

STAKEHOLDERS OF SUSTAINABLE REGIONAL DEVELOPMENT ACCORDING TO THE QUADRUPLE HELIX MODEL: A CASE STUDY OF REGIONAL INDUSTRIAL PARKS

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Abstract

Despite the normative view that the Quadruple Helix model (government, academia, industry, and civil society) is intended to enhance regional development, there is limited understanding of the collaboration opportunities from the stakeholders' perspective aimed at regional sustainability. To address this gap, the aim of this article is to empirically explore the stakeholders involved in sustainable regional development according to the Quadruple Helix model, using regional industrial parks as a case study. This involves identifying, from the stakeholders' viewpoint, their expectations, potential benefits, and challenges in collaboration. Based on this analysis, recommendations for future collaboration management and evidence-based decision-making can be developed. Overall, stakeholder analysis is critically important for overcoming expectation and implementation gaps, ensuring stakeholder satisfaction with collaboration, and promoting sustainability. Design/Methodology/Approach: The study employs monographic and descriptive methods, logical construction methods, graphical methods, and case studies. Main Findings: The Quadruple Helix model approach is participatory and transparent, and its application can ensure appropriate sustainable outcomes. According to the analysis conducted, it is essential to define collaboration mechanisms and identify issues-points of contact and conflicting paradigms. Thus, the application of the Quadruple Helix model in stakeholder engagement and management needs optimization to ensure regional development. Originality: This study contributes to existing literature by utilizing the Quadruple Helix model in the context of sustainability. It conducts an analysis of stakeholders in regional industrial parks based on the Quadruple Helix model, thereby expanding the understanding of the Quadruple Helix model.

Keywords: collaboration mechanisms, industrial parks, Quadruple Helix model, stakeholders, sustainable regional development.

Introduction

Sustainability is defined as a process that meets the needs of the present generations without compromising the ability of future generations to meet their own needs (Luengo-Valderrey et al., 2020). In this study, the concept of sustainable regional development is understood as a continuous, qualitative, and upward process of change that ensures regional prosperity, social justice, and environmental security while considering cultural aspects. Essentially, the concept of sustainable development is based on a balance between scientific and technological progress, adherence to social and ethical norms, and the interests of future generations. Science and technology bring both benefits and risks, so their application must be carefully considered and ethically justified in the present to ensure resource availability for future generations.

Sustainable development consists of two opposing aspects - stability, which characterizes sustainability, and dynamics, which characterize development. While these aspects are opposite, they complement each other. Stability can be understood as the long-term preservation of resources, while dynamics allow for adaptation and progress in changing conditions. Thus, it can be concluded that sustainable development ensures not only the preservation of natural resources for future generations but also the improvement of the quality of life in the present.

Balanced social, cultural, environmental, and economic development of regions is impossible without the direct involvement of the government, residents, industry, and academia. Therefore, the

Quadruple Helix model, which includes civil society, industry, academia, and government, can be considered as representing the key regional stakeholders. The Quadruple Helix model is specifically aimed at prioritizing the stakeholders involved in sustainable regional development. It is essential to recognize that each of these stakeholders has its own, often economic, interests, which may sometimes compete with one another.

Materials and Methods

As a result of the study, available literature was analysed, and an in-depth investigation was conducted, leading to a detailed understanding of the stakeholders involved in regional industrial parks. This analysis was based on the Recovery and Resilience Mechanism's 3.1.1.3.i. investments available in Latvia. The case study is guided by a key research question that defines the study's direction-who are the stakeholders in regional industrial parks, what are their expectations and benefits, and what are the main challenges in collaboration? Based on this analysis, recommendations can be developed for future cooperation management and evidence-based decision-making. Consequently, in-depth and innovative knowledge about industrial park stakeholders has been obtained, contributing to ensuring the sustainable development of regions. This study contributes to the existing literature by applying the Quadruple Helix model in the context of sustainability. It conducts an analysis of regional industrial park stakeholders based on the Quadruple Helix model, accurately identifying the involved

parties and thereby expanding the understanding of this model.

It should be noted that the empirical research section does not aim to be exhaustive but provides a clear assessment of the involved stakeholders. This, in turn, enables better collaboration with them, ultimately ensuring the sustainable development of regions.

Results and Discussion

A society striving to promote sustainability must ensure a balance between economic development, social well-being, and environmental preservation (Zhou & Etkowitz, 2021). Since 2015, sustainability has become a universal call to action, as the United Nations General Assembly adopted the Sustainable Development Goals (SDGs) during this period (United Nations, 2015). Like sustainable development, regional development is also a transformation process that focuses on regional growth without harming future generations. This process involves the appropriate use of production factors, the rational utilization of natural resources, environmental conservation, and solidarity (De Lima, 2021).

Sustainable development cannot be achieved through isolated initiatives. Integrated efforts at various levels are required, incorporating multiple aspects, fostering positive synergies, and creating meaningful sustainable development. While ensuring sustainability is a shared responsibility, global, regional, and national organizations, as well as governments and civil society organizations, are encouraged and expected to demonstrate ownership, leadership, and civic responsibility (Mensah, 2019).

Although there is no doubt about the importance of integrating the pillars of sustainable development (environmental, cultural, economic, and social) at the regional level, implementing this concept in practice has proven to be challenging. The integration of sustainable development pillars at the regional level requires the implementation of coordinated and complementary actions across various fields, resulting in economic growth while also achieving social goals without jeopardizing limited resources (Jovovic et al., 2017). While sustainable development is often viewed as the responsibility of national governments, much can be accomplished at the regional level. Considerations of equity in income distribution across different regions are particularly important for regional policymakers.

This suggests that central and regional governments may reach different conclusions regarding the best solutions to economic, social, and environmental challenges that must be addressed for sustainable development. This issue becomes even more complex when determining how to distribute the short-term burden of long-term sustainability efforts across different regions of the country. In such situations, reaching a mutually acceptable compromise can be difficult. Since the division of tasks and

responsibilities between central and regional governments is also a matter of power distribution, it must be decided through a political process between central and regional authorities (Ahlheim, 2009).

Sustainable development cannot be left solely to the responsibility of the central government. Regional governments must also recognize it as a priority. Many issues are more effectively addressed at the regional level, ensuring sufficient public participation—for example, environmental protection in specific territories. It is crucial to achieve coordinated action between the central government and regional governance structures. Only such an approach can ensure sustainable development at both the regional and national levels.

The term ‘stakeholder’ was first introduced by Freeman in 1984 (Freeman, 1984). Since then, it has been widely used in academic research and management thinking across various fields, leading to the development of a distinct branch known as ‘stakeholder theory.’ The concept emerged from the realization that corporate management should be concerned not only with the interests of shareholders (Freeman et al., 2010). Literature defines a stakeholder as any individual or organization that influences an organization and any individual or organization that is influenced by the organization (Mitchell et al., 1997). More recently, this idea has evolved into stakeholder engagement, focusing on value creation and addressing sustainability challenges through their involvement (Freeman et al., 2010; Freudenreich et al., 2019) (Sady, 2023).

Stakeholder theory and sustainability management reject the notion of separating ethical issues from economic concerns, as they are significantly interconnected rather than contradictory. Aligning these aspects can create real value for stakeholders and promote sustainable development (Hjörishc et al., 2014). Both concepts move beyond the traditional view that companies exist solely to maximize short-term shareholder value, introducing a long-term perspective and corporate responsibility into core business operations.

Stakeholders are at the centre of sustainability research because no organization can navigate an evolving environment alone (Dentoni et al., 2020). The first United Nations Conference on Environment and Development in 1992 acknowledged that achieving sustainable development would not be possible without stakeholder involvement. The 2030 Agenda for Sustainable Development emphasizes broad stakeholder participation, stating that ‘other interested parties actively engaged in sustainable development’ may not fit into standard categories. Therefore, adaptation and collaboration with relevant actors in specific processes are necessary (UN DESA & UNITAR, 2020).

Stakeholder theory assumes that an organization’s development is determined by how well it considers

stakeholder expectations. Organizational activities should be based not only on identifying stakeholders but also on understanding their expectations and communication methods (Freeman et al., 2010). Organizations must not only define but also prioritize their stakeholders based on instrumental and/or normative considerations, as they operate with limited resources and bounded rationality, making it impossible to create all forms of social value for every stakeholder (Jamali, 2007).

The Quadruple Helix model was developed by Henry Etzkowitz and Loet Leydesdorff, proposing those three key stakeholders-government, academia, and industry-play a crucial role in understanding and promoting sustainable development and innovation (Etzkowitz & Leydesdorff, 2000). Carayannis and Campbell (2009) expanded this concept by adding 'civil society' as the fourth helix to the original Triple Helix theory. According to Carayannis and Campbell (2012), the Quadruple Helix model emphasizes collaboration in innovation, particularly in dynamic processes (Sabaruddin et al., 2023).

Each stakeholder within this model fulfils a specific role: academia focuses on research and innovation, industry produces various goods and services, government regulates the market through policymaking and legislation, and civil society ensures its rights are upheld throughout these processes. The Quadruple Helix model helps clarify the relationships among these stakeholders, highlighting that one stakeholder can also take on roles traditionally assigned to another-for instance, the government may actively promote innovation. Such coordinated collaboration fosters initiatives aimed at achieving sustainable regional development.

Each helix component plays a crucial role in promoting sustainability, contributing significantly to the process (Gouvea et al., 2013; Hasche et al., 2020; Roman et al., 2020; Yun & Liu, 2019). This aligns with the rationale for achieving the Sustainable Development Goals (SDGs), which require collaboration among multiple actors. The United Nations influences institutions such as universities, governments, non-governmental organizations, and individuals to work together toward achieving the SDGs (Amry et al., 2021; Zhou & Etzkowitz, 2021; Hakeem et al., 2023).

Key stakeholders have a significant impact on sustainable development and its core values (pillars), which include improving living standards (economy), ensuring fair resource distribution (social), creating a liveable environment (environment), and preserving cultural values (culture).

The Quadruple Helix model adopts an approach that groups stakeholders with similar characteristics. In this model, these groups are government, academia, industry, and end-user (society) stakeholders, who can either influence or be influenced by the system. Each of these four groups within the Quadruple Helix

framework may encompass multiple individual stakeholders.

Case study

There are several reasons why it is important to identify the specific stakeholders involved in regional development programs. The key arguments are outlined below.

Firstly, identifying stakeholders is essential for ensuring effective collaboration between them. All parties that influence and are influenced by regional development can achieve efficient communication and make fact-based decisions through cooperation. Collaboration enhances resource efficiency. The Ministry of Environmental Protection and Regional Development of the Republic of Latvia emphasizes that the development of a sustainable regional strategy is only possible by involving stakeholders, as this ensures the creation of a comprehensive and effective strategy (Guidelines for the development of municipal sustainable development strategies, 2021).

Secondly, identifying stakeholders allows for the alignment of planned policy actions, ensuring the best possible outcome.

Thirdly, engaging all relevant stakeholders-especially civil society and local communities-enables an understanding of the situation 'on the ground' and ensures that the specific needs of a given area are considered. This alignment of local needs with sustainable development goals is crucial. A deep understanding of local needs, particularly in Latvia's eastern border region, can significantly impact the region's socio-economic development and contribute to improved physical security.

Fourthly, stakeholder involvement fosters social cohesion, ensuring that key actors, particularly civil society and industry, feel engaged in the decision-making process.

Fifthly, defining stakeholders and ensuring cooperation among them promotes regional innovation. One of the key stakeholders in this process is academia, which can support the development and transfer of innovations to the industry.

Stakeholder analysis is not widely applied in Latvia for various development programs, including regional development programs and different European Union fund programs. The most recent available information indicates that stakeholder participation (including representatives of municipalities, planning regions, ministries, and non-governmental organizations) was ensured during the development of the Regional Policy Guidelines for 2021–2027 (Cabinet of Ministers Order No. 587, November 26, 2019). Additionally, stakeholder analysis was conducted during the development of the Latvian Tourism Development Action Plan for 2021–2027 (Van der Steina et al., 2019). However, both documents were created in 2019.

One of the regional development programs available in Latvia for project submissions from October 19, 2022, to April 28, 2023, was the European Union

Recovery and Resilience Facility Plan’s Reform and Investment Direction 3.1 ‘Regional Policy’, specifically Investment 3.1.1.3.i ‘Investments in Business Public Infrastructure for the Development of Industrial Parks and Territories in the Regions’. This program focuses on the establishment of industrial parks and territories outside the Riga Planning Region. The goal of these recovery fund investments is to develop national-level industrial park infrastructure and attract investors to Latvia’s regions beyond the Riga Planning Region, fostering the creation of high-value-added and export-oriented jobs while reducing regional development disparities (Cabinet Regulation No. 543, 2022).

Within this program, five industrial parks are being developed across Latvia’s regions (in Daugavpils, Valmiera, Ventspils, Liepaja, and Jelgava) (Central Finance and Contracting Agency, 2022). The planned completion date for the parks is June 30, 2026, with non-financial investments of at least €85,741,349 and the creation of 328 jobs by industrial park operators (managers) or private investors (entrepreneurs). These jobs should offer salaries exceeding the average wage

in the respective economic sector (Cabinet Regulation No. 54, August 30, 2022).

Since the industrial parks are being developed exclusively outside Riga, this program serves as a suitable case study for assessing its potential impact on stakeholders involved in sustainable regional development.

According to the World Bank’s definition, an industrial park is a designated area with the necessary infrastructure (such as buildings, access roads, electricity connections, railway sidings, and other utilities) created to stimulate business activity and promote industrial development while minimizing its environmental impact (World Bank Group, 1998). Industrial parks play a crucial role in technology transfer, attracting investments, improving the business environment, creating new jobs, and optimizing costs. However, the development of such parks outside major urban agglomerations requires various forms of support at both national and regional levels. Not only appropriate legislation but also suitable political, social, and economic conditions are needed for their establishment and successful operation.

Table 1

Analysis of Stakeholders Involved in Latvian Regional Industrial Parks (Developed within the Support Program) Based on the Quadruple Helix Model (Created by the Author)

<i>The value of the Quadruple Helix model</i>	<i>Stakeholders</i>	<i>Typical behaviour</i>	<i>Expectations from collaboration</i>	<i>Benefits from collaboration</i>	<i>Challenges of collaboration</i>
Government	-Cabinet of Ministers -Local Government -Ministry of Smart Administration and Regional Development -Ministry of Economy -Latvian Investment and Development Agency -Planning Regions*	-Policy development, maintenance and implementation -Strong orientation towards engagement	-Solving economic, social, environmental and cultural problems -Development of innovations -Ensuring the adequacy of the state and regional budgets and stimulating income growth -Maintaining social stability in the region	-Better understanding of local communities and their needs -Slow decision-making process	-Slow decision-making process -Complex structure
Academia	-Vidzeme University of Applied Sciences and its research institutes -Ventspils University of Applied Sciences and its research institutes -RTU Liepaja Academy and its research institutes -Latvia University of Life Sciences and Technologies and its research institutes -Rezekne Academy of Technology and its research institutes	-Development of science and innovation -Publication and presentation of academic works -Knowledge transfer to industry -Strong orientation towards understanding	-Increasing importance of research and innovation -Innovation and knowledge transfer	-Collection and analysis of various socio-economic data -Wider use of research results	-Determination of research priorities

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Civil society	<ul style="list-style-type: none"> -Non-governmental organizations** -Residents (especially those living relatively close to the industrial area and potential workers) -Media (especially regional, including social) 	<ul style="list-style-type: none"> -Protection of civil rights -Protests, petitions, lobbying, founding and leading new non-governmental organizations -A strong orientation towards communication 	<ul style="list-style-type: none"> -Support for civic activities -Improvement of the business environment -Satisfaction of social interests in the region (e.g., healthcare, education, etc.) -Rational use of natural resources and environmental protection -Improved financial situation -Various needs (including intangible ones) are satisfied) -Respect for public interests 	<ul style="list-style-type: none"> -Improved living conditions in the regions -Various services are available in the regions 	<ul style="list-style-type: none"> -Lack of effective communication -Uncertainty of role
Industry	<ul style="list-style-type: none"> -Existing companies (especially those directly or indirectly related to the operation of potential industrial parks) -Potential companies (especially those directly or indirectly related to the operation of potential industrial parks) -Business organizations and their regional representative offices*** -Latvian Development Finance Institution Altum -Regional business support centres -Regional business associations -Regional business incubators -Business start-up, investments in the company, business management -Regional business incubators 	<ul style="list-style-type: none"> -Business start-up, investments in the company, business management -Knowledge transfer from the academy -Strong focus on results 	<ul style="list-style-type: none"> -Maintain continuous, profitable long-term operations -Stable and development-oriented business environment -Receive economic benefits from knowledge transfer 	<ul style="list-style-type: none"> -Improved reputation of the industry and/or companies -Regional brand awareness 	<ul style="list-style-type: none"> -Reluctance to participate

*Considering that the primary source of funding for planning regions is the state budget, planning regions (in the context of the case study – Kurzeme, Zemgale, Vidzeme, and Latgale) are included under the ‘government’ category in the Quadruple Helix model.

**The contribution of non-governmental organizations (NGOs) is not primarily measured from an economic perspective, but rather in terms of public benefit and sustainable development. In addition, NGOs can also include elements of economic activity and monetary investment (Spuriņš, 2024). NGOs carry out targeted activities to ensure the well-being of society. These organizations can identify and solve societal problems, strengthen communities, promote sustainable development and promote dialogue with other social actors (Putāne, 2024). As of 2023, a total of 26,928 associations and foundations were registered in Latvia. The number of organizations increases annually by approximately 3% or 600-700 new units (net difference between newly established and liquidated NGOs). In the regions of Latvia (excluding Riga and the Riga planning region), 13,765 NGOs were registered in 2023 (Klasons, 2024). There is no readily available information in public sources about NGOs in the regions directly or indirectly related to the case study area.

***The most active business organizations with regional representation are the Latvian Chamber of Commerce and Industry and the Latvian Employers’ Confederation.

In Poland, 73% of industrial parks are in border regions and are experiencing active development. The main tax incentives and regional aid mechanisms

support the establishment of industrial parks near the Ukrainian border, offering tax relief of up to 50% (Doing Business in Poland - Investor’s Guide, 2024).

This policy is likely influenced by Russia's full-scale invasion of Ukraine in 2022.

Although industrial parks are a vital part of the economy with significant development potential, there is no comprehensive data available in Latvia on the total area of established industrial parks across the regions.

It is essential to identify the stakeholders involved, considering both the benefits and challenges of cooperation. This helps bridge the gap between expectations and reality (Capello & Kroll, 2016). Based on an analysis of the available information and applying the Quadruple Helix model, the key stakeholders, expectations, benefits, and collaboration challenges related to regional industrial parks developed under the European Union Recovery and Resilience Facility's Investment 3.1.1.3.i 'Investments in Business Public Infrastructure for the Development of Industrial Parks and Territories in the Regions' have been identified (see Table 1).

To establish, manage, and maintain relationships among stakeholders within the Quadruple Helix model, proactive stakeholder dialogue and engagement are required (Labelle & Aka 2012). According to Greenwood (2007), the process of stakeholder engagement within the Quadruple Helix model is iterative (Greenwood, 2007). Idealism should be avoided (Flanagan & Uyarra 2016), while not diminishing stakeholder expectations (Filtenborg et al., 2017; Grimmelikhuijsen & Porumbescu, 2017; Nguyen & Marques, 2021). Considering the interests of stakeholders in sustainable regional development in regional development programs and the implementation of sustainable development principles is an important goal for regional transformation (Porini & Striani, 2017).

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Conclusions

1. Previous studies on the Quadruple Helix model have focused mainly on the macroeconomic level, despite the sustainability-related activities that take place at the micro level. Therefore, future studies should explore this micro-level perspective.

2. In the Quadruple Helix model, stakeholders play a crucial role in regional development, as they significantly influence economic, social, cultural and environmental impacts.

3. The Quadruple Helix approach is participatory and transparent, ensuring sustainable outcomes. However, the lack of a comprehensive policy regulating the roles and powers of stakeholders in regional development governance reduces stakeholder participation and interest.

4. It is important to define mechanisms for collaboration, identify problems, points of contact and conflicting paradigms. Optimizing the Quadruple Helix model for stakeholder engagement and governance can promote regional development. It may be necessary to expand the list of stakeholders.

5. This article enriches the existing literature by testing the stakeholder approach of the Quadruple Helix model for promoting sustainable regional development. It provides a detailed understanding of the characteristics of all four stakeholder groups.

6. The limited scale of the specific regional development program limits generalizability. However, the case study demonstrates the practical application of the Quadruple Helix model. Future research could explore the applicability of the analyzed program to other regional development forms and programs.

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