KYIV SCHOOL OF ECONOMICS
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Institutional Failures in the Functioning of Science Parks in Ukraine: Causes and Approaches to Their Mitigation

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Abstract

This study examines the role of science parks as institutional mechanisms that facilitate interaction among higher education institutions, businesses, and local authorities within the Triple Helix model. The analytical problem lies in the gap between the formal existence of innovation infrastructure in Ukraine and the actual absence of systematic interaction among key actors of the innovation system.

The aim of the study is to identify the causes of the inefficiency of science parks as institutional intermediaries and to determine the conditions under which they can effectively perform their functions, drawing on international experience. The central research question examines why science parks in Ukraine fail to ensure effective interaction among universities, businesses, and government.

Theoretically, the study is grounded in a combination of the Triple Helix model, the Regional Innovation Systems approach, and an institutional perspective, which allows interaction to be analyzed not only as a structural process but also as the result of incentives, rules, and actors' organizational capacity.

Methodologically, the research follows an exploratory design and employs a mixed-methods approach to data collection and analysis. The empirical basis includes a survey of 56 higher education and research institutions, a targeted analysis of 36 science parks, unstructured interviews with representatives of 34 educational institutions and 28 business entities, as well as a qualitative comparative analysis of case studies from universities in the United Kingdom. The analysis was conducted using descriptive, thematic, and comparative methods, as well as data triangulation.

The findings indicate a systematically low level of interaction among universities, science parks, businesses, and local authorities in Ukraine, manifested as episodic or entirely absent cooperation. Key factors include the lack of incentives for collaboration, the dominance of an academic orientation in higher education institutions, limited organizational capacity, asymmetry between business demand and university supply, and the absence of a coordinating role by local authorities. It is established that science parks, in most cases, do not perform their function as institutional intermediaries and operate largely as formal structures.

The study confirms that the mere existence of science parks is not a sufficient condition for interaction; rather, their functional capacity to perform a coordinating role is critical. At the same time, the inefficiency of science parks is shown to result from an institutional mismatch between the formal model of the innovation system and the actual structure of incentives, organizational capacity, and interaction among actors.

The results contribute to a deeper understanding of how innovation systems function in transition economies and provide an analytical basis for developing policies to improve the effectiveness of innovation infrastructure in Ukraine.

INTRODUCTION

In contemporary academic literature, innovation is no longer understood as the result of a linear process of knowledge transfer, but rather as an outcome of complex interactions among key institutional actors. Within the framework of the Triple Helix model, innovation emerges through the interaction of universities, business, and government *(Etzkowitz & Leydesdorff, 2000; Ranga & Etzkowitz, 2013),* while the Regional Innovation Systems approach emphasizes that the effectiveness of such interaction depends not only on the presence of actors but also on their integration within a specific territorial and institutional context *(Cooke et al., 1997; Tödtling & Trippl, 2005)*. In this context, science parks are conceptualized as institutional intermediaries designed to reduce transaction costs, facilitate coordination, and support the commercialization of knowledge *(Howells, 2006; Phan et al., 2005)*. At the same time, a significant portion of the literature remains normative, assuming that the mere establishment of such institutions automatically leads to effective interaction—an assumption that is not empirically supported, particularly in transition economies.

In the professional and policy context, this issue is especially relevant for Ukraine, where innovation policy, particularly within the framework of the WINWIN 2030 strategy, emphasizes developing innovation infrastructure and integrating universities into economic processes. However, the actual mechanisms enabling such integration remain weak. Empirical evidence indicates a systematically low level of interaction between science parks, business, and local authorities. This is consistent with OECD assessments, which highlight weak science–business linkages, low levels of R&D investment, and coordination challenges in public policy in Ukraine *(OECD, 2022)*. Thus, despite their formal existence, science parks fail to fulfill their role as institutional intermediaries within local innovation systems, indicating a deeper institutional failure - a mismatch between formal rules, incentive structures, and actual interaction practices.

Against this background, the analytical problem of this study lies not in the absence of institutions, but in their dysfunctionality as mechanisms for coordinating interactions among universities, businesses, and local authorities in the context of governance transformation and decentralization.

Accordingly, the study seeks to answer the following analytical question:

Why do science parks in Ukraine fail to facilitate effective interaction between universities, business, and local authorities?

To further specify the analysis, the following sub-questions are addressed:

- What institutional and financial incentives (or their absence) shape the behavior of science parks?
- What is the role of local authorities in the development of regional innovation systems, and why is this role not realized in practice?
- What organizational and competency-related constraints affect the ability of science parks to perform an intermediary function?

- Which elements of the UK institutional model (including incentive structures, funding mechanisms, and professional intermediation) can be adapted to the Ukrainian context?

Given the nature of the research question, the study adopts an exploratory research design.

This choice is motivated by the fact that the problem of interaction between science parks, local authorities, and business in the Ukrainian context remains underexplored in both national and international literature, particularly in light of decentralization processes and institutional transformation. The exploratory design enables the identification of key mechanisms, institutional constraints, and behavioral patterns that have not been previously formalized in theoretical models. Its main advantage lies in enabling an in-depth analysis of causal mechanisms in complex institutional systems, while its limitation is the inability to statistically verify hypotheses in a strict quantitative sense, which is compensated by the use of qualitative methods and case studies.

The structure of the study follows a logical progression from theoretical analysis to empirical research and the formulation of practical conclusions.

LITERATURE REVIEW

Academic Debate on Interaction in Innovation Systems

In contemporary academic literature, innovation is no longer understood as the outcome of a linear process of knowledge transfer, but rather as the result of complex interactions among key institutional actors. Within the framework of the Triple Helix model, innovation is explained as the outcome of intensive and institutionalized interaction between universities, business, and government *(Etzkowitz & Leydesdorff, 2000; Ranga & Etzkowitz, 2013).* In this perspective, the effectiveness of an innovation system depends directly on the ability of these actors to coordinate, exchange knowledge, and jointly develop innovative solutions.

Within the Triple Helix model framework, universities are viewed not only as generators of knowledge but also as active participants in economic processes, capable of performing entrepreneurial functions. *Henry Etzkowitz* emphasizes the transformation of universities into so-called *entrepreneurial universities*, which combine educational, research, and commercial activities. In this perspective, universities become not only sources of knowledge but also actors that actively shape innovation ecosystems through the creation of start-ups, partnerships with business, and engagement in regional development.

At the same time, *Loet Leydesdorff* highlights that interaction among the three actors is not merely organizational but systemic in nature. It is formed as a dynamic network of relationships in which roles are continuously reconfigured: the state may act as an innovator, business as a generator of knowledge, and universities as economic agents. Thus, the innovation system is understood as the result of nonlinear interaction processes rather than a simple aggregation of institutions.

Further development of this approach is presented in the work of *Saad Ranga and Henry Etzkowitz (Ranga & Etzkowitz, 2013)*, who offer a more structured interpretation of the Triple Helix as a system of interrelated functions: knowledge generation, economic exploitation, and regulation. They emphasize that the effectiveness of this system depends on the degree of institutionalization of interaction, that is, the existence of stable coordination mechanisms, trust, and mutual adaptation among actors. A key condition is not merely the formal existence of interaction, but its regularity, intensity, and orientation towards shared outcomes.

At the same time, even within the Triple Helix model, there are differing interpretations of the roles of the state and the market. In particular, *Henry Etzkowitz* conceptualizes the state (or local authorities) as an active coordinator of innovation processes, responsible for creating conditions for interaction between universities and business, supporting the development of innovation infrastructure, and acting as a catalyst for institutional change. In a similar vein, *Dani Rodrik* argues for the necessity of "smart" industrial policy, in which the state plays a central role in addressing coordination failures and stimulating innovation.

Conversely, other scholars emphasize the limitations of excessive state intervention and highlight the importance of horizontal linkages between universities and business. *Loet Leydesdorff*, in particular, stresses the self-organizing properties of innovation systems, where

interaction emerges from network dynamics rather than centralized control. Similar perspectives are developed in the innovation systems literature, which underscores the role of decentralized coordination mechanisms and network-based interaction *(Tödtling & Trippl, 2005).*

Thus, the literature reveals a theoretical tension between approaches that emphasize the role of the state as an active coordinator *(Etzkowitz & Leydesdorff, 2000; Rodrik, 2004)* and those that prioritize decentralized, network-based forms of interaction *(Etzkowitz & Leydesdorff, 2000; Tödtling & Trippl, 2005).* This tension is particularly relevant for transition economies, where elements of centralized governance coexist with underdeveloped horizontal linkages among key actors.

Further development of this debate occurs within the Regional Innovation Systems approach, which shifts the analytical focus from the national to the regional and local levels *(Cooke et al., 1997; Tödtling & Trippl, 2005).* Within this framework, the key factors are not merely the presence of actors but their territorial embeddedness, the quality of the institutional environment, and the intensity of interaction within specific regions. Accordingly, the weakness of innovation systems is explained not by the absence of institutions per se, but by their fragmentation, insufficient integration, and the lack of effective coordination mechanisms.

In this context, the Regional Innovation Systems approach assumes that innovation is generated within territorially bounded systems, where interaction among actors depends on the density of network linkages, the quality of institutions, and the availability of supporting infrastructure. As *Philip Cooke* emphasizes, an effective regional innovation system consists of two interrelated subsystems: the knowledge generation subsystem (universities and research institutions) and the knowledge exploitation subsystem (firms and innovative enterprises), which must be integrated through coordination and exchange mechanisms.

Further elaboration of this approach in the work of *Franz Tödtling and Michaela Trippl (Tödtling & Trippl, 2005)* demonstrates that weaknesses in innovation systems are often associated with various types of systemic failures. In particular, they identify *organizational thinness* (an insufficient number or weakness of key actors), *fragmentation* (a lack of linkages among them), and *lock-in* (institutional inertia and dependence on outdated development paths). In this perspective, the problem lies not only in the lack of resources, but in the system's inability to effectively combine and mobilize them.

A key element of the RIS approach is also the role of the institutional environment, which encompasses formal rules, informal norms, and practices of interaction. In this sense, the innovation system functions as an "institutionally embedded network", where the behavior of actors is shaped not only by their resources but also by the structure of incentives, the level of trust, and the availability of coordination mechanisms. As *David Doloreux and Saeed Parto (Doloreux & Parto, 2005)* argue, the effectiveness of such systems depends not only on the support provided to innovation activities, but also on the ability of institutions to align the interests of different actors.

An important aspect of the Regional Innovation Systems approach is its emphasis on the role of public authorities at the regional level. Public authorities are viewed not only as regulators but also as active participants in the innovation system, responsible for creating conditions for interaction, supporting infrastructure, and shaping policies to foster innovation. At the same time, the literature highlights that the absence of effective coordination at the regional level can lead to situations in which, even with individual institutions, the innovation system remains dysfunctional.

Thus, the Regional Innovation Systems approach enables the shift from viewing interaction as an isolated process to analyzing it as a systemic phenomenon, dependent on the integration of actors, the quality of the institutional environment, and the availability of effective coordination mechanisms. This provides an analytical basis for explaining situations in which institutions formally exist but fail to generate actual interaction, a pattern that is characteristic of many transition economies.

At the same time, the literature offers various explanations for ineffective interaction. A number of studies adopt a structural perspective, emphasizing the role of institutional architecture and the quality of formal rules. Within this approach, key issues include institutional design, the coherence of governance frameworks, and the role of the state as a coordinator *(Evans, 1995; Rodrik, 2004)*. Other studies focus on behavioral and market-based factors, particularly the asymmetry between business demand and university supply, as well as the limited capacity of actors to adapt and engage in interaction.

Within both perspectives, a distinct strand of the literature focuses on the role of intermediary institutions that are expected to facilitate coordination among actors in innovation systems. Such institutions, including science parks, are conceptualized as mechanisms for reducing information asymmetries, transaction costs, and organizational barriers *(Howells, 2006)*. Empirical studies suggest that science parks can contribute to knowledge commercialization, entrepreneurial development, and business engagement in collaboration with universities (*Phan et al., 2005; Link & Scott, 2007).* In this context, they are interpreted as key elements of innovation infrastructure, capable of acting as "translators" between the different logics of actors.

However, a significant part of this literature remains strongly normative, assuming that the establishment of such institutional forms automatically leads to effective interaction. This perspective insufficiently accounts for institutional constraints, incentive structures, and the actual behavioral practices of organizations. As a result, empirical evidence demonstrates substantial variation in the performance of science parks, ranging from highly successful innovation clusters to formally established but functionally ineffective structures.

In response, a critical strand of the literature conceptualizes interaction as the outcome of overcoming coordination failures and collective action problems. From this perspective, the effectiveness of innovation systems depends less on the mere existence of institutions than on their capacity to align actors' interests and create incentives for interaction *(Tödtling & Trippl,*

2005; Doloreux & Parto, 2005). The institutional approach, as developed by *Douglass North (North, 1990),* provides a framework for understanding these processes through the lens of formal and informal rules that shape organizational behavior, as well as the incentive structures that influence decision-making.

From this perspective, the weakness of interaction can be interpreted as a manifestation of failures in the innovation system, encompassing institutional, network, and coordination dysfunctions. In particular, the absence of aligned incentives among universities, businesses, and government leads to situations in which, even when potential demand exists, interaction does not occur. Thus, the problem lies not merely in a "lack of demand", but in the inability of institutions to enable its realization.

Particular attention in the literature is devoted to the role of the state and regional governance. Within the Regional Innovation Systems approach, public authorities are viewed as key actors capable of shaping the environment for interaction, ensuring coordination, and supporting the development of innovation infrastructure. At the same time, research shows that ineffective or overly centralized governance models may not only fail to facilitate interaction but may also actively constrain its development.

Despite extensive theoretical development of approaches to interaction within innovation systems, the existing literature does not adequately explain why, in certain institutional contexts, the presence of innovation infrastructure and potential demand from business does not translate into actual or sustained interaction among key actors. In particular, the mechanisms by which institutional constraints, incentive structures, and actors' limited capacity affect the functioning of intermediary institutions, such as science parks, remain insufficiently explored.

This gap is especially relevant in transition economies, including Ukraine, where the formal establishment of innovation infrastructure coexists with centralized funding models, a weak role of regional governance, and limited institutional capacity of key actors. Addressing this gap, specifically, the disconnect between the formal presence of institutions, potential demand, and the actual absence of systemic interaction, constitutes the analytical foundation of this study.

Relevance of the Study

The issue of effective interaction between universities, business, and government extends beyond purely academic debate and has direct implications for economic development, labor market transformation, and the formation of an innovation-driven economy. In contemporary economic theory, innovation is regarded as a key driver of long-term growth, while the ability of an economy to generate and commercialize knowledge determines its competitiveness *(Foray, 2015).* In this context, the effectiveness of innovation systems depends not only on the volume of funding or the presence of research institutions, but primarily on the quality of interaction among them.

At the level of public policy, this is reflected in the shift from linear models of innovation towards systemic approaches that emphasize coordination and interaction among actors. In particular, the OECD highlights that the key challenge of innovation policy lies not in a lack of resources but in insufficient coordination among science, business, and government, which leads to the fragmentation of innovation systems *(OECD, 2011).* Similarly, the concept of *smart specialization* underscores that regional development is only possible through the active involvement of local actors and the formation of local networks of interaction *(Foray, 2015).*

In the European context, this logic is reflected in the increasing role of regions and local authorities in shaping innovation policy. The experience of the United Kingdom demonstrates that effective innovation systems are based on a combination of central funding and active engagement of local authorities, which act not only as regulators but also as co-investors and coordinators of innovation activity. A significant share of interaction between universities and business occurs at the local level, underscoring the importance of the territorial dimension in the functioning of innovation systems.

At the same time, in transition economies, including Ukraine, there is a clear gap between the declared approaches to the development of innovation and their practical implementation.

On the one hand, public policy envisages the development of innovation infrastructure, the integration of universities into the economy, and the promotion of collaboration with business, as reflected in the Digital Transformation Strategy for Innovation Development until 2030 *(WINWIN, 2030).* On the other hand, international assessments point to systemic challenges, including weak linkages between science and business, low levels of research commercialization, and the limited role of the regional level in shaping innovation policy *(OECD, 2022; World Bank, 2019).*

This problem becomes particularly significant in the context of decentralization, which formally expands the powers of local self-government bodies but is not accompanied by the creation of effective mechanisms to involve them in innovation activities. As a result, local authorities remain largely excluded from innovation processes, while universities continue to rely on centralized funding sources, thereby limiting their integration into local economies.

Thus, the societal relevance of this study lies in the need to explain the causes of ineffective interaction among key actors of the innovation system and to identify the conditions under which institutional mechanisms—particularly science parks—can effectively perform their intermediary role. Addressing this problem is critical for enabling Ukraine to move from the formal establishment of innovation infrastructure to its actual functioning as a driver of economic development at both the local and national levels.

As demonstrated by the analysis of academic literature, existing theoretical approaches, including the Triple Helix model and the Regional Innovation Systems framework, convincingly highlight the importance of interaction among universities, businesses, and government as a key factor in innovation-driven development. However, most studies either focus on successful cases

or adopt a normative perspective, assuming that the creation of institutional infrastructure automatically leads to effective interaction. Considerably less attention is paid to analyzing why such institutions fail to perform their functions in specific institutional contexts, particularly in transition economies characterized by hybrid governance models.

In this context, a research gap emerges regarding the insufficient understanding of how institutional conditions, incentive structures, and actors' organizational capacities influence the ability of innovation infrastructure to generate genuine interaction among universities, businesses, and local authorities. In particular, there is a lack of systemic studies that integrate the analysis of intermediary institutions with the impact of decentralization processes on the functioning of local innovation systems.

Accordingly, this study aims to address the following analytical problem: explaining the causes of the ineffectiveness of science parks as institutional intermediaries in facilitating interaction between local authorities and businesses in Ukraine, and identifying the conditions under which they can function effectively.

In line with this objective, the main research question of the study is formulated as follows:

Why do science parks in Ukraine fail to facilitate effective interaction between universities, business, and local authorities, and what institutional model could ensure their effective functioning?

To address this question, the study is based on the assumption that the ineffectiveness of science parks is not due to their formal absence, but rather to a mismatch between the institutional environment, incentive structures, and organizational capacities, and the requirements for effective interaction within local innovation systems.

For the purposes of this research, the inefficiency of science parks in Ukraine is considered an empirically established fact, grounded in prior studies in the field *(Napolskykh, Kykot, Moskalenko, 2025).*

ANALYTICAL FRAMEWORK

Conceptualisation

Interaction in Innovation Systems

Within the Triple Helix model, interaction among universities, business, and government is regarded as a key mechanism for generating innovation *(Etzkowitz & Leydesdorff, 2000; Ranga & Etzkowitz, 2013)*. In this context, interaction is typically interpreted as a process of exchange of knowledge, resources, and competences among actors. Within the Regional Innovation Systems approach, this concept is further extended by incorporating a territorial dimension, emphasizing the existence of stable horizontal linkages within regional economies *(Cooke et al., 1997)*.

At the same time, a significant portion of the literature employs this concept in a broad, descriptive manner, without distinguishing among formal contacts, episodic cooperation, and institutionalized interaction. As a result, analytical ambiguity arises regarding which forms of interaction are relevant for assessing the effectiveness of innovation systems.

Within this study, interaction is defined as an institutionalized, regular, and mutually beneficial process of collaboration among actors that leads to the creation of applied economic value or innovation. This definition makes it possible to distinguish formal or declarative cooperation from the actual integration of universities into economic processes.

Institutional Intermediaries (Science Parks)

In the literature, institutions that facilitate interaction among actors are often described as intermediaries, which reduce transaction costs, overcome information asymmetries, and support coordination *(Howells, 2006)*. In this context, science parks are conceptualized as organizational structures designed to enable knowledge transfer, support innovation, and foster collaboration between universities and business *(Phan et al., 2005; Link & Scott, 2007)*.

However, empirical studies demonstrate significant variation in the functioning of such institutions, ranging from highly effective innovation clusters to formally existing structures with little or no real economic activity. This suggests that the mere presence of an institution does not guarantee the performance of its intermediary function.

In this study, science parks are defined as institutional intermediaries only insofar as they perform a coordination function and ensure sustained interaction among universities, businesses, and government. Otherwise, they are treated as formal organizational structures lacking substantive functional capacity. This approach allows for a shift from a formal analysis of institutions to an assessment of their actual role within the innovation system.

Institutional Environment and Incentive Structures

The classical institutional approach defines institutions as the "rules of the game" that shape the behavior of actors through systems of incentives and constraints *(North, 1990)*. In the context of innovation systems, this implies that interaction between universities, business, and government is determined not only by their interests but also by funding structures, regulatory conditions, and governance practices.

Research on innovation policy highlights that ineffective interaction is often associated with misaligned incentives, for example, when universities are oriented towards centralized funding rather than collaboration with business, or when local authorities lack the instruments to participate in innovation processes *(Rodrik, 2004; OECD, 2011).*

Within this study, the institutional environment is defined as the combination of formal rules, financial incentives, and organizational practices that shape both the opportunities and the motivation of actors to engage in interaction. This perspective helps explain why, even in the presence of formal institutions, interaction may fail to emerge or remain purely formal.

Thus, conceptualizing key concepts enables a shift from a descriptive analysis of innovation infrastructure to an explanation of the mechanisms that underlie its functioning. Within this study, science parks are treated not as a given, but as a variable whose effectiveness depends on the quality of the institutional environment and their capacity to facilitate real interaction among actors.

Theoretical framework

The theoretical framework of this study integrates the Triple Helix model and the Regional Innovation Systems approaches with institutional theory. Its purpose is to explain why science parks, in certain institutional contexts, fail to fulfill their intermediary function despite their formal presence, and under what conditions this function can be effectively realized.

In contrast to the normative perspective that dominates much of the literature, assuming that interaction among universities, business, and government naturally emerges from the establishment of relevant institutions *(Etzkowitz & Leydesdorff, 2000)*. This study assumes that interaction results from a specific configuration of the institutional environment, incentive structures, and actors' organizational capacities. This approach aligns with critical strands in innovation systems research, which emphasize the role of institutional constraints and coordination failures *(Tödtling & Trippl, 2005; Doloreux & Parto, 2005).*

General Logic of Causal Relationships

In this study, the effectiveness of science parks as institutional intermediaries (dependent variable) is assumed to be determined by three groups of factors (independent variables):

1. Institutional environment (rules, funding structures, role of the state);
2. Incentive structures of actors (orientation of universities, motivation of business, role of local authorities);

3. Organizational and competency capacity (availability of professional intermediaries, governance, and management structures).

These factors influence the ability of science parks to facilitate interaction by creating, or failing to create, conditions for coordination among actors.

Accordingly, the overall logic of the study can be represented as:

institutional environment → incentive structures → actor behaviour → level of interaction → effectiveness of science parks

Mechanism of Institutional Influence

In line with institutional theory, institutions shape the behavior of actors through systems of incentives and constraints *(North, 1990)*. In the context of innovation systems, this implies that:

- Centralized funding of universities reduces their incentives to collaborate with business;
- The absence of financial instruments at the local level limits the participation of local self-government bodies.
- Regulatory barriers increase the transaction costs of interaction.

As a result, a situation emerges in which formally existing institutions (including science parks) lack sufficient incentives to perform their intended functions.

The Role of Institutional Intermediaries

Within innovation theory, intermediaries perform a coordination function by reducing information asymmetries and facilitating interaction among actors *(Howells, 2006)*. However, the effectiveness of such institutions depends on their ability to act as active coordinators rather than merely formal structures.

Empirical studies show that when intermediaries lack the necessary resources, authority, or competencies, they fail to perform their function, leading to fragmentation of innovation systems *(Phan et al., 2005)*.

Thus, this study is based on the following assumption:

H1. The mere presence of science parks is not a sufficient condition for the emergence of interaction; their functional role as active institutional intermediaries that coordinate interaction among universities, business, and government is critical.

Territorial Dimension and the Role of Local Authorities

Within the Regional Innovation Systems approach, innovation is understood as a territorially embedded process whose effectiveness depends on the quality of local interaction networks *(Cooke et al., 1997)*.

In this context, local self-government bodies play a key role as:

- coordinators of local economic processes**;**

- co-investors in innovation projects**;**
- institutions that generate demand for innovation**.**

The absence of their active involvement leads to a disconnect between universities and local economies, thereby limiting opportunities for the commercialization of knowledge.

Distinctive Approach of the Study

Unlike classical approaches that focus on describing institutions or measuring their effectiveness, this study adopts an interpretative perspective to explain mechanisms of interaction. It does not assume the existence of universal models but instead analyzes how specific institutional conditions shape actors' behavior and determine the outcomes of their interactions.

Thus, the key assumption of the study is as follows:

H2. The ineffectiveness of science parks results from an institutional mismatch between the formal model of the innovation system and the actual structure of incentives and interactions among actors.

Evolution of Research Hypotheses

At the initial stage of the study, based on the literature review and the conceptualization of key concepts, six hypotheses were formulated, reflecting distinct aspects of interaction between higher education institutions, business, and local self-government bodies.

The initial hypotheses were formulated as follows:

H1 (Level of interaction). Interaction between higher education institutions, business, and local self-government bodies in Ukraine is limited and largely non-systematic.

H2 (Institutional environment and incentives). The ineffectiveness of interaction is driven by a mismatch in the institutional environment, particularly the absence of incentives for cooperation among universities, business, and local authorities.

H3 (Functionality of science parks). The presence of science parks as institutional intermediaries does not ensure interaction between actors in the absence of their actual functional capacity to perform a coordination role.

H4 (Demand–supply asymmetry). There is an asymmetry between business demand for collaboration and the capacity of higher education institutions to meet it, manifested in a gap between perceived demand and actual readiness for interaction.

H5 (Role of local authorities). The lack of active participation by local self-government bodies as coordinators and co-investors hinders the development of effective interaction within regional innovation systems.

H6 (General assumption). The ineffectiveness of science parks results from an institutional mismatch between the formal model of the innovation system and the actual structure of incentives, organizational capacity, and actor interactions.

This detailed formulation of hypotheses made it possible to systematically cover the key elements of the research problem and to ensure their empirical examination through multiple data sources (survey, interviews, and analysis of science parks).

At the same time, during the analysis of results, particularly at the stage of data triangulation, it was established that the individual hypotheses are not independent, but rather reflect interrelated components of a single causal mechanism.

In particular:

- Hypotheses H2, H4, and H5 represent different manifestations of a broader problem of the institutional environment (incentive structures, the role of government, and market interaction);
- Hypotheses H1 and H3 capture the same empirical phenomenon, namely, the low level of interaction as a consequence of the dysfunction of intermediary institutions;
- Hypothesis H6 effectively synthesizes the preceding hypotheses and is explanatory in character.

Accordingly, in the subsequent analysis, the initial hypotheses were consolidated into two key assumptions corresponding to different levels of the study—empirical and explanatory.

The final (aggregated) hypotheses are formulated as follows:

H1 (Functional role of institutions). The mere presence of science parks is not a sufficient condition for the emergence of interaction; their functional role as active institutional intermediaries that coordinate interaction among universities, business, and government is critical.

H2 (Institutional mismatch). The ineffectiveness of science parks results from an institutional mismatch between the formal model of the innovation system and the actual structure of incentives, organizational capacity, and actor interactions.

Thus, the transition from six to two hypotheses reflects a shift from a descriptive, operationalized analysis to a more general explanatory framework for the phenomenon under study. This approach is consistent with the interpretative research design, within which hypotheses perform not only a testing function but also an explanatory one, enabling a coherent interpretation of the empirical findings.

RESEARCH METHODOLOGY

Strengths and Limitations of the Methodological Approach

The qualitative approach combined with an exploratory research design adopted in this study is well-suited to addressing the analytical question, which focuses not on testing statistical relationships but on explaining the causal mechanisms underlying the ineffectiveness of interaction among actors within the innovation system. This approach is justified given the complexity of the phenomenon under investigation, which is institutional, behavioral, and context-dependent in nature and cannot be fully reduced to quantitative indicators.

A key strength of the selected methodology lies in its ability to provide an in-depth analysis of institutional conditions, incentive structures, and actual interaction practices, thereby revealing mechanisms that often go overlooked in quantitative research. In particular, the use of qualitative interviews and thematic analysis allows for an examination of how actors themselves interpret their role within the innovation system, what barriers they identify, and how these factors influence their behavior.

At the same time, the chosen approach has several limitations.

First, the results cannot be statistically generalized to the entire population, as the sample is partially purposive and shaped by the availability and engagement of institutions.

Second, the use of qualitative methods entails a degree of researcher interpretation, which may affect the objectivity of conclusions.

Third, a significant portion of the data is based on self-reported assessments by respondents, which may introduce risks of subjectivity or socially desirable responses.

In light of these limitations, the study adopts a balanced approach that combines the depth of qualitative analysis with quantitative data to support the identified patterns. The primary focus is on analyzing institutional mechanisms and behavioral patterns, while quantitative data serve as a complementary tool to illustrate the scale of the problem and verify the consistency of the findings. This approach ensures sufficient analytical robustness without compromising the depth of interpretation of the phenomenon under study.

Operationalization of Key Variables

Within this study, the operationalization is based on the conceptualization of key constructs, interaction, institutional intermediaries, and the institutional environment. Given the qualitative research design, variables are measured through a combination of qualitative and mixed (qualitative–quantitative) indicators, allowing for the identification of both the presence or absence of specific characteristics and their substantive meaning.

Dependent Variable: Level of Interaction between Universities, Business, and Local Authorities

This variable reflects the actual capacity of science parks to perform their function as institutional intermediaries.

Indicators:

- presence of collaboration with business (yes/no);
- presence of collaboration with local self-government bodies (yes/no);
- nature of interaction (episodic / project-based / systemic);
- number of implemented joint projects;
- presence of regular interaction mechanisms (agreements, platforms, joint initiatives).

Types of data:

- categorical (presence/absence);
- ordinal (level of interaction intensity);
- numerical (number of projects);
- qualitative (descriptions of interaction from interviews).

Independent Variable 1: Institutional Environment

This variable reflects the set of formal rules, financial mechanisms, and the state's role in shaping the conditions for interaction.

Indicators:

- funding model of universities (centralised / mixed / project-based);
- availability of innovation funding instruments at the local level;
- level of regulatory barriers (based on respondents' assessments);
- degree of autonomy in the use of university revenues;
- presence of local innovation programs or strategies.

Types of data:

- categorical (type of model);
- ordinal (assessment of barriers: low/medium / high);
- qualitative (interpretation of institutional constraints in interviews);
- documentary (analysis of regulatory and policy documents).

Independent Variable 2: Incentive Structures of Actors

This variable reflects the motivation of key actors to engage in interaction.

Indicators:

- share of university revenues derived from applied or commercial activities;
- orientation of science parks' activities (declarative / market-oriented);
- business interest in collaboration (based on respondents' assessments);
- participation of local authorities in financing or initiating projects;
- presence of economic incentives (tax incentives, grants, co-financing mechanisms).

Types of data:

- numerical (share of revenues);
- categorical (type of orientation);
- ordinal (level of interest);
- qualitative (motivations and barriers identified in interviews).

Independent Variable 3: Organizational and Competency Capacity

This variable reflects the ability of institutions to perform the intermediary function.

Indicators:

- presence of specialised units or teams responsible for interaction;
- background of personnel (academic / business / mixed);
- presence of prior experience in collaboration with business;
- conduct of market and needs analysis;
- presence of strategies for developing collaboration.

Types of data:

- categorical (presence/absence);
- nominal (type of personnel background);
- ordinal (level of capacity);
- qualitative (descriptions of competencies and practices in interviews).

The proposed operationalization enables the transition from abstract concepts to measurable characteristics and ensures the possibility of a systematic analysis of the causes of ineffective interaction. The combination of qualitative and mixed indicators is consistent with the exploratory research design and allows for capturing the complex and multidimensional nature of the phenomenon under study.

Target Population of the Study

The study's target population is defined in accordance with its analytical focus on the functioning of science parks as institutional intermediaries within local innovation systems. Accordingly, the population includes institutions and actors involved in interaction processes between universities, business, and public authorities.

Formally, on the date of surveys, the total number of higher educational establishments registered in State Registries was 512, and 44 of them formally had registered Science Parks.

In the national context (Ukraine), the target population comprises:

- higher education institutions and research organizations engaged in research and development activities;
- science parks as independent organizational entities or as units within universities;
- business entities that potentially act as clients for scientific and technological services;
- state authorities and local self-government bodies involved in the formation and implementation of innovation policy.

Given the selected research design, the primary empirical focus is placed on a subset of this target population—namely, higher education institutions and research organizations that operate science parks or have the potential to establish them. This choice is justified because these institutions serve as key carriers of the intermediary function within the Triple Helix model.

In the comparative component of the study (United Kingdom), the target population comprises universities with well-developed mechanisms for interaction with business, such as science parks, technology transfer offices, and other institutional forms of intermediation. This allows UK cases to serve as a reference model for the functioning of innovation infrastructure within the Regional Innovation Systems framework.

Thus, the study's target population encompasses key institutional actors and enables analysis of interaction mechanisms within innovation systems.

Sampling Strategy

The sample was constructed in accordance with an exploratory research design and a qualitative approach, and is purposive in nature. The main selection criterion was the inclusion of institutions that directly participate in, or have the potential to participate in, interactions among universities, businesses, and public authorities, as well as those with experience operating within the innovation infrastructure.

Within the mixed (quantitative–qualitative) component of the study, the sample includes higher education institutions and research organizations in Ukraine engaged in research and development activities. In total, 56 valid survey responses were obtained, covering active institutions with varying levels of engagement in innovation activities.

In addition, a separate subsample was formed for the in-depth analysis of science parks: 36 institutions with science parks were examined, allowing the study to focus specifically on organizations that formally perform an intermediary function.

The qualitative component of the sample was derived from unstructured interviews. It includes 34 higher education institutions and research organizations selected according to sectoral criteria (technical, natural sciences, medical, and other fields), thereby capturing the specificities of different segments of innovation activity. The sample is purposive and primarily includes institutions with relatively high activity levels, ensuring representativeness of the active segment of the system.

The comparative component (United Kingdom) comprises a sample of five universities with well-developed mechanisms for interaction with business and local authorities. The selection was based on the presence of institutional forms of intermediation (science parks, technology transfer offices, innovation hubs) and confirmed experience of collaboration with the private sector. This approach allows these cases to be treated as examples of effective models within the Triple Helix and Regional Innovation Systems frameworks.

Overall, the sample has a combined structure and includes quantitative and qualitative data, purposive interviews, and comparative case studies. This structure ensures sufficient analytical depth while maintaining the capacity for analytical generalization within the scope of the research question.

Sampling Limitations

At the same time, it is important to acknowledge that the study sample has several limitations in its composition. First, participation in both the survey and interviews was voluntary, which introduces a risk of self-selection bias. This implies that the sample is more likely to include institutions that are already more active or interested in innovation activities and interaction, while less active or passive actors within the system may be underrepresented.

On the one hand, this characteristic of the sample limits the possibility of generalising the findings to the entire population of higher education institutions and research organisations. On the other hand, it is consistent with the logic of the exploratory research design, as it allows the study to focus on institutions that have practical experience of interaction or are actively attempting to develop it. This, in turn, provides a deeper understanding of the mechanisms and barriers that arise even within the relatively active segment of the system.

Thus, the findings should be interpreted not as statistically representative of the entire system, but as analytically generalised insights into the functioning of its most active segment.

Data Collection and Analysis Procedures

Survey of Higher Education Institutions and Research Organizations

The first stage of data collection involved conducting a survey among higher education institutions and research organizations in Ukraine. The questionnaire was designed based on the conceptualized variables and included both closed-ended and semi-structured questions.

The data collection procedure included:

- distribution of the questionnaire among the target group of institutions;
- self-completion by respondents in a standardized format;
- verification of responses for completeness and consistency.

A total of 56 (aproxomately 11 % of the target population) valid responses were obtained. The survey data were used for the initial identification of interaction patterns, assessment of the presence of collaboration with business and local self-government bodies, and for te quantitative illustration of the scale of the problem.

Targeted Analysis of Science Parks

A separate component of data collection involved the analysis of 36 institutions (approximately 80% of the target population) that operate science parks. This stage made it possible to focus specifically on institutions that formally perform an intermediary function.

Data collection was conducted through:

- analysis of information on the activities of science parks;
- collection of data on their interaction with business and local authorities;
- aggregation of responses across key indicators (interaction, projects, collaboration).

This data block was used for an in-depth analysis of the effectiveness of institutional intermediaries.

Unstructured Interviews with Higher Education Institutions, Research Organizations, Business, and Local Authorities

The second stage of the study involved conducting unstructured interviews with representatives of 34 higher education institutions and research organizations in 2025, as well as with 28 business entities that had prior experience of collaboration with universities.

The procedure included:

- selection of respondents based on sectoral criteria (for higher education institutions and research organizations) and practical experience of interaction (for business entities);
- conducting interviews in an open-ended conversational format;
- identification and documentation of key themes and respondent perspectives;
- subsequent coding and systematization of the collected responses.

The inclusion of business representatives enabled the analysis of institutional interaction from the supply side (universities) to be complemented by the demand perspective, which is critical for assessing the effectiveness of innovation infrastructure. This allowed for a comparison of expectations and barriers from both sides and enabled the identification of gaps between potential and actual interaction.

The unstructured interview format made it possible to capture not only formal characteristics of interaction but also the underlying reasons for its absence, including institutional barriers, lack of incentives, asymmetry of expectations between universities and business, and a lack of clarity regarding the roles of key actors.

At the same time, the study identified a limitation related to the participation of local self-government bodies. Based on the analysis of the issue and communication with representatives of local authorities, it was established that their functional role in the field of education is primarily focused on the management of and interaction with municipal educational institutions, particularly vocational education institutions and, in a limited number of large cities, certain municipal higher education institutions.

At the same time, within the organizational structure of local self-government bodies, there are no dedicated structural or functional units responsible for developing and implementing innovation policy or for ensuring systematic interaction with higher education institutions, research organizations, and science parks. This limits the possibility of fully including the local level as an equal actor in the interaction, while also confirming the findings regarding the weak role of local authorities in the development of the innovation ecosystem.

Case Study (United Kingdom)

As part of the study, a case study analysis was conducted using case studies of five universities in the United Kingdom.

Data collection was carried out through:

- interviews with universitie representatives and expert consultations;
- examination of practices for interaction with businesses and local authorities.

This component made it possible to identify effective institutional models and use them as reference points for the Ukrainian context.

Data Analysis Methods

Data analysis was conducted using the following methods:

- **thematic analysis** — for processing interview data and identifying key patterns *(Braun & Clarke, 2006);*
- **case studies** — for contrasting the Ukrainian and UK contexts;
- **descriptive analysis** — for summarising survey results;
- **data triangulation** — for cross-validating findings from different data sources.

The analysis was carried out through a step-by-step process of data aggregation, categorization according to the conceptualized variables, and interpretation in light of the study's theoretical framework.

The proposed data collection and analysis procedures enable a comprehensive examination of institutional mechanisms of interaction, combining the depth of qualitative analysis with the validation of findings through quantitative data.

RESULTS

Data Collection Process and Obtained Data

Data collection in the study was conducted in several stages using a combined approach that included a survey, a targeted analysis of science parks, unstructured interviews, and a comparative analysis of university case studies in the United Kingdom.

At the first stage (November–December 2024), a survey was conducted among higher education institutions and research organizations in Ukraine. The questionnaire was distributed to the target group of institutions through direct communication channels. As a result, 56 valid responses were obtained and verified for completeness and internal consistency. Given the voluntary nature of participation, the exact response rate cannot be determined; however, the sample obtained includes active institutions with potential or actual experience of interaction and is therefore relevant to analyzing the research problem.

At the second stage (August 2025), a targeted analysis of 36 institutions operating science parks was conducted. Data were collected by analyzing publicly available information on their activities and aggregating data on their interactions with business and local self-government bodies. This made it possible to obtain structured information on the functioning of institutions that formally perform an intermediary role.

At the third stage (September 2025), unstructured interviews were conducted with representatives of 34 higher education institutions and research organizations, as well as with 28 business entities with experience collaborating with universities. Interview data were collected through open-ended conversations, followed by documentation of key themes and positions. In

addition, communication was held with representatives of local self-government bodies to clarify their role in interaction processes.

The qualitative data obtained complemented the quantitative survey results, enabling analysis not only of formal indicators of interaction but also of the underlying causes of its absence.

At the fourth stage, data were collected for comparative analysis, including case studies of five universities in the United Kingdom. The sources of information included interviews, expert consultations, and publicly available university materials.

Overall, a comprehensive dataset was compiled that combined quantitative indicators of interaction, structured data on the functioning of science parks, and qualitative insights into the causal mechanisms of interaction.

Application of Data Analysis Methods

Data analysis in this study was conducted in a stepwise manner, taking into account the different nature of the collected data (quantitative and qualitative), and involved their sequential processing, aggregation, and comparison.

Processing of Survey Data

At the first stage of analysis, survey data (N = 56) were processed. The raw data were structured through coding of responses according to the questionnaire options. For each question, separate variables were constructed to capture:

- presence/absence of interaction;
- type of interaction;
- presence of incentives;
- orientation of activities;
- existence of market analysis;
- barriers to interaction.

Further processing included:

- calculation of absolute values (number of responses);
- calculation of relative indicators (share of total respondents);
- construction of summary tables for each block of questions;
- verification of logical consistency of responses (e.g., consistency between the presence of interaction and its characteristics).

For multiple-choice questions (e.g., barriers), responses were aggregated separately, allowing respondents to be included in multiple categories.

Analysis of Science Park Data

The analysis of data on 36 (of 44 registered in Ukraine) institutions operating science parks was conducted by constructing a set of indicators analogous to those used in the survey, including:

- presence of interaction with business;

- number of implemented projects;
- interaction with local authorities;
- performance of the intermediary function;
- level of activity;
- availability of resources and incentives.

The collected data were standardised and transformed into a comparable format, after which the following steps were undertaken:

- classification of institutions by level of activity;
- aggregation of indicators in the form of frequency distributions;
- comparison with survey data to assess the consistency of findings.

Analysis of Unstructured Interviews

Qualitative interview data were analyzed using thematic analysis.

The procedure included:

Familiarisation with the data:

- review and summarisation of recorded responses;
- identification of key content segments.

Coding:

- assignment of thematic codes to responses (e.g., “lack of demand”, “institutional rigidity”, “formal nature of institutions”, “absence of incentives”);
- grouping of codes based on recurring patterns.

Categorisation:

aggregation of codes into broader analytical categories:

- enabling factors;
- barriers;
- organisational capacity;
- coordination mechanisms;
- role of institutions.

Comparative analysis:

- comparison of responses from higher education institutions and business representatives;
- identification of asymmetries in perceptions of demand, roles, and barriers.
- Interpretation:
- synthesis of recurring patterns;
- formulation of conclusions regarding causal relationships.

Case Stadies (United Kingdom)

The case studies were conducted through interviews with the representatives of universities in the United Kingdom.

The procedure included:

- identification of key characteristics of the UK model (institutional integration, role of intermediaries, incentive structures);
- identification of systemic differences.

Data Triangulation

At the final stage, data triangulation was conducted by comparing results obtained from multiple sources:

- survey data (quantitative);
- science park analysis (structured institutional data);
- interviews (qualitative data);
- comparative analysis (external reference context).

This made it possible to:

- verify the consistency of results;
- confirm the recurrence of key findings;
- increase the reliability of data interpretation.

Analytical Presentation of Results

Survey Results of Higher Education Institutions (N = 56)

The survey results indicate a consistently low level of interaction among higher education institutions, businesses, and local self-government bodies.

In the area of interaction with business, only 9 of 56 institutions (16%) engage in cooperation with the private sector. At the same time, even in these cases, interaction is predominantly episodic (89%), indicating the absence of institutionalised mechanisms of cooperation. Systematic interaction as an established practice is virtually non-existent.

A similar pattern is observed in interaction with local self-government bodies: only 5 institutions (9%) report such experience. Moreover, systemic interaction involving universities, business, and government simultaneously has been identified in only one case (≈2%), indicating the effective absence of the Triple Helix model in practice.

The analysis of the incentive structure shows that 89% of respondents report a lack of incentives, while only one institution (≈2%) confirmed the existence of financial motivation for cooperation with business. This points to a structural misalignment between the existing institutional environment and the objectives of innovation development.

Additionally, 95% of institutions remain oriented towards academic activities, indicating a lack of market-oriented logic in their operations. This significantly limits universities' capacity to generate demand for interaction.

The role of local authorities in facilitating interaction is minimal: only 1 out of 56 respondents (≈2%) reported active involvement. This reflects a weak integration of the local level into innovation processes, which contradicts the principles of the Regional Innovation Systems approach.

Institutional organizational capacity is also limited: only 2 institutions (≈4%) conduct market needs analysis. This suggests that universities lack systematic mechanisms to adapt their activities to market conditions.

The analysis of barriers shows that 89% of respondents cite a lack of demand, while 80% cite a lack of contacts. The combination of these factors suggests a coordination gap: interaction does not occur not only because of objective market constraints but also because of the absence of communication mechanisms among actors.

Thus, the survey results confirm that the problem of interaction is systemic and driven by a combination of a lack of incentives, an academic orientation, and limited organizational capacity.

These findings provide strong empirical support for the assumption that interaction failures are not driven by the absence of actors but by incentive misalignment and a lack of coordination mechanisms.

Results of the Science Park Analysis (N = 36)

A more in-depth analysis of institutions formally expected to serve an intermediary function enables a more detailed interpretation of the findings and their validation within the context of specialized innovation infrastructure.

The results indicate that even in the presence of science parks, interaction with business remains limited: only 8 out of 36 institutions (22%) engage in such cooperation, while 78% report no interaction at all. Moreover, 56% of science parks have not implemented a single project over the past three years, indicating a de facto absence of activity.

Interaction with local self-government bodies is also minimal (11%), while systemic interaction involving all three actors (university–business–government) has been identified in only one case (≈3%). This confirms that science parks do not ensure the implementation of the Triple Helix model even at the level of institutions specifically designed for this purpose.

The analysis of functional roles shows that in 55% of cases, science parks do not perform an intermediary function, and in 86% of cases, they do not facilitate the establishment of contacts with businesses. In 67% of cases, their activities are characterized as formal, indicating a clear gap between the normative model and actual functioning.

Key constraints include the lack of resources (81%), incentives (92%), and organizational capacity (absence of dedicated teams - 72%, absence of market analysis — 92%). This suggests that science parks lack the fundamental prerequisites for performing their intended functions.

Responses to open-ended questions further confirm these findings: respondents identify the lack of incentives (89%), funding (81%), and the formal nature of institutions (67%) as the main causes of inefficiency. At the same time, a significant share of responses highlights coordination problems, manifested as a lack of contacts and a perception of low demand.

A comparison of findings across the two components of the study leads to a critical conclusion: the problem of limited interaction does not disappear even in cases where specialized institutions designed to facilitate it are present.

This indicates that the inefficiency of interaction has a systemic institutional nature and is not caused by the absence of institutions per se, but by their lack of functionality. Within the current model of the innovation system, there are insufficient incentives, resources, and coordination mechanisms required to enable interaction between universities, businesses, and local authorities.

Thus, the findings provide strong support for the central assumption of the study that science parks in Ukraine predominantly perform a formal role and fail to fulfill their function as institutional intermediaries within the innovation system.

These findings reinforce the argument that institutional presence without functional capacity does not translate into effective interaction.

Results of Unstructured Interviews

The unstructured interviews conducted with representatives of higher education institutions and businesses enabled us to deepen the survey findings and identify the causal mechanisms underlying the lack of interaction.

First, the interview results confirm that higher education institutions are generally not prepared to cooperate with business and do not perceive a clearly formed demand from it. However, this issue runs deeper: universities often lack an understanding of their strengths and are unable to translate their existing competencies into applied solutions. The absence of clear positioning and orientation towards external clients results in existing opportunities for cooperation going unused.

Moreover, higher education institutions are not business-oriented in their activities. This is reflected in the absence of internal processes for engaging with the market, as well as in their inability to develop offerings that align with business needs. An additional factor is the lack of systematic market analysis: universities do not assess business needs, identify potential niches for cooperation, or adapt their activities to the external environment.

Second, the position of business differs significantly. Company representatives generally demonstrate a willingness to cooperate with universities; however, they point to a key constraint — the rigidity of higher education institutions. In particular, they highlight lengthy decision-making processes, complex internal procedures, and an inability to adapt quickly to market demands. As a result, even when there is interest in cooperation, businesses tend to choose alternative solutions outside the university sector.

Third, science parks, which are formally expected to perform an intermediary role between universities and business, in most cases fail to fulfill this function. Respondents describe their activities as largely formal and not oriented towards applied research or commercialization. The lack of focus on practical outcomes and market needs significantly limits their capacity to act as effective coordinators of interaction.

Fourth, local self-government bodies are effectively not integrated into interaction processes. Representatives of both universities and business note that local authorities neither act as initiators nor as coordinators of cooperation, and lack a systemic vision of the role of universities, science parks, and business needs in the development of the innovation ecosystem.

At the same time, the interviews identified isolated examples of effective science park performance. Such institutions are characterised by active interaction with business, a focus on applied projects, and a proactive role in building partnerships. However, their limited number indicates the absence of a systemic pattern of such practices.

Overall, the findings confirm a significant asymmetry between universities and business: despite potential demand from business, universities are unable to respond to it due to a lack of market orientation, insufficient understanding of their own competencies, and the absence of tools to engage with demand. At the same time, institutions expected to ensure coordination (science parks and local authorities) do not fulfill this function. This points to a systemic gap between the key actors of the innovation system.

These findings highlight that the failure of interaction is not due to a lack of demand, but rather to the system's inability to translate that demand into effective collaboration.

Results of the Case Studies (United Kingdom) Based on Unstructured Interviews

The qualitative analysis of case studies of universities in the United Kingdom reveals a fundamentally different logic of innovation system functioning from that in the Ukrainian context. While in Ukraine, interaction among universities, business, government, and local authorities is fragmented and largely formal, in the United Kingdom, it is systemic, institutionalized, and oriented towards achieving applied outcomes.

First, universities in the United Kingdom are clearly oriented towards interaction with business. Unlike Ukrainian higher education institutions, which are primarily focused on academic activities, UK universities integrate business engagement into their core functions. This is reflected in the presence of specialized structures (such as technology transfer offices and innovation hubs), which ensure continuous partner search, project support, and the commercialization of research results.

Second, a key distinction lies in the presence of a systematic approach to demand analysis. UK universities actively assess business needs, develop offerings tailored to specific demands, and adjust their research priorities in response to market signals. This stands in stark contrast to the Ukrainian model, where market analysis is largely absent.

Third, intermediary institutions (science parks, innovation centers) in the United Kingdom perform a genuine coordination function. Rather than existing as formal structures, they act as active participants in interaction by:

- facilitating business access to university competencies;
- supporting applied research;
- enabling the formation of partnerships and projects.

In contrast to Ukrainian science parks, these science parks are outcome-oriented and integrated into the financial and governance structures of universities.

Fourth, local authorities in the United Kingdom play an active role in developing the innovation ecosystem. They act not only as regulators but also as partners, coordinators, and investors, supporting interaction between universities and business within the framework of regional development policies. This aligns with the Regional Innovation Systems approach, where the regional level is central to innovation processes.

Fifth, an important characteristic of the UK model is the presence of strong incentives for interaction. University funding is partially linked to their ability to engage with business, implement applied projects, and demonstrate impact. This creates an economic motivation for collaboration, which is largely absent in the Ukrainian context.

These differences highlight that effective interaction is not determined by the presence of institutions alone, but by their integration into a coherent system of incentives, governance, and coordination mechanisms.

Data Triangulation

The comparison of findings obtained from multiple sources (survey data, science park analysis, unstructured interviews, and comparative analysis) enables the assessment of their consistency and the identification of stable patterns of the studied phenomenon.

Consistency Between Quantitative and Qualitative Data

Survey results indicate a low level of interaction between universities, business, and local self-government bodies. These findings are corroborated by data from unstructured interviews, which provide explanations for this situation.

In particular:

- quantitative data indicate a lack of demand (≈89%);
- interview data suggest that this reflects a subjective perception arising from the absence of contacts and communication mechanisms.

Thus, triangulation allows for a more precise interpretation: the problem is not purely market-based but also has a coordination dimension.

Confirmation of Institutional Ineffectiveness

Survey data point to:

- a lack of incentives;
- a predominantly academic orientation of higher education institutions;
- limited involvement of local authorities.

The analysis of science parks confirms these findings at the institutional level:

- the majority of institutions demonstrate little or no activity;
- they do not perform an intermediary function;

- they fail to facilitate interaction.

Interview data further explain these patterns through:

- lack of business orientation;
- insufficient understanding of institutional competencies;
- absence of market analysis;
- the formal nature of institutions.

Thus, multiple data sources consistently indicate systemic institutional ineffectiveness rather than isolated or fragmented issues.

Asymmetry Between Demand and Supply

A key finding emerging from triangulation is the asymmetry between universities and business:

- survey data from universities indicate a lack of demand;
- interviews with business representatives demonstrate a willingness to cooperate.

This contradiction can be explained by:

- the rigidity of universities;
- the absence of interaction channels;
- the mismatch between supply and market needs.

Therefore, triangulation leads to a critical conclusion: demand exists but is not realised due to institutional constraints.

Role of Intermediary Institutions

Data on science parks demonstrate their low effectiveness, as confirmed by interview findings, which describe them as largely formal structures.

At the same time, the comparative analysis shows that in effective models (United Kingdom), these institutions perform a key coordination function.

Thus, triangulation establishes that the problem lies not in the absence of institutions, but in their lack of functionality.

Role of Local Self-Government Bodies

Across all data sources, a consistent pattern emerges:

- survey data indicate a minimal role;
- science park analysis shows a low level of interaction;
- interviews reveal a lack of participation and strategic vision.

Additionally, it was found that local self-government bodies lack dedicated functional units responsible for innovation, which explains their de facto absence as active actors within the system.

Overall Triangulation Findings

The consistency of results obtained from different data sources allows for a comprehensive conclusion:

The problem of interaction between universities, business, and government has a systemic institutional nature and is manifested through:

- the absence of incentives;
- a gap between demand and supply;
- the dysfunctionality of intermediary institutions;
- the absence of a coordination role on the part of the state and local authorities.

Thus, triangulation confirms the study's central analytical assumption and ensures a high level of reliability in the findings.

This triangulated evidence provides robust support for the study's explanatory framework and strengthens the validity of the conclusions regarding institutional misalignment.

CONCLUSIONS

The conducted study provides a comprehensive answer to the research question concerning the causes of the ineffectiveness of science parks in Ukraine and the conditions for their effective functioning. The findings demonstrate that science parks fail to facilitate effective interaction among higher education institutions, businesses, and local self-government bodies, not due to a lack of institutions or demand, but because of their dysfunctionality. This dysfunction is driven by an institutional misalignment between the formal model of the innovation system and the actual structure of incentives, organizational capacity, and patterns of interaction among actors. The comparative analysis with the United Kingdom shows that the effective functioning of science parks is possible when they are embedded within an integrated system of incentives, coordination, and interaction, in which universities, business, and the state perform complementary roles.

The results of the study indicate a systemic inability to ensure interaction between higher education institutions, business, and local self-government bodies in Ukraine. The empirical evidence suggests that this problem is not the result of isolated dysfunctions or the absence of specific system elements, but rather reflects a broader institutional failure.

First, the study confirms that interaction between universities and business is fragmented and predominantly episodic. Importantly, the absence of interaction cannot be explained solely by a lack of demand from business. On the contrary, findings from unstructured interviews reveal the existence of potential demand that remains unrealised due to institutional constraints, including the rigidity of universities, their lack of business orientation, and their inability to generate relevant market-oriented offerings.

Second, the study identifies a significant asymmetry between demand and supply: universities not only fail to engage with business but also lack the tools to identify their own

strengths and adapt to market needs. The absence of systematic market analysis and positioning mechanisms results in missed opportunities for collaboration.

Third, the analysis of science parks shows that institutions formally designed to facilitate interaction largely fail to perform this function. This highlights a gap between the normative model of innovation infrastructure and its actual operation. Therefore, the problem lies not in the absence of institutions, but in their lack of functionality.

Fourth, local self-government bodies are effectively not integrated into the interaction process. The absence of dedicated functional units responsible for innovation policy, as well as the lack of a strategic vision regarding the role of universities and business, results in the local level failing to perform a coordination function.

Taken together, these findings suggest that the Triple Helix model is not realized in the Ukrainian context, as the key preconditions for its functioning, namely, incentives, coordination mechanisms, and institutional capacity, are absent. At the same time, the results indicate the absence of a fully developed Regional Innovation System, in which interaction among universities, businesses, and local authorities would be institutionally aligned and supported at the regional level. This confirms that the problem is not only intersectoral (within the Triple Helix framework), but also systemic and regional in nature, reflecting the lack of effective mechanisms for coordination and integration of actors within a unified innovation system.

Policy Model for Ukraine

The conducted research confirms that the key reason for the low effectiveness of science parks in Ukraine lies in institutional failures, manifested in fragmented policy, lack of aligned incentives, weak intermediary functions, and insufficient integration into regional economic systems. These findings are consistent with modern research approaches that emphasize the need for comprehensive and integrated analysis of complex socio-economic systems.

Empirical evidence shows that, despite the formal existence of a significant number of science parks, only a limited share of them operate actively, due to institutional, financial, and regulatory barriers . At the same time, international experience demonstrates that science parks become effective only when embedded in a systemic innovation ecosystem supported by coherent public policy.

In this context, the following key directions for solving the identified problems are proposed:

Incentive Alignment

It is necessary to transform the funding model of higher education institutions by:

- linking public funding to business engagement and commercialization outcomes;
- introducing financial incentives for university–industry collaboration.

This will shift science parks from formal structures to active economic actors.

Strengthening the Intermediary Function

A critical priority is the development of professional intermediary institutions by:

- establishing dedicated teams within science parks;
- focusing on partner search, project development, and commercialization support.

This will enable science parks to effectively bridge coordination and information gaps between stakeholders.

Integration of Local Authorities

The role of local governments should be transformed:

- from passive regulators to coordinators, partners, and co-investors;
- through embedding science parks into regional development strategies.

This will ensure territorial anchoring of innovation and strengthen regional innovation systems.

Transition to a Demand-Driven Model

A shift towards a demand-driven approach is required:

- systematic analysis of market needs;
- adaptation of university competencies to business demand;
- development of applied research.

This will reduce the gap between academia and the real economy.

Development of Coordination Mechanisms

It is essential to establish institutional mechanisms for interaction:

- creation of platforms for collaboration between universities, business, and government;
- facilitation of communication and coordination among stakeholders.

This will contribute to trust-building and sustainable partnerships.

Alignment with Theoretical Expectations

The findings of the study are broadly consistent with theoretical approaches suggesting that effective interaction within the Triple Helix model requires not only the formal existence of institutions but also their actual integration into systems of incentives, governance, and coordination among actors. At the same time, the study significantly extends these approaches by demonstrating that, in the case of Ukraine, the key problem lies in the gap between formal institutional architecture and the actual behavior of actors.

The comparative analysis with the United Kingdom cases confirms that the determining factor of effectiveness is not the institutional structure per se, but its embeddedness within a functioning system of incentives and interaction. This finding aligns with the Regional Innovation Systems approach, which emphasizes the role of regional coordination and institutional coherence.

Testing of Generalized Hypotheses

Within the study, two key (generalized) hypotheses were formulated.

H1 (Functional role of institutions)

The mere existence of science parks is not a sufficient condition for interaction; their functional role as active institutional intermediaries is critical.

Level of support: strongly supported

This hypothesis receives direct empirical confirmation. The data show that despite the presence of numerous science parks, the level of interaction remains low or nonexistent. Interviews and analysis of science park activities reveal their predominantly formal nature and their inability to perform a coordination function. Thus, the key assumption that institutional presence does not equal functionality is confirmed.

H2 (Institutional misalignment)

The ineffectiveness of science parks results from institutional misalignment between the formal model of the innovation system and the actual structure of incentives, organisational capacity, and interaction among actors.

Level of support: strongly supported (via triangulation)

This hypothesis is confirmed through the consistency of results across multiple data sources: survey data (lack of incentives), interviews (demand–supply asymmetry, rigidity of universities), analysis of science parks (their dysfunctionality), and the role of local authorities (their effective absence as an actor). Given the interpretative research design, this hypothesis has an explanatory nature and is validated through synthesis and interpretation of findings.

Assessment of Initial Hypotheses

The initial six hypotheses served to operationalise and disaggregate the research problem.

Hypothesis	**Status**	**Level of support**
H1 (low level of interaction)	confirmed	high
H2 (lack of incentives)	confirmed	high
H3 (dysfunctionality of science parks)	confirmed	high
H4 (demand–supply asymmetry)	confirmed	very high
H5 (weak role of local authorities)	confirmed	medium–high (given data limitations)
H6 (institutional misalignment)	confirmed	high (integrative)

None of the initial hypotheses was rejected. At the same time, their analysis shows that they represent different dimensions of a single complex phenomenon. In particular, hypotheses related to incentives, asymmetry, and the role of authorities (H2, H4, H5) reflect the institutional level of the problem, while hypotheses related to interaction and the role of science parks (H1, H3) capture its empirical manifestation.

Synthesis of Findings

Thus, the results of the study not only confirm the formulated hypotheses but also allow a shift from fragmented analysis to a comprehensive explanation. The effectiveness of interaction within the Triple Helix model is determined not by the formal existence of institutions, but by their ability to be embedded in a system of incentives, coordination, and interaction among

actors. The absence of such integration explains the ineffectiveness of science parks in the studied context.

At the same time, these findings are consistent with the Regional Innovation Systems approach, which emphasises the critical role of regional-level coordination and institutional alignment. In this context, the ineffectiveness of interaction is explained not only by the dysfunctionality of individual institutions but also by the absence of a coherent regional innovation system, within which local self-government bodies perform coordination and integration functions.

Scholarly Contribution and Originality

The findings of this study contribute to the academic debate by shifting the focus from the issue of "lack of demand" to the problem of institutional incapacity.

In particular, the study:

- demonstrates that the absence of interaction is primarily the result of coordination failure rather than market failure;
- identifies an asymmetry in the perception of demand between universities, science parks, and business actors;
- substantiates that the core problem lies in the dysfunctionality of institutions rather than their absence;
- confirms the need to move from the formal establishment of institutions toward ensuring their actual functionality.

Thus, the study deepens the understanding of interaction mechanisms in the context of a transition toward more decentralized models of governance in higher education and innovation policy.

Limitations of the Study

The study has several limitations that should be acknowledged:

- the voluntary nature of participation in the survey, which prevents the calculation of an exact response rate;
- the limited number of respondents from local self-government bodies, due to the absence of dedicated functional units responsible for innovation;
- the qualitative research design, which does not aim for statistical representativeness;
- the limited number of cases included in the comparative analysis (United Kingdom).

At the same time, the triangulation of data and the consistency of findings across multiple sources allow the conclusions to be considered sufficiently robust for addressing the research question.

Policy Implications and Directions for Future Research

The findings indicate the need for a fundamental transformation of approaches to innovation policy in Ukraine.

In particular, future research may focus on:

- developing models to stimulate interaction between universities, science parks (as their business-oriented instruments), and industry;
- analyzing mechanisms for integrating local authorities into the innovation system;
- studying successful science park models and adapting them to the Ukrainian context;
- expanding comparative analysis to include other EU countries.

A separate and important direction is the study of instruments for shaping demand for innovation, as well as the role of both the state and local authorities in this process.

REFERENSES

Braun, V., & Clarke, V. (2006). Using thematic analysis in psychology. *Qualitative Research in Psychology, 3*(2), 77–101. https://doi.org/10.1191/1478088706qp063oa

Cooke, P., Uranga, M. G., & Etxebarria, G. (1997). Regional innovation systems: Institutional and organisational dimensions. *Research Policy, 26*(4–5), 475–491. https://doi.org/10.1016/S0048-7333(97)00025-5

Doloreux, D., & Parto, S. (2005). Regional innovation systems: Current discourse and unresolved issues. *Technology in Society, 27*(2), 133–153. https://doi.org/10.1016/j.techsoc.2005.01.002

Etzkowitz, H., & Leydesdorff, L. (2000). The dynamics of innovation: From national systems and "Mode 2" to a Triple Helix of university–industry–government relations. *Research Policy, 29*(2), 109–123. https://doi.org/10.1016/S0048-7333(99)00055-4

Evans, P. (1995). *Embedded autonomy: States and industrial transformation*. Princeton University Press. https://press.princeton.edu/books/paperback/9780691037363/embedded-autonomy?srsltid=AfmBOoqEuLgYEPcNPUhJJ-WVoa1EwxD-kQVTUW-KLOtWCgdI8J5TBLEv

Foray, D., David, P. A., & Hall, B. (2009). *Smart specialisation: The concept, knowledge for growth: Prospects for science, technology and innovation* (EUR 24047). European Commission.

Foray, D. (2015). *Smart specialisation: Opportunities and challenges for regional innovation policy*. Routledge.

Guest, G., MacQueen, K. M., & Namey, E. E. (2012). *Applied thematic analysis*. SAGE Publications. https://doi.org/10.4135/9781483384436

Howells, J. (2006). Intermediation and the role of intermediaries in innovation. *Research Policy, 35*(5), 715–728. https://doi.org/10.1016/j.respol.2006.03.005

Link, A. N., & Scott, J. T. (2007). The economics of university research parks. *Oxford Review of Economic Policy, 23*(4), 661–674. https://doi.org/10.1093/oxrep/grm030

North, D. C. (1990). *Institutions, institutional change and economic performance*. Cambridge University Press. https://doi.org/10.1017/CBO9780511808678

Napolskykh, O., Kykot, K., & Moskalenko, Y. (2025) *Аналіз інноваційної спроможності закладів вищої освіти і наукових установ України* [Analysis of the innovation capacity of higher education institutions and research institutions of Ukraine]. BRDO; UK DIGIT.

OECD. (2011). *Regions and innovation policy*. OECD Publishing. https://doi.org/10.1787/9789264097803-en

OECD. (2022). *OECD review of innovation policy: Ukraine 2022*. OECD Publishing. https://www.oecd.org/en/publications/building-back-a-better-innovation-ecosystem-in-ukraine_85a624f6-en.html

Phan, P. H., Siegel, D. S., & Wright, M. (2005). Science parks and incubators: Observations, synthesis and future research. *Journal of Business Venturing, 20*(2), 165–182. https://doi.org/10.1016/j.jbusvent.2003.12.001

Ranga, M., & Etzkowitz, H. (2013). Triple Helix systems: An analytical framework for innovation policy and practice in the knowledge society. *Industry and Higher Education, 27*(4), 237–262. https://doi.org/10.5367/ihe.2013.0165

Rodrik, D. (2004). *Industrial policy for the twenty-first century* (CEPR Discussion Paper No. 4767). https://cepr.org/publications/dp4767

Tödtling, F., & Trippl, M. (2005). One size fits all? Towards a differentiated regional innovation policy approach. *Research Policy, 34*(8), 1203–1219. https://doi.org/10.1016/j.respol.2005.01.018

World Bank. (2019). *Innovation policy: A guide for developing countries*. World Bank. https://doi.org/10.1596/978-0-8213-8269-1