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An Entrepreneurial Perspective on the Transition of Lignite Rural Areas to a New Regime within a Suffocating Timeframe

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Abstract: Timetables for energy transition vary across EU Member States. The planning for dealing with the consequences of the transition in affected regions also varies. Under the pressure of the ten-year economic crisis, Greece is one of the few countries that has committed to stop using lignite in electricity generation, achieving 80% by 2023 and definitively by 2028. Apart from its environmental impact, the country assessed using lignite in electricity generation as unprofitable and damaging to the Greek economy. Simultaneously, it formulated a national energy transition plan for the country's lignite areas. The plan also provides support for existing enterprises and incentives for new enterprises. European and domestic financial instruments accompany the support incentives. The compressed timetable is ambitious and demanding, entailing risks of project failure. As one of the first Member State projects to be completed in 2028, its outcome will shape an ambient atmosphere, positive or negative, for other Member States' projects as well. Based on the transition plan and the timelines to which Greece has committed, this research examines the reanimation of rural areas involved in lignite mining from the perspective of entrepreneurship and financial support instruments. The findings revealed that while there is strong social consensus around the design that incorporates best practices, the basis for the completion schedule has unrealistic elements that will have potentially negative consequences for the restoration of the areas that the energy transition affects. The present study highlights the risks for entrepreneurship that tight schedules pose in the context of lignite area redevelopment.

Keywords: energy transition; entrepreneurship; lignite areas; financial instruments

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1. Introduction

Diversifying local economies during the energy transition requires a long-term sustainable development strategy (Cheung et al. 2019; Snell 2018; Snyder 2018), the creation of local revenue streams (Carley et al. 2018; Johnstone and Hielscher 2017; Qadir et al. 2021), and effective support policies in tandem with financial instruments (Manta et al. 2020; Tandon 2021). Access to financial instruments is expected to support existing businesses in lignite regions, attract new investments, support investments in clean energy technologies, and help workers acquire new skills (Official Journal of the European Union 2021; European Commission 2020a, 2020b, 2020c). The reconstruction of rural areas involved in lignite mining is a complex process in which the operation of enterprises in these areas plays an important role (Haldar 2022; Sheng 2020; Süsser et al. 2017). Transitions significantly impact local communities, requiring consensus to address them (Chilvers et al. 2021; Bazilian et al. 2021; Weller 2019). Policymakers must convince local communities and workers in lignite areas that they have ensured that anticipated impacts will be fairly addressed (Alexander and Floyd 2020; Koutsandreas et al. 2021; Newell and Mulvaney 2013). These must include guarantees for the workforce that will lose jobs due to the transition (Cha 2017; Pollin

and Callaci 2019) that existing and newly attracted businesses will create quality jobs to employ them (Zervas et al. 2021) and that there is a comprehensive transition plan with strong financial instruments, in place and implemented, to avoid the desertification of their region (Filipović et al. 2022; Krawchenko and Gordon 2021; Manta et al. 2020). To mitigate the negative impacts of the transition, these regions also need investments that will create quality jobs that workers will assume after upgrading their knowledge and skills (Liargovas et al. 2021; Nikas et al. 2020).

The energy transition requires resources and robust financing mechanisms to be fair and effective (Chu 2024; Gema 2023; Egli et al. 2022; Battiston et al. 2021). In this light, the EU created the Just Transition Fund featuring a budget of €17.5 billion euros in 2018 prices. (Official Journal of the European Union 2021). EU Member States could add resources to the Just Transition Fund from their national envelopes within the European Regional Development Fund (ERDF) and the European Social Fund Plus (ESF+). On top of that, it created a special scheme under InvestEU to support investments in the Territorial Transition Plan. In this regard, the new public sector loan facility leveraged by the European Investment Bank mobilizes public investment for the areas of Just Transition (Calice et al. 2023; Sikora 2021).

In the case of reconstructing Greece's lignite areas, an examination of the role of rural entrepreneurship in combination with financial support tools occurred because four elements characterize this country. The first relates to its electricity generation being highly dependent on the use of lignite, making it one of the most lignite-dependent EU countries (EURACOAL 2019; Kavouridis 2008; Marinakis et al. 2020). The second element relates to Greece's commitments to reduce the use of lignite in its electricity generation by 80% by the end of 2023 and finally phase out its use by 2028 (Ministry of Environment and Energy 2021). This is a compressed timeframe during which the country must end the use of lignite in its electricity generation, restore the environment of the lignite mines, and shape the conditions for developing these areas. In addition, the national energy transition plan entails supporting existing businesses, attracting new ones, and upgrading knowledge and skills in the existing workforce to integrate them into the labor market (Ministry of Environment and Energy 2021). The government chose the suffocating timeframes because the use of lignite in power generation had become unprofitable and detrimental to the Greek economy (Vlassopoulos 2020). The government considered necessary the immediate liberalization of the energy market and the energy transition. The third element concerns experience with transition best practices. Despite Greece's rich mineral wealth (Pavloudakis et al. 2020; Tsirambides and Filippidis 2012), it does not have much experience with best practices from past transitions (Mavrommatis and Menegaki 2017). Areas involved in mining operations commonly experience abandonment after they end, with major impacts on socioeconomic life and the environment (Nikolaidis et al. 2013). The fourth element concerns the consultation and consensus that transitions require. Greece is among the countries not known for effective consultation and consensus building, though the energy transition plan demonstrated a large degree of consensus (Cedefop 2020).

The aforementioned elements created a challenging environment with suffocating timeframes that require business action to develop and contribute to lignite area reconstruction. Funding for the energy transition and the development of Greek areas affected by the transition comes from three main sources, namely: (a) *National mechanisms* comprising the state budget, the sectoral and regional programs of the National Strategic Reference Framework (NSRF) 2021–2027, the Development Bank, the Infrastructure Fund, the Business Equity Fund (EquiFund), the National Rural Development program, the Investment Loans for the preparation of Local Spatial Plans, the Public Building Energy Upgrade program, and the Energy Refurbishment of Residences. (b) *European Community mechanisms* comprising the funding scheme of the Just Transition Mechanism and other European funding programs. And (c) *International mechanisms* comprising the European Investment Bank, the European Bank for Reconstruction and Development, the Black Sea Trade and

Development Bank, and the International Finance Corporation (Ministry of Environment and Energy 2020).

In this research, the evaluation of the existing incentive programs in terms of their effectiveness was carried out on the basis of two pillars, the pillar of programs to maintain existing production operations and transition to sustainability and the pillar of programs to attract new production operations. In the first pillar, incentive programs were evaluated for businesses and workers operating in the areas affected by the transition with the aim of staying in the area and orienting themselves to the green economy. In the second pillar, incentives for businesses, institutions, and workers to settle in the areas affected by the transition were evaluated to develop new entrepreneurial activities integrated into the green economy. The results that emerged from the evaluation were then correlated with the results of other studies from the international literature.

Transition priorities must include a coherent strategy to redefine transition-affected areas on the basis of innovative interventions and economic diversification. It is necessary to integrate modern technologies and promote innovations in all business activities operating in the transition areas (Stognief et al. 2019; Kivimaa and Kern 2016). In the major investments, the actions for the development of innovation zones of clean energy and environmental technologies in the lignite center are considered of decisive importance. The "Competitiveness and Innovation" program contributes positively to this direction. Besides, one of the objectives of the Just Transition Fund is to support investments in research and innovation as well as to promote the transfer of advanced technologies (Kolde and Wagner 2022).

Figure 1 shows the lignite areas in Greece that the energy transition affects.

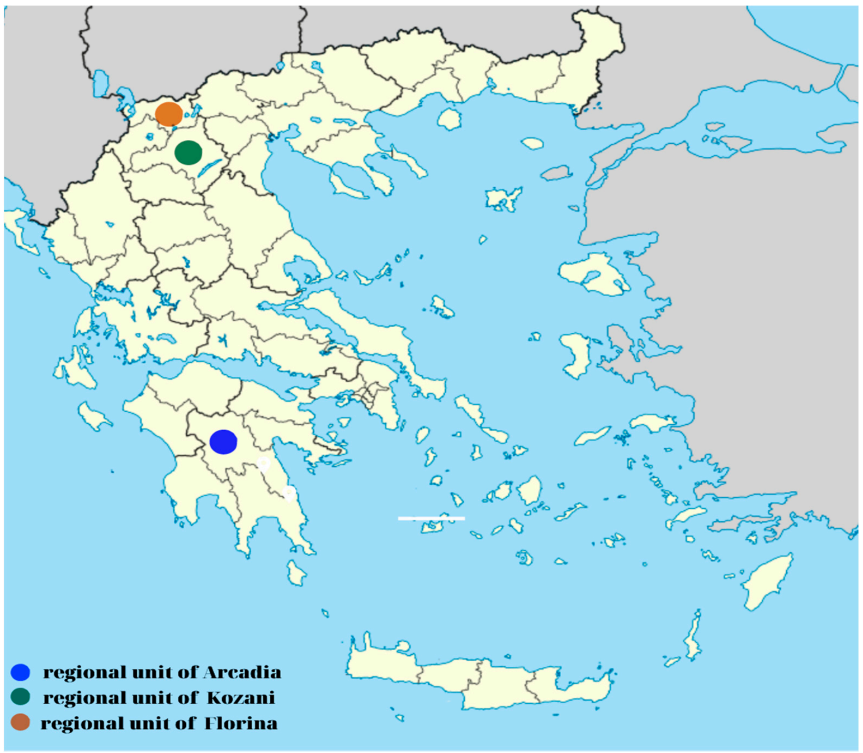

Figure 1. The lignite areas of Greece affected by the energy transition.

This research aimed to identify the contribution of companies to the reconstruction of lignite areas within tight timeframes. This study sheds light on the role of financial instruments in supporting existing and new enterprises there, focusing on sustainable business systems and the transformation of existing enterprises affected by lignification (see Table 1). Accordingly, it describes incentives for companies to invest in lignite areas, notably

to include both European and domestic financial instruments that support businesses and contribute to sustainable development.

Table 1. Enterprises in lignite areas directly affected by the energy transition.

	Regional Unit of Kozani	Regional Unit of Florina	Regional Unit of Arcadia
Number of enterprises	1.145	300	125
Business staff	3.985	930	295
Personnel per company	4	3	3
Total turnover (in thousands of euros)	264.463	82.545	20.601
Average turnover per undertaking (in thousands of euros)	231	275	213

Source: Data from the Just Development Transition Plan for Lignite Areas.

The main aim is to support businesses affected by the transition: to meet their obligations, maintain their human resources, and restructure their operations.

2. Theoretical Background

Transitions in the daily life of citizens, as well as on economic, social, and environmental levels, are frequent and sometimes appear to be favorable, at other times difficult and unpleasant (García-García et al. 2020; Nikas et al. 2020). Notably, the same occurs when enterprises must operate in a transitional environment (Loorbach et al. 2010; Newell 2020). These transitions positively or negatively influence individuals, local societies, institutions, and organizations. According to Hopson (1981), transition creates discontinuity in the lifeline. In fact, when transitions are urgent, such as the energy transition driven by the need to tackle climate change, they lead to disruptions in the local community, turmoil in people's lives, and a need to restructure the business environment (Luciani 2020; Lutz et al. 2014; Newell 2020). In addition, the transition could create anxiety and insecurity for citizens, social unrest, and uncertainty in the local community (Cooper and Hopson 1981; Griffiths and Hopson 1981) and a demand for the creation of new business models (Blazquez et al. 2020). In the business sector, energy transitions create a reallocation of capital and changes in the basis of business competitiveness (Kemp 2010; Wood et al. 2020). Therefore, the relationship of established or prospective enterprises (sustainable entrepreneurs) with the public authorities during the transition to a low-carbon economy is one of the main issues in achieving successful outcomes regarding entrepreneurship and sustainable development (Gasbarro et al. 2017; Gibbs and O'Neill 2012).

The present research's basis is the theory of transitions, formulated through relevant studies, especially after the 1970s (Adams et al. 1976; Schlossberg 1981; Schlossberg et al. 1995; Loorbach 2010; Meleis et al. 2010; Solomon and Krishna 2011; Laes et al. 2014). It takes into account the characteristics emerging on the basis of synthesizing ideas and concepts, with such attributes as co-evolutionary, multidimensional, and long-term processes, as well as changes in established modes of operation (Schlaile and Urmetzer 2019). In this light, Laes et al. (2014) developed four archetypical transition phases—pre-development, take-off, acceleration, and stabilization—by likening them to the flight process. At the level of transition management theory, we considered the types of governance activities at strategic, tactical, business, and reflexive levels (Loorbach 2007, 2010). In this regard, we posed relevant questions to the interviewees responsible for implementing energy transition policies in lignite areas by emphasizing support measures for existing businesses, as well as other measures to attract new businesses to these areas. Figure 2 illustrates the elements of transition theory the research considered based on the views of Laes et al. (2014), Loorbach (2007, 2010), and Schlaile and Urmetzer (2019).

Based on the theoretical background of transitions, the present research focused on the extent to which entrepreneurship can be developed effectively for lignite areas within a suffocating transition timeframe.

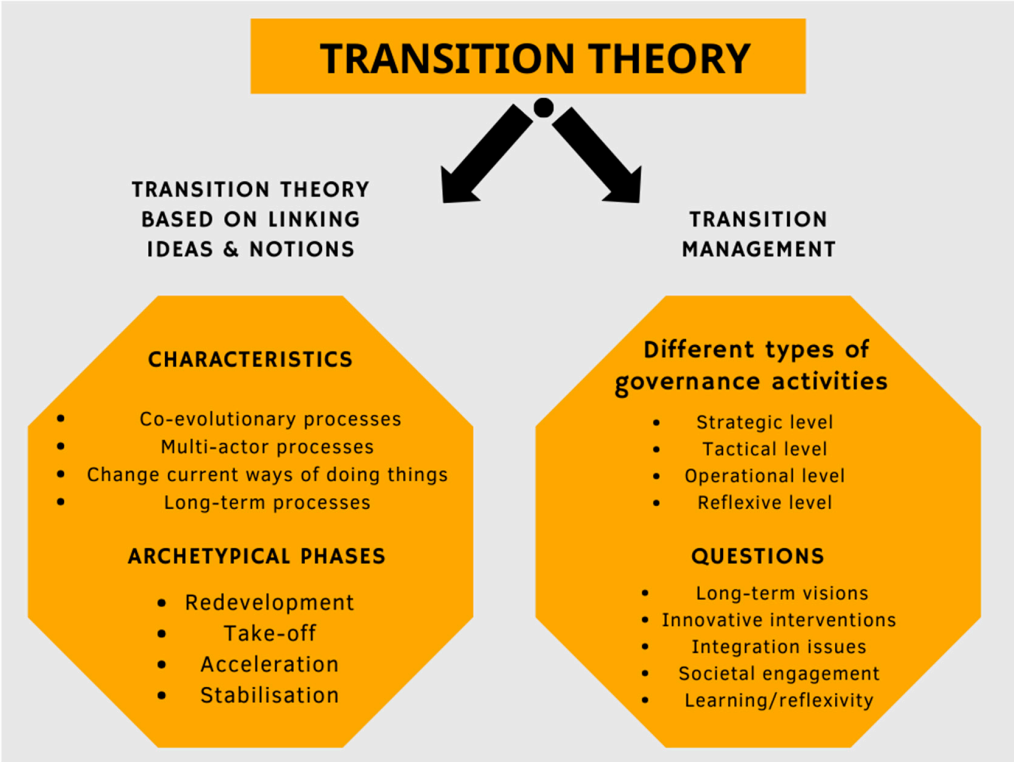

Figure 2. Transition theory elements considered. Source: Data from Laes et al. (2014), Loorbach (2007), Loorbach et al. (2010), Schlaile and Urmetzer (2019).

3. Literature Review

Considerable research interest has focused on the energy transition and its impact on the regions previously involved in the mining of lignite for power generation needs (Harrahill and Douglas 2019; Lenferna 2018; Tranoulidis et al. 2022). The same applies to the restoration of the environment of the lignite mines and the sustainable development of these areas (Karagianni and Pempetzoglou 2022; Spanidis et al. 2020). Several studies examined the socioeconomic and environmental impacts of transitions in lignite areas (Tranoulidis et al. 2022; Zervas et al. 2021), as well as the respective planning and long-term strategy needed for fair and effective transitions (Cha and Pastor 2022; Harrahill and Douglas 2019; Weller 2019). Some referred to ensuring the prerequisites for making the transition fair, effective, and conducive to sustainable development (Cha 2020; Grubert 2020; Mayer 2018), others to the creation of a robust and diversified economy in transition-affected places (Cheung et al. 2019; Snell 2018; Snyder 2018). Furthermore, studies examined the field of ensuring local community engagement in the lignite area transition and redevelopment plans (Bazilian et al. 2021; Chilvers et al. 2021; Weller 2019) and ensuring financial tools to attract enterprises there (Filipović et al. 2022; Krawchenko and Gordon 2021; Pollin and Callaci 2019). More studies addressed the acquisition of new knowledge and skills to enable power generation workers to re-enter the labor market (Alexander and Floyd 2020; Koutsandreas et al. 2021).

Another research theme is the environmental restoration of lignite mining areas so agricultural production and businesses can utilize them afterward (Greenberg 2020; Pavloudakis et al. 2020). Also, studies have undertaken topics on supporting businesses to create quality jobs (Pollin and Callaci 2019; Zervas et al. 2021) and the creation of local revenue streams for the sustainable development of lignite areas (Carley et al. 2018; Haggerty et al. 2018). The research regarding the role of entrepreneurship in lignite areas' sustainable development on a tight transition schedule remains unsaturated, with aspects awaiting illumination. The research of Ziouzios et al. (2021) implies this need, arguing that the economic reanimation of lignite areas to achieve the respective transformation

requires further investigation. In this regard, that study also included the crucial role of entrepreneurship in these areas

The Case of Greece

The Greek context was determined on the basis of the Greek experience of transitions in three pillars. For the pillar of the ability to convert the reference area, success factors are considered to be the conversion of the reference area to "related" use, the redefinition of the use of the area, the provision of professionals and financial incentives to local businesses, the creation and maintenance of infrastructure, and the transformation of the wider supply chain. For the pillar of cooperation of the agencies involved, success factors are considered the planning of a transition plan, the participation of national and local agencies in the regional strategy, honest and well-structured communication with local communities, the planning of social protection measures, and the joint strategy between the owner company and the agencies. For the pillar of economic support of those regions and the accumulation of private capital, factors of success are considered the financial support of local communities, the support of work integration programs, and the compensation and early retirement schemes

In Greece, a country with no strong culture of consensus, in the case of transition, consensus was formed on the nexus of incentives from all stakeholders. This consensus was also reflected in the transition plan. To determine the incentives, specific factors and regulations were taken into account, such as the workforce of transition areas, the existing businesses in these areas, the new investment schemes, as well as the European experience and EU regulations. The framework of motivations in the Greek case was based on four categories. The first category included investment and financial incentives such as subsidies, financial aids, guarantees, and microcredits, as well as co-investment funds. The second category included tax incentives such as tax exemptions, tax reductions, and tax facilities, as well as exemptions from fees and other charges. The third category included operational incentives such as insurance, pensions, and research and development, as well as energy efficiency. The fourth category included licensing incentives such as setting a maximum time for granting licenses and exemptions from licensing fees, as well as the creation of a central unit for full services and the settlement of licensing issues. Also, there was a consensus on the workers affected by the transition in order to upgrade their knowledge and skills and join the green market. The only debated issue was the transition timetables. According to most of the local stakeholders (entrepreneurs, citizens, and officials), those timetables were unrealistic and difficult to implement, resulting in the dependence on imported natural gas.

In Greece, in the schemes of regional aid, the following costs have been included as eligible: innovation for small and medium-sized enterprises, procedural and organizational innovation for small- and medium-sized enterprises, innovation clusters for new small and very small enterprises, energy efficiency measures, and the restoration of contaminated areas. There is an urgent need for collaboration among the primary sector, research, and innovation. The available technology, along with the scientific human resources under a common strategy, could promote the holistic development of lignite areas, creating new jobs, attracting young people, and eliminating the environmental impact of economic activity in those areas. Thus, motivation through new initiatives is necessary with the cooperation of local authorities, communities, and organizations. The effective orientation of the economy toward resilience demands the activation and cooperation of all of the basic stakeholders of the local social capital. Greek lignite areas (mainly in Western Macedonia and Megalopolis), could achieve development in economic, social, environmental, technological, and cultural, aspects, as long as it bases its strategic vision on innovation, entrepreneurship, research, and synergies, enhancing regional resilience (Pavloudakis et al. 2023; Marinakis et al. 2020).

4. Methodology

To explore the views of participants in energy transition planning, 12 qualitative, semi-structured interviews were organized (Fossey et al. 2002; Saunders et al. 2009) with executives from regional and local government, decentralized administration, and social partners. Table 2 summarizes some details for the participants selected. All participated in the consultation and planning for the energy transition and the Greek lignite areas. A purposive sampling technique was used to trace and approach the potential participants (Apostolopoulos and Liargovas 2016; Kenny and Duckett 2003; Schmidt et al. 2020). According to Patton (2002), this sampling technique, very often used in qualitative studies, refers to the selection of information-rich cases for study in depth and features small sample orientations since they feature homogeneity. The participants were recruited based on specific criteria relevant to their common characteristics (Amoatey et al. 2015; Bagheri et al. 2013; Hussain et al. 2018), such as their role and duties in energy transition projects of the examined areas. Therefore, the selected participants appeared to be the appropriate choices because of their deep knowledge regarding the topic (Bernard 2002; Creswell and Clark 2011). A qualitative research approach was selected because it could effectively detect and evaluate human views and experiences and the environment in which the social event unfolds (Denzin and Lincoln 2011; Tuli 2010). It could reliably clarify and interpret complex social, economic, and business environments (Neergaard and Ulhøi 2007). Semi-structured interviews were selected because they are more effective in qualitative research approaching social and business issues (Hassink et al. 2016; Wallace et al. 2019). They have the potential to shed light on particular aspects of social and business phenomena with objectivity and reliability (Aung et al. 2021; DeJonckheere and Vaughn 2019; Kakilla 2021; Qu and Dumay 2011).

Table 2. Characteristics of participants in the semi-structured interviews.

R	Status	Geographical Area
R1	Regional Government Executive	Western Macedonia
R2	Regional Government Executive	Western Macedonia
R3	Regional Government Executive	Peloponnese
R4	Regional Government Executive	Peloponnese
R5	Local Government Executive	Peloponnese
R6	Government Executive of the Just Transition Central Administration	Athens
R7	Executive of the Decentralized Administration of Peloponnese–Western Greece and Ionian Islands	Peloponnese
R8	Executive from the social partners involved in the consultation	Peloponnese
R9	Regional Government Executive	Peloponnese
R10	Regional Government Executive	Western Macedonia
R11	Executive from the social partners involved in the consultation	Western Macedonia
R12	Executive from the social partners involved in the consultation	Western Macedonia

The interviews lasted on average one hour. They included a structure and flexibility design that enabled the researchers to approach with predetermined topics and themes that arose spontaneously from the participating executives (Legard et al. 2003). Interviews occurred by telephone or online, which are just as reliable as face-to-face collection of sample material (Cachia and Millward 2011; Deakin and Wakefield 2014; Lo Iacono et al. 2016). The researchers studied and were informed in many ways about the complexities of energy transition (Kvale and Brinkmann 2009). They informed participating managers in the study who gave their consent about the nature and objectives of the research. The sample size was based on the principle of relevance and adequacy, such that individual

characteristics could not be altered (Morse 1994; Morse and Field 1996; Polit and Hungler 1999; Thompson 1999). Based on these principles, we selected 12 executives who had been involved in the energy transition consultation, planning, and implementation process.

The survey was conducted in the native language of the executives who participated in the survey (Greek) from December 2022 to February 2023. The content of the interviews was classified into four thematic sections. The first concerned the sustainable business ecosystems in lignite rural areas. The second concerned the transformation of existing businesses. The third was about incentives for entrepreneurs to invest in the areas that affected by delignitization. The fourth concerned the Just Transition Fund. The data analysis was also carried out in Greek to avoid ambiguities and misinterpretations (Maneesriwongul and Dixon 2004; Temple and Young 2004). Only the references were translated into English (Van Nes et al. 2010). Initially, the interviews were examined individually, using an inductive approach, before being compared with each other (Creswell 2005; Thomas 2006). Emergent issues and subjects were recorded (Gioia et al. 2013) and captured in Table 3. The creation of categories was specified in detail, and coding was exclusive and independent (Krippendorff 2018; Smith et al. 2001).

Table 3. Content Analysis.

Emerging Issues	Subjects	Summary
Sustainable business ecosystems in lignite rural areas	• Plan to support sustainable enterprises in transition regions. • Entrepreneurship infrastructures and mechanisms. • Partnership schemes. • Meeting energy transition planning timetables.	✓ Transition plans provide support for sustainable business ecosystems. ✓ There is a concern if the plan is implemented without reductions along the way. ✓ Infrastructure and support mechanisms for viable businesses are a prerequisite. ✓ Business partnership is a necessity even if Greece has no tradition of partnerships. ✓ Timetables must be respected. But the transition period to which the Greek government committed is compressed and difficult to meet.
Transformation of existing businesses	• Changes in the structure and operation of businesses toward sustainability. • Inclusion in European programs. • Supporting jobs. • Digital transformation and business carbon footprint reduction plan.	✓ Support for existing businesses is a positive element. ✓ Need for financial support instruments. ✓ The need to support workers to integrate smoothly into the green businesses that will be developed in the lignite areas. ✓ Measures to support the digital transformation of businesses.
Incentives for entrepreneurs to invest in areas affected by delignitization	• Designing new green businesses. • Promoting start-up entrepreneurship. • Financial and tax incentives. • Inclusion in programs. • Creating new quality green jobs.	✓ Investment support measures are foreseen. ✓ Potential provision of information to investors. ✓ The development of start-up entrepreneurship in lignite areas is an opportunity. ✓ Financial incentives are needed. ✓ Other incentives, such as tax incentives and favorable lending conditions, are needed. ✓ The business support funding framework must be simplified, made flexible, and be free of bureaucracies. ✓ There is provision for the creation of quality green jobs.
European and national financial instruments	• Financing schemes for sustainable entrepreneurship. • Financial facilities. • Support through European and national financial tools.	✓ There is optimism that the European funds will effectively support enterprises and jobs and contribute to the development of the region. ✓ The restoration of lignite lands, the creation of infrastructure, and the possibility of favorable bank lending are considered primary issues. ✓ There are concerns about bank lending due to negative experiences. ✓ Funds for lignite areas must be used in a targeted manner, without obstacles and bureaucracies.

Combining the interviews with the literature review enabled us to increase the validity and reliability of the survey results (Bell and Waters 2018). It also helped us in Section 6

to relate the analysis of the primary data to the literature review findings, ensuring their external validity.

5. Findings

The structuring of the findings was built upon the following four thematic sections: 'Sustainable business ecosystems in lignite rural areas', 'Transformation of existing businesses', 'Incentives for entrepreneurs to invest in areas affected by delignitization', and 'The Just Transition Fund'.

- Sustainable business ecosystems in lignite rural areas

The transition plans include the support of sustainable business ecosystems in the lignite rural areas. Stakeholders who participated in the plan's consultation are concerned about whether the program will be implemented according to the plan.

> *'In the context of promoting and strengthening entrepreneurship in the regions of the Just Development Transition Program 2021–2027, many categories of new or existing businesses that seek to upgrade their status in the logic of sustainability are surely eligible. New enterprises could be established in those areas which have been severely affected by delignitization. In essence, the Just Transition Development Plan (JTDP) promotes a new development model focusing on the countryside.'* (R1)

> *'The energy transition has at its core the development of the areas that will be affected by delignitization. In order to prevent desertification, we have prioritized a two-pillar plan through consultation. One pillar is concerned with the strengthening of sustainable entrepreneurship and the other with the creation of quality green jobs. I hope the plan will be put into practice without any reductions along the way.'* (R2)

Survey participants consider the existence of infrastructure and support mechanisms to be a necessary prerequisite for attracting investment in lignite areas. Thus, planning the just transition prioritized spatial planning, specific urban plans, infrastructure, and business incentive packages.

> *'In order for someone to invest, the existence of infrastructure and support mechanisms is a prerequisite. In this regard, there has been a great deal of discussion related to all lignite areas. During the relevant planning, we created a package of business incentives and infrastructure. Spatial planning, special urban plans as well as infrastructure were set.'* (R12)

> '*Sustainable entrepreneurship is clearly strengthened mainly through the development of infrastructure and entrepreneurial mechanisms. A properly organized entrepreneurial park, harmonized with modern technological requirements, that is planned to be built in the Megalopolis area, will be the best host of sustainable entrepreneurship. This project features an eco-industrial area with green functions.'* (R3)

Moreover, interviewees consider business partnerships in the lignite rural areas to be a necessary condition for the energy transition as a valuable tool. They feel that this is a difficult step since Greece does not have a long tradition of partnerships.

> *'This is a big issue because in Greece, entrepreneurship has no tradition of partnerships. But the new business environment that is being shaped right now creates the need for such partnerships, and this is a bet that must be won, especially for the lignite areas. The transition plan places emphasis on strengthening business partnerships. Investments in sustainable flagship enterprises are needed.'* (R7)

> *'The JTDP supports collaborations among firms. It also promotes innovative synergies and even co-working spaces.'* (R1)

Subsequently, the survey participants expressed the necessity of faithfully implementing the energy transition timetables. Interviewees expressed strong reservations about the feasibility of the short transition period to which the Greek government had committed,

calling for a longer transition. The energy crisis that arose with Russia's military invasion of Ukraine eventually forced the government to revise the transition timetable.

> *'Due to the energy crisis caused by the war, it was deemed necessary by the European states to extend certain lignite plants in order to have energy sufficiency. In any case, all actions provided by JTDP will be implemented in accordance with the initial timeframe.'* (R6)

> *'Even before the war in Ukraine, we thought that the schedule of the transition was unrealistic and would have major social consequences. Unfortunately, we were confirmed. We are now restarting lignite-fired power stations.'* (R11)

- Transformation of existing businesses

Interviewees claim that the transition plan's support for the existing enterprises located in the lignite areas constitutes a positive element.

> *'The transformation, upgrade and reconfiguration of existing enterprises are foreseen and supported by the JTDP. The aim refers to the achievement of sustainable business development. Such examples include the digital transformation of businesses, the acquisition of know-how and the reskilling of those already employed in established enterprises.'* (R1)

> *'The transition to the lignite areas, which also bear the heavy burden of impacts, requires smart sustainable investments. In light of this, special incentives are given for the development of business activities in the lignite areas. In this context, for instance, in the wider Megalopolis area, the development of an entrepreneurial and commercial park is planned to increase business interest in the area and support entrepreneurship in the region.'* (R7)

Research participants consider financial support programs a necessary initiative for investments in lignite areas. They claim that such programs are already activated and support entrepreneurship in these areas.

> *'There exists support for upgrading local enterprises, for sure. I'm talking about financial tools of other European Programs, mainly the ESPA and LEADER. We are waiting for the issuance of the calls which will define exactly the terms required for a company to join the financial instrument.'* (R5)

> *'There are financial programs to support businesses in the lignite areas in order for them to create certain entrepreneurial activity with quality workplaces. Without these programs, I am afraid that no one would invest in these areas.'* (R4)

Furthermore, respondents argue that the transition plan enhances workers by securing employment in viable regional enterprises through training and upskilling programs.

> *'The JTDP provides significant funds (€227 million for the Region of Western Macedonia and €65 million for the Megalopolis region) for labor transition and human resources empowerment. In this context, upskilling and reskilling of the workforce in these regions is an important tool to lead to a zero-emission economy.'* (R6)

> *'The transition plan foresees the creation of quality jobs in the lignite areas. There is, of course, a long way to pass from plans to action.'* (R8)

The energy transition plan emphasizes the digital transformation of businesses that exist or will be established in the referenced areas.

> *'In the Region of Western Macedonia, we have a specific vice region that deals with the digital transition and the green transformation of businesses. The faster the digital transition of the business, the better it is for the business.'* (R2)

> *'Digital and green transformation is one of the key pillars of the program. Emphasis is placed on the use of new technologies to protect the environment. In particular, digital orientation, support for the development of digital transformation and the creation of value chains will lead many businesses to sustainability.'* (R5)

- Incentives for entrepreneurs to invest in areas affected by delignitization.

Executives stated that to have green investments in the energy transition plan, the field of incentives for attracting businesses to the lignite areas received special attention. They believe that to achieve positive results, investors must be informed about these incentives.

'The central administration, regional and local authorities have an obligation to communicate in the best possible way all the advantages and high subsidies in the JTDP areas. This way, they will attract new green, sustainable businesses to settle in these regions.' (R6)

'It is a necessity to establish sustainable businesses in the lignite areas that will contribute to sustainable development. The creation of a strong business ecosystem will create growth dynamics. This will require strong incentives to support green businesses.' (R9)

According to survey participants, the ecosystem for promoting start-up entrepreneurship in Greece appears to be in a weak mode. They consider the challenge of developing the lignite areas an opportunity for Greece to develop a start-up entrepreneurship system.

'It is important to point out the lack of start-ups throughout Greece and mainly in the lignite areas. It is imperative that more financial incentives are provided by the transition program in this direction so that many start-ups can be established, which will contribute to increasing productivity, employment and the production of innovative products and services.' (R4)

'It is true that the start-up entrepreneurship system is weak in Greece. There are good practices in many countries for the development of start-ups that can be useful for Greece as well. In this regard, the use of technology will help significantly. The transition plan mentions start-up entrepreneurship, but it needs to be specialized.' (R7)

For the sustainable development of lignite areas, in addition to financial incentives to attract investment, the respondents consider that other incentives are required, such as favorable lending conditions, tax exemptions, and tax relief.

'*Apart from financial incentives to attract businesses, other strong incentives such as wage cost subsidies, insurance subsidies, tax reliefs, fee waivers and access to bank loans on favorable terms are also needed.'* (R10)

'*So far, the support to businesses is only through financial support (subsidies), but there are plans to do so through tax incentives.'* (R3)

For the inclusion of enterprises in financial support programs, there are concrete guidelines featured in the transition plans that directly relate to the nature of the sector in which the enterprises operate. Participants stated that this framework must be simplified, made more flexible, and set free of bureaucracy and delays.

'In lignite areas, which are heavily affected by the delignitization, the inclusion of a new business in a subsidy program requires a good investment proposal, a small equity stake and, of course, some formal requirements, as well as desire for work.' (R6)

'Financial support programs for businesses in lignite areas affected by the energy transition are necessary. However, I believe that the framework and procedures for including businesses in the financial programs are rigid, complex, time-consuming and bureaucratic.' (R8)

Survey participants state that the energy transition plan takes care of the human resources that will lose their jobs in the lignite areas. In particular, survey participants from the social partners expressed their concern about whether the plan would deliver the expected outcomes.

'*As regards the planning level, concrete care has been taken for the existing human resources in the lignite areas so that no jobs are lost. The plan provides programs to upskill the workforce to enter green jobs. But we will have to see how this plan will work in practice.'* (R12)

'There can be no transition without the human resources of the lignite areas being smoothly integrated into new green quality jobs. The acquisition of new green skills requires being supported by specific policies.' (R11)

- European and national financial instruments

Interviewees appeared to be optimistic about the support that the lignite areas will receive from the European and national funds. Their assessment is that, particularly, the Just Transition Fund will support entrepreneurship and employment and be the main driver for these regions' development.

'There are European funds like the Just Transition Fund, which support lignite areas. Enterprises need to be viable, including agri-food businesses.' (R3)

'Large funds for sustainable entrepreneurship in these regions are foreseen in the transition plan. We are referring to all businesses and especially for agri-food entrepreneurial activities, such as smart farming and circular economy.' (R4)

Respondents argue that working on a plan to build the necessary infrastructure, to restore land in the lignite areas, as well as loan facilities for investors, are of particular importance. They consider the loan facilities for working capital loans, infrastructure, energy saving, and the introduction of technologies issues that must be addressed. Simultaneously, they express their concern about bank lending, citing past negative experiences.

'We are currently in the process of conducting the studies for the restoration of the land and the construction of infrastructure, and this planning is progressing according to schedule. The only variation is the extension of the operation of some lignite plants, which was granted due to an energy crisis caused by the war in Ukraine. Borrowing money is planned and given by banks solely on economic criteria.' (R6)

'The energy transition program provides for favorable loan conditions to cover the own contribution. The problem is that entrepreneurs in Greece have had bad experiences with bank lending during the years after the 2009 financial crisis, and they are currently very cautious when it comes to that issue. The confidence of entrepreneurs and the banking system has been shaken. This relationship needs to be restored in clear terms.' (R7)

The participants of the survey consider the Just Transition Fund a key pillar of economically viable and sustainable business in the lignite areas. They believe that support for enterprises through the Just Transition Fund should be provided without obstacles or bureaucracy.

'The Just Transition Fund provides significant funds to support and promote entrepreneurship in the lignite areas. Supportive actions, such as innovation, investment in technology, digital and green transformation, start-ups, clean energy and many others.' (R4)

'The existence of certain European financial instruments, especially the Just Transition Fund, fills us with optimism that the lignite areas will not be driven to desertification. It is the key financial tool for sustainable development. It supports entrepreneurship and investment in infrastructure and technology. The question is how this financial tool will be used in practice. That's where the impact of the transition will be reflected.' (R10)

6. Discussion

This research showed that the energy transition plans affected the business ecosystems of the lignite regions involved in the mining of lignite for the needs of power generation. Dealing with the effects of the energy transition in these areas and attracting investment projects requires spatial planning, as well as incentives, consensus with the local community and labor force, and planning to create quality jobs through investments in the area. Investment and financial incentives, tax and licensing incentives, as well as operational incentives, are required within an integrated incentive system. A crucial factor in the transitions is the existing best practices resulting from the national and European experience. It is a guide for effective interventions. The role of best practices in transitions has also

been captured in other research findings (Pavloudakis et al. 2023; David and Schulte-Römer 2021; Cholewa et al. 2022). The previous research also showed that rehabilitating mines, upgrading workers' knowledge and skills to join the labor market, and supporting existing businesses and attracting new ones is a process that takes time. It cannot occur under suffocating schedules because they include a great risk of failure in transition plans.

Greece's national transition plan is at risk of stalling, not due to poor design or lack of consensus but because it must be implemented by 2028. Within these tight timelines, the participants in the survey expressed concerns about how realistic the goal is for investment and recovery of the affected lignite areas. They consider revising the time schedules necessary; otherwise, the implementation of the project may lead to a dead end. Relating those findings to the international literature, we find that the energy transition needs a long-term, sustainable development strategy to achieve the diversification of the local economy (Cheung et al. 2019; Snell 2018; Snyder 2018).

Furthermore, it needs supportive policies accompanied by financial tools (Tandon 2021; Manta et al. 2020), with the prerequisites for restoring the lignite mine environment and addressing the socio-economic and environmental impacts of the transition (Karagianni and Pempetzoglou 2022; Spanidis et al. 2020; Tranoulidis et al. 2022). Creating the basic infrastructures that will support businesses is necessary (Pavloudakis et al. 2020; Zervas et al. 2021). There is also a need to create a strong diversified economy in the lignite regions that will attract investment and create quality jobs (Cheung et al. 2019; Filipović et al. 2022; Krawchenko and Gordon 2021; Pollin and Callaci 2019; Snell 2018; Snyder 2018). The international literature underlines that achieving all this requires planning, a long-term strategy, and realistic time schedules (Zervas et al. 2021; Snell 2018; Snyder 2018). The research by Zervas et al. (2021) highlighted the existing doubts about whether the lignite mine rehabilitation can occur within the Greek transition timeline and whether investments could occur in the area that will keep workers from migrating. In the same vein, the research by Lypiridi (2021) concluded that achieving the energy transition requires strategic planning, along with a policy framework with specific implementation objectives and a realistic timetable. Furthermore, Lypiridi (2021) considered the energy crisis putting Greece's ambitious decarbonization plan and its timetables on a new basis that requires drastic changes and realism. The socio-economic implications of the goal of the rapid withdrawal of all lignite units in Greece by 2028, 80% of which are to be carried out in 2023, were also mentioned by other researchers (Ziouzios et al. 2021).

There was a positive evaluation of the incentive programs by the research participants as something rational, since the research participants also participated in the design of the transition programs and the decisions were unanimous. Comparing the existing programs with the international literature, their compatibility is confirmed. While and Eadson (2022) underlined the potential to create new employment pathways for disadvantaged areas and communities (in renewable energy, in the manufacture of green equipment, etc.), creating opportunities to build skills and R&D capacities in less favored regions within a relatively stable growth and investment framework. The German experience of the transition process (Furnaro et al. 2021) concluded that policies to support coal regions have been particularly successful when tailored to the local realities and needs. Including the active participation of local stakeholders in the design and implementation of these policies is important not only from a procedural justice perspective but also to create more locally coherent and effective interventions. Also, coal workers benefited from social security programs with monetary transfers, at least for a short period.

The present research shows the necessity of supporting the existing businesses operating in the lignite areas. The energy transition affects these businesses, and they need support to meet their obligations, reform their operations, and retain their workforce. Providing that support should happen according to an organized plan that is the result of a dialogue and consultation process and accompanied by the necessary financial tools. The overall planning should include the support of the employees in those businesses, along with a process of upgrading the knowledge and skills of the workforce that is necessary

to reform their operation, emphasizing the digital transformation of these businesses. A critical parameter is the planning for innovative interventions from businesses to change their production model as well as the creation of "clean energy innovation zones" and environmental technologies in the transition areas.

Relating these findings to those of the relevant literature, we conclude that the findings of this study are consistent with other findings in the international literature. Research has shown that reconstructing the lignite areas and reforming the operation of existing businesses require support policies accompanied by relevant financial tools (Haldar 2022; Manta et al. 2020; Sheng 2020; Süsser et al. 2017; Tandon 2021). Other research also showed requirements for specific commitments to the human resources of the lignite areas and procedures for upgrading the knowledge and skills of the workers to respond to the reformed operation of those enterprises (Alexander and Floyd 2020; Koutsandreas et al. 2021). The decisive role of innovative interventions in lignite areas is supported by many more studies (Ragnitz et al. 2022; David and Schulte-Römer 2021).

This research showed that the mining areas need investment to diversify their local economy and create quality jobs, requiring incentives accompanied by financial tools and investor information mechanisms. The incentives should be institutional, financial, fiscal, insurance-related, and operational. The overall framework for the inclusion of investments in the incentives must be simple, functional, and flexible, without bureaucracy or delays. Similar findings appear in the international literature. Research has shown the necessity of providing incentives for investments in the lignite areas to create quality jobs (Apostolopoulos et al. 2023; Pollin and Callaci 2019; Zervas et al. 2021). Tranoulidis et al. (2022) showed that special incentive zones accompanied by financial instruments have the power to attract new investments in lignite areas. Other research also showed the necessity of supporting these investments to create quality jobs (Nikas et al. 2020; Pollin and Callaci 2019; Zervas et al. 2021). In this direction, research has shown the necessity of eliminating bureaucracy and the seamless, timely licensing of businesses (Tranoulidis et al. 2022; Zervas et al. 2021).

It is undeniable that providing incentives for investment in lignite areas is vital for the economic development of the region and the jobs' creation. However, it is equally important to ensure that these incentives are aligned with environmental sustainability objectives. According to the literature, one of the key principles after mine closure is the long-term sustainability of the land and ecosystem, which requires the provision of services that exclude environmental pollution (Gerwin et al. 2023). Practices that promote the use of renewable energy sources, sustainable primary production through 'smart agriculture', and the creation of energy communities should be integrated within these incentives (Marinakis et al. 2020; Majeed et al. 2023)

This study revealed that European and domestic financial instruments are necessary to support sustainable entrepreneurship, create quality jobs, and upgrade the knowledge and skills of the workforce to enter the green labor market. They are the key drivers for the development of areas affected by the transition. Private and public financial tools contribute to the effective support of the regions toward sustainable development and should therefore be utilized in a targeted manner, without any obstacles or bureaucracies. In this sense, European and national funding encourages financial markets to invest in sustainability and green energy production (Polzin and Sanders 2020). Notably, the referenced tools contribute to supporting transitional regions in order for them to avoid desertification by transforming their economic development model toward sustainability. The important role of European and national funding has been reflected in the global literature through numerous studies (Gema 2023; Kulovesi and Oberthür 2020; Durst and Gerstlberger 2020; Clark et al. 2018).

This research showed that European and domestic financial tools are necessary to support entrepreneurship and create quality jobs. They are also the main drivers of the lignite areas' development. This research also showed the necessity of debt facilities to strengthen businesses' equity capital. The existence of a breach of trust between Greek

businessmen and the banking system was revealed, the result of the negative experiences of businessmen during the financial crisis of 2009. That issue requires careful consideration for the smooth operation of the businesses in the sector. These findings resemble those from other studies in the international literature. Research shows that a fair and effective transition requires support for entrepreneurship in the regions that participated in mining in order to contribute to socioeconomic sustainable development and the creation of quality jobs (Filipović et al. 2022; Henriques et al. 2022; Krawchenko and Gordon 2021; Leppänen and Liefferink 2022). This gap in trust between Greek businessmen and the banking system has also appeared in other research (Apostolopoulos et al. 2021, 2022).

7. Conclusions

The diversification of the local economies of the lignite regions affected by the energy transition is a complex process; economic, social, and environmental factors interact at its core. It requires careful planning and a long-term sustainable development strategy. A thorough examination of the effectiveness of current incentive programs for entrepreneurs is required as well as an examination of the impact on business expansion, quality job creation, and sustainability orientation. Furthermore, it calls for the restoration of the mining lands along with supporting mechanisms for existing businesses and incentives for new ones, accompanied by financial tools that will support them. A comprehensive transition plan that will have the consent and support of local communities will include the reconstruction of the affected areas, mapping of the future needs of the labor market, and the development of mechanisms to upgrade the knowledge and skills of the workforce, which is integral to the sustainable operation of businesses in these areas. The success of energy transition plans requires realistic time schedules that enable the restoration of lignite-mined areas and the attraction of investments that will create quality jobs, enabling existing businesses in those areas to meet their obligations through incentives, accompanied by financial tools to reform their operation and maintain their workforce. Delignitization time schedules must be ambitious and demanding but realistic in order to be accomplished and able to deal with emergencies as well as the particularities of the affected regions. European and domestic funding plays a pivotal role in changing the production model. It supports sustainable development, encourages businesses to reduce their environmental footprint, enhances green energy production, and creates quality jobs.

The transformation of the affected regions should be supported by a series of interventions based on the following four major pillars: a pillar of creating sustainable business ecosystems by developing sustainable business support plans, infrastructure, entrepreneurship mechanisms, partnership plans, and planning timelines. A pillar of transformation of existing enterprises through changes in their structure and operation toward sustainability, integration into European programs, employment support, digital transformation, and carbon footprint reduction plans. A pillar of incentives and investment by designing new green enterprises, by promoting start-up entrepreneurship, by offering financial and tax incentives, by integrating development programs, and by creating new quality jobs. And finally, a pillar of utilizing European and National funding programs through sustainable entrepreneurship funding projects, financial facilitation, and the support provided by European and national funds.

The findings of this research add evidence to the international literature on the issues of the energy transition of lignite regions. They contain evidence of the realism that must be embedded in energy transition timetables to serve their purpose. They add evidence for the reconstruction of rural areas that enabled lignite mining from the perspective of entrepreneurship and financial support tools. At the same time, the findings of this research are useful for those involved in the planning and implementation of transition programs, as well as for potential businessmen who intend to invest in the lignite areas or reform the operation of existing businesses. This research was based on the views and the experiences of those involved in the consultation and design of the energy transition plans for the lignite regions, and these findings will be useful for local communities and social partners

involved in this process. The findings are highlighted on the basis of the overall plan. Therefore, after 2028 (the critical date for Greek delignitization), evaluating these findings should facilitate the implementation of the process.

8. Policy Recommendations

It is now up to policymakers and stakeholders in the lignite regions to shape a sustainable future and build sustainable adaptation capacity. An approach that can serve these goals is to strengthen the infrastructure and entrepreneurship in lignite regions through the Just Transition and Utilization Fund and all other European and domestic financing programs, with an emphasis on sustainable development and long-term ecosystem protection. Another approach is to invest in the upskilling and re-skilling of human resources in these areas. The integration of digital tools and modern equipment in the workplace requires a higher level of education, especially in rural areas where there is a low level of education. It is important to implement not only technological innovations but also social innovations that will reduce energy poverty in the affected areas and promote integration. Of course, in order to implement these policies, it is important to revise, where necessary, the current institutional framework and make it more friendly to attract new investments and strengthen existing business activities in the delignitization zones.

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