation system, aligning with the program's theory of change. The evolutionary approach takes the third spot, with 3 planned evaluations, emphasizing behavioral changes among potential and actual beneficiaries.

The analysis reveals a notable absence of a transformative approach in the FENG evaluation plan, suggesting misalignment between the program's goals and transformative ambitions.

6. Conclusions

The results of the study indicate the dominance of a neoclassical approach to innovation policy evaluation in Poland, with a complementary systems approach. It is noticeable that the logic of the research follows the scheme of the FENG support, which primarily refers to changes in the economic aspect and increasing the competitiveness and innovativeness of the Polish economy, and not really

to socio-technological change, despite the declared greening of enterprises under Priority 3. Green technologies are only supposed to be a supplement to the current economic structure of Poland, not a fuel to reformulate its foundations. The support system is immersed in an efficiency-oriented neo-classical approach, which is directed towards gaining economic advantages, in line with the direction of growth-oriented innovation policies according to Schot and Steinmuller (2018).

Another issue is that the descriptions of the studies do not refer to investigating how the intervention responds to market or systemic failures. This makes it difficult to understand the classification of the study but also to know the rationale behind why the intervention is being undertaken and what permanent systemic effect it is intended to have. Krupnik et al. (2021) also underscore the necessity for a clearer conceptualization of the strategic premises underlying innovation support programs, emphasizing the need for well-defined program theories to specify anticipated effects. Their study highlights the lack of clarity in Poland's strategic direction for subsidies, resulting in contradictory recommendations. The evaluation of support effects often focuses on direct results and short-term indicators, overlooking long-term economic impacts, even when the effectiveness of support programs depends heavily on beneficiary characteristics, influenced by the project selection system (Krupnik et al., 2021).

It is also worth commenting on the comprehensiveness and multiplicity of up to 21 planned studies between 2023 and 2030 covering ex-ante, ongoing, and ex-post analyses. On the one hand, this corresponds to the multiplicity of instruments undertaken and the numerous teams responsible for their implementation. On the other hand, it seems that the scope of the planned studies seeks to replicate the logic of support in the next financial perspective since it does not include elements from the transformative and evolutionary framework. In these frameworks, it is essential to know the causal mechanisms leading to behavioral change and socio-technological configuration for sustainable development. Pressing climate and socio-economic problems point to a turn towards sustainable development, which involves the introduction of new solutions. Geels indicates that this change includes consumer practices, policies, cultural meanings, infrastructures, and business models (Geels, 2018).

To understand more specific change patterns, this transformation theory mobilizes ideas from evolutionary economics, sociology of innovation, and institutional theory. Sustainability transitions are being investigated by a socio-technical Multi-Level Perspective (MLP) as one of its orienting frameworks, which functions more like a model than a mechanism. This model follows shifts from one socio-technical system to another at the level of societal functions - an example for transport systems is the shift from horse-drawn carriages to automobiles. This shift not only involved artifacts but also

infrastructures, regulations, cultural changes, mobility patterns, and markets (Geels, 2005). Incorporating MLP-related models into the evaluation of innovation policies will allow Poland to prepare more effective instruments in the ongoing process of Just Transition.

The MLP suggests that transitions involve alignments of processes within and between three analytical levels: the niche-level that accounts for the emergence of new innovations, the socio-technical regime level that accounts for the stability of existing systems, and the socio-technical landscape that accounts for exogenous macro-developments. The MLP draws attention to socio-technical systems as a new unit of analysis, which is more comprehensive than a micro-focus on individuals and more concrete than a macro-focus on a green economy (Geels, 2018).

The study's limitation is using a single case approach from Poland, which is a country embedded in a catching-up context as a post-soviet region. Schot and Steinmuller (2018) illustrate that shifts in innovation policy approaches involve distinct political practices. The selection of innovation policies is, however, influenced by the socio-economic context of a specific country and factors affecting the efficacy of national innovation systems. Less developed countries, like Poland, tend to prioritize solutions that enhance their competitiveness and leverage the potential of their national innovation systems (Pires et al., 2020). Decision-makers overseeing innovation policies might align themselves with a particular trend despite challenges within the innovation system or societal and environmental concerns. This raises the question of the sequential relationship among these concepts, questioning whether the effects of the first two—creating a competitive economy and a robust technology transfer system—are prerequisites for the implementation of TIP.

An area warranting further investigation is the connection between public administration capabilities and the design of transformative innovation policies and using evaluation framework. Conclusions identified in the study are contextually relevant, but their applicability beyond the specific case should be confirmed through additional research.

7. References

Bergek, A., Hellsmark, H., Haddad, C. R., & Nakić, V. (2022). Transformative innovation policy: A systematic review. *Environmental Innovation and Societal Transitions*, 43, 14-40. https://doi.org/10.1016/j.eist.2021.11.001

Chaminade, C., & Edquist, C. (2010). Rationales for Public Policy Intervention in the Innovation Process: Systems of Innovation Approach. 10.4337/9781849804424.00012.

European Commission, Directorate-General for Research and Innovation, Hollanders, H., *European Innovation Scoreboard 2023*, Publications Office of the European Union, 2023, https://data.europa.eu/doi/10.2777/119961

Fuenfschilling, L., & Truffer, B. (2014). The structuration of socio-technical regimes—Conceptual foundations from institutional theory. *Research Policy*, 43(4), 772-791. https://doi.org/10.1016/j.respol.2013.10.010

Geels, F. (2005). Processes and patterns in transitions and system innovations: refining the co-evolutionary multi-level perspective. *Technological Forecasting and Social Change*, 72, 681-696.

Geels, F. (2018). Socio-Technical Transitions to Sustainability. *Oxford Research Encyclopedia of Environmental Science*. https://oxfordre.com/environmentalscience/view/10.1093/acrefore/9780199389414.001.0001/acrefore-9780199389414-e-587

Grin, J., Rotmans, J., & Schot, J. (2010). *Transitions to Sustainable Development: New Directions in the Study of Long Term Transformative Change*. Dawley.

Górniak, J., & Keler, K. (2008). Evaluation and indicators in the planning and implementation cycle of public policies. *Public Management / Public Governance*, 1(3), 109-124.

Haddad, C. R., & Bergek, A. (2023). Towards an integrated framework for evaluating transformative innovation policy. *Research Policy, 52*(2), 104676. https://doi.org/10.1016/j.respol.2022.104676

Jakob Edler, Martin Berger, Michael Dinges, Abdullah Gök. (2012). The practice of evaluation in innovation policy in Europe. *Research Evaluation*, 21(3), 167–182. https://doi.org/10.1093/reseval/rvs014

Kattel, R., & Mazzucato, M. (2018). Mission-oriented innovation policy and dynamic capabilities in the public sector. *Industrial and Corporate Change*, 27, 787-801. https://doi.org/10.1093/icc/dty032

Köhler, J., Geels, F. W., Kern, F., Markard, J., Onsongo, E., Wieczorek, A., ... & Wells, P. (2019). An agenda for sustainability transitions research: State of the art and future directions. *Environmental Innovation and Societal Transitions*, 31, 1-32. https://doi.org/10.1016/j.eist.2019.01.004

Krupnik, S., Szczucka, A., & Lisek, K. (2021). The effects of supporting business innovation and R&D activities from European Union funds in Poland: a review of evaluation studies. *Zarządzanie Publiczne = Public Governance*, 4(58), 27–37. https://doi.org/10.15678/ZP.2021.58.4.03

Mazzucato, M. (2018). Mission-oriented innovation policies: Challenges and opportunities. *Industrial and Corporate Change*, 27(5), 803-815. https://doi.org/10.1093/icc/dty034

Pires, S. M. i in. (2020) Territorial innovation models in less developed regions in Europe: the quest for a new research agenda?, w: European Planning Studies, 28(8), str. 1639–1666. doi: 10.1080/09654313.2019.1697211.

Schot, J., & Steinmueller, W. E. (2018). Three frames for innovation policy: R&D, systems of innovation and transformative change. *Research Policy*, 47(9), 1554–1567. https://doi.org/10.1016/j.respol.2018.08.011

Steward, H. (2012). Actions as processes. *Philosophical Perspectives*, 26(1), 373-388.

Weber, K. M., & Rohracher, H. (2012). Legitimizing research, technology and innovation policies for transformative change: combining insights from innovation systems and multi-level perspective in a comprehensive 'failures' framework. *Research Policy*, 41, 1037-1047.

Yin, R. K. (2003). 'Designing case studies', *Qualitative research methods*, 5(14), 359-386.