



# Challenges and Barriers to Implementing Collaborative Governance for Linking Education and Industry

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## Abstract

The present study aims to identify the challenges and barriers to implementing collaborative governance in the linkage between education and industry to provide practical solutions for managers and stakeholders in this field. To achieve the research objectives, the theoretical literature, including the history, definitions, and theories related to collaborative governance, education-industry interaction, and existing barriers, was first reviewed. The study, based on an interpretive philosophical foundation and an inductive approach, employed a qualitative method and a grounded theory strategy. Participants were selected through purposive sampling and snowball techniques. Data were collected using interviews with 10 experts from academia, industry, and government sectors. The research data were analyzed using a three-phase coding process: open coding, axial coding, and selective coding. Based on data analysis, the barriers to implementing collaborative governance in the education-industry linkage were categorized into six dimensions: causal conditions, contextual conditions, intervening conditions, the core category, strategies, and outcomes. In causal conditions, factors such as a lack of financial resources and the absence of legal infrastructure were identified as key barriers. Contextual conditions included inappropriate organizational culture and traditional attitudes toward collaborative governance. Intervening conditions highlighted the impact of rapid technological changes and insufficient policy-making. The core category identified in this study was the inefficiency of governance structures, which serves as the central challenge in education-industry interaction. Proposed strategies included enhancing transparency, reforming regulations, and leveraging modern technologies to facilitate interactions. Positive outcomes of successfully implementing collaborative governance included increased innovation, strengthened collaborations, and improved educational effectiveness. The temporal scope of the study was 2024, and the spatial scope was higher education institutions and industries in Iran. The study results revealed that the barriers to implementing collaborative governance pertain to two levels: macro (policy-making and legislation) and micro (cultural development, planning, and operational tools). Accordingly, a combined top-down and bottom-up approach is recommended to address these barriers. This approach can foster effective interactions among academic, industrial, and governmental institutions, thereby enabling the successful implementation of collaborative governance.

**Keywords:** *Governance, Participation, Collaborative Governance, Education, Industry.*

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## 1. Introduction

In today's world, the need for effective communication between various sectors of society, particularly education and industry, is more critical than ever. This connection is regarded as a key factor for economic, social, and scientific growth in many countries. Collaborative governance, as an innovative approach, provides a platform where all stakeholders—including universities, industries, governments, and related institutions—can actively and effectively participate in decision-making processes and policy implementation. This approach is founded on principles such as transparency, collaboration, and accountability, aiming to create a sustainable and efficient system for fostering communication and cooperation among various sectors [1, 2].

Collaborative governance has increasingly become a focus in policy-making and management, especially in the domains of education and industry. This approach emphasizes the active involvement of all stakeholders in decision-making processes and has the potential to significantly enhance the connection between education and industry. However, the implementation of collaborative governance in many countries, particularly developing ones, faces numerous challenges and barriers [3].

In Iran, the connection between universities and industries has not been adequately established due to various issues, including structural problems, weak legislation, and cultural barriers. This has resulted in industries failing to fully utilize the scientific and research capabilities of universities, while universities struggle to meet labor market needs and train skilled human resources efficiently [4]. A primary reason for these challenges is the absence of an efficient collaborative governance system that can facilitate cooperation between these two sectors. Specific issues such as weaknesses in designing and implementing supportive policies, a lack of financial resources for joint projects, insufficient infrastructure for interaction and coordination, and resistance to organizational and cultural changes are among the factors hindering the implementation of this approach [5, 6].

In many countries, successful experiences have demonstrated that collaborative governance can play a significant role in strengthening the connection between universities and industries [7]. For example, in developed countries, programs such as joint research collaborations, the establishment of technology parks, and government support for collaborative projects have contributed to improving

these connections. However, in countries like Iran, the lack of such mechanisms has prevented universities' scientific and research capacities from being effectively utilized by industries. Conversely, industries, due to ineffective communication, have been unable to optimally leverage existing knowledge [4].

The theoretical framework of this study is rooted in the concept of collaborative governance, which emphasizes inclusive stakeholder participation in decision-making and policy-making processes to enhance interactions across different sectors of society [8]. Specifically, in the context of education and industry, collaborative governance offers a structured approach for strengthening partnerships between universities and economic enterprises [9]. This governance model is based on principles of transparency, accountability, equity, and mutual cooperation, aiming to leverage shared resources and capacities for achieving superior outcomes [10]. In this study, education is conceptualized as the process of knowledge, skills, and ability development through formal and informal educational programs provided by universities and higher education institutions [2, 11], while industry encompasses economic activities focused on producing goods and services using technology, labor, and resources [6].

The relationships among the key variables are explored through established theoretical lenses. Collaborative governance has been shown to enhance the effectiveness of educational systems by fostering active participation among universities, industries, and governments to design programs aligned with labor market needs [12]. This alignment bridges the gap between theoretical and practical learning, producing graduates equipped with applicable skills [13]. Simultaneously, collaborative governance enhances industrial performance by facilitating the transfer of technology and innovation from universities to industries, reducing R&D costs and boosting innovation [14, 15]. Moreover, the direct interaction between education and industry leads to the development of skilled human resources and the implementation of applied research projects, optimizing outcomes when educational programs are tailored to meet real-world industry demands [16]. These interactions are encapsulated in the Triple Helix Model, which underscores the dynamic interplay among universities, industries, and governments as a driver of innovation, sustainable development, and economic and social advancement [13, 17].

Supporting theories further enrich this framework. Network Governance Theory highlights the importance of

inter-organizational networks in resolving complex issues, demonstrating that collaborative networks in education and industry can unlock shared resources and capacities [18]. Social Capital Theory emphasizes trust, norms, and social networks as facilitators of sustained collaborations, reducing cultural and structural barriers in university-industry partnerships [19]. The University-Industry Linkage Model examines the mechanisms of interaction between these two sectors, including joint projects, technology transfer, and internships, underscoring their mutual benefits [15]. Lastly, Organizational Learning Theory posits that mutual learning and knowledge exchange between universities and industries can foster innovation and productivity, further validating the value of collaborative governance [20].

In the context of the education-industry connection, collaborative governance entails creating an environment where universities, industries, and governments collaborate not only in terms of knowledge and information but also in financial, human, and infrastructural resources to generate synergy. Such governance can lead to workforce skill development, increased scientific and technical capacities, and ultimately, a more effective alignment between industry needs and educational programs [5]. This approach can also enhance the quality of education, improve research capabilities, and foster joint projects between universities and industries.

Despite the numerous advantages of collaborative governance, its implementation in many countries, particularly in Iran, faces barriers and challenges that require careful attention and examination. These challenges may arise at structural, legal, and cultural levels and can disrupt collaborative processes. This study aims to systematically and comprehensively identify the key challenges in this field and, through detailed data analysis, provide solutions to mitigate these barriers.

## 2. Methodology

The present study falls under the category of qualitative research. Given the existing theoretical gap, the systematic approach of Strauss and Corbin (1998) for grounded theory was employed as the primary qualitative research method. This approach was chosen to develop a framework for deeply understanding the challenges and barriers to implementing collaborative governance in the education-industry linkage. Grounded theory is a qualitative research method that systematically applies inductive procedures to generate a theory about the phenomenon under study.

The statistical population consisted of academic experts and industrial and governmental specialists. A sample of 10 participants was selected using purposive sampling or the snowball technique. Interviewees were asked to introduce other experts in the field, aligning with the snowball sampling concept often used in qualitative research. Purposive sampling in qualitative studies refers to selecting participants who can significantly contribute to understanding the research problem and the core phenomenon under investigation.

Data were collected using semi-structured, in-depth interviews. Before the interviews, a summary of the research plan, definitions of key terms used in the study, and the research objectives and main questions were sent to participants via email, Telegram, or during in-person meetings to ensure preliminary preparation. At the beginning of each interview session, the researcher provided a brief explanation of the research work conducted thus far.

The collected data were analyzed using a three-phase coding process (open coding, axial coding, and selective coding) to extract key concepts and patterns:

1. **Open Coding:** At this stage, the collected data were coded to identify initial concepts. These concepts might include communication issues, cultural barriers, organizational differences, and the lack of coordination among various sectors (Bryant & Charmaz, 2020).
2. **Axial Coding:** This stage examined the relationships between the identified codes and concepts. The analyses focused on identifying key elements of collaborative governance, such as leadership, transparency, and community participation (Creswell & Poth, 2018).
3. **Selective Coding:** At this stage, the final codes were selected based on their conceptual and practical significance for analyzing the main challenges and barriers to collaborative governance.
4. **Category Formation:** Similar concepts were grouped into larger categories. These categories could focus on cultural, structural, and organizational challenges (Strauss & Corbin, 2015).
5. **Theory Development:** A theory was developed based on the data, providing a descriptive framework for the challenges and barriers to implementing collaborative governance in the education-industry linkage.

**6. Development of the Paradigmatic Model:**

The paradigmatic model of this research was designed based on Strauss and Corbin's paradigmatic framework. Considering the identified factors and conditions, a model and process for the challenges and barriers to implementing collaborative governance in the education-industry linkage were developed. A separate interpretation for each of the six dimensions of grounded theory related to the

challenges and barriers to collaborative governance in this context is provided in subsequent sections.

**3. Findings**

Causal conditions refer to the factors that lead to the emergence of a particular situation or phenomenon. In this research, causal conditions represent the obstacles preventing the successful implementation of collaborative governance between education and industry.

**Table 1.** Causal Conditions in Collaborative Governance Between Education and Industry

Open Codes	Axial Codes	Selective Codes
Lack of financial resources for university-industry collaboration	Weak financial support for joint projects	Lack of sustainable financial infrastructure
Absence of legal infrastructure for university-industry interaction	Weak supportive regulations for inter-institutional connections	Lack of appropriate legal frameworks
Conflicts of interest among stakeholders	Lack of alignment in the interests of different sectors	Differences in strategies and goals between universities and industries
Lack of transparency in policy-making	Absence of unified decision-making approaches	Ambiguity in roles and responsibilities
Structural complexities in the education system	Inefficiency of existing frameworks in coordinating education and industry	Weak structural planning

The lack of financial resources for university-industry collaboration is identified as a major barrier to joint projects. Without adequate financial capacity from public or private sectors, supporting such collaborations is unattainable. The absence of legal infrastructure for university-industry interaction further hinders effective cooperation, as supportive legal frameworks are crucial. Stakeholder conflicts of interest, where diverse entities like universities, industries, and governments possess conflicting objectives, result in mistrust and resistance to collaboration. Transparency issues in macro-level policy-making prevent stakeholders from effectively engaging in decision-making processes and erode confidence in these processes. Additionally, the structural complexities in the education system limit its adaptability for joint initiatives, as rigid frameworks often obstruct flexibility and collaboration.

Weak financial support for joint projects highlights the inadequacy of resources needed for effective university-industry collaborations. Similarly, the lack of supportive inter-institutional regulations underscores the absence of policies that can foster a collaborative system. Coordination failures among stakeholders, driven by conflicting interests, impede simultaneous engagement in shared initiatives. The absence of a unified governance approach leads to disjointed decision-making, causing confusion and stalling progress. Lastly, the inefficiency of existing governance structures for aligning universities and industries amplifies the challenges of creating cohesive collaboration.

Contextual conditions refer to factors that shape the environment and prerequisites for implementing collaborative governance. These environmental factors—cultural, social, or political—can indirectly influence governance processes.

**Table 2.** Contextual Conditions in Collaborative Governance Between Education and Industry

Open Codes	Axial Codes	Selective Codes
Absence of a culture of collaboration in organizations	Cultural resistance to adopting changes	Resistance to change
Lack of awareness about the benefits of collaboration	Lack of education and communication about governance	Limited understanding of collaborative governance
Negative attitudes towards innovative governance methods	Traditional perspectives on management practices	Reluctance to embrace modern approaches
Cultural differences between education and industry	Misalignment in values, goals, and processes	Cultural inconsistencies
Lack of managerial skills among stakeholders	Absence of training programs for collaboration management	Weak governance capacities

The lack of a collaborative culture in organizations, particularly in public and educational sectors, results in isolated operations where collaboration is neither prioritized nor nurtured. Insufficient awareness of the benefits of collaboration between universities and industries further discourages stakeholder engagement. Negative attitudes towards innovative governance methods, often stemming from fear of change or unfamiliarity with such approaches, create significant challenges. Cultural differences between educational institutions and industries, driven by divergent values, objectives, and processes, obstruct cooperation. Additionally, the lack of managerial skills among stakeholders limits the effectiveness of managing inter-organizational collaborations and projects.

Cultural resistance to change, fueled by traditional norms, prevents organizations and individuals from embracing collaborative governance. A lack of education and communication about collaborative governance models hinders a comprehensive understanding of the approach. Traditional attitudes towards management methods also act as barriers to the adoption of innovative frameworks. Misalignment of cultural values and goals between universities and industries further exacerbates conflicts in interactions. Lastly, the absence of managerial training programs tailored to inter-organizational collaboration weakens governance capacities.

Intervening conditions are factors that directly impact the implementation of collaborative governance, either positively or negatively influencing its processes.

**Table 3.** Intervening Conditions in Collaborative Governance Between Education and Industry

Open Codes	Axial Codes	Selective Codes
Rapid technological changes	Pressure to quickly adapt to new technologies	Opportunities for innovation and competition
Weak governmental policy support	Lack of incentive policies for collaboration	Limitations in governmental facilities and resources
Absence of intermediary institutions	Gap in the role of communication intermediaries	Need for facilitation centers
Economic pressures on industries	Decline in financial capacity for joint projects	Need for investment and support
Legal complexities	Regulatory and procedural barriers in projects	Need for legal reforms

Rapid technological advancements continuously transform operational environments, creating both opportunities and challenges for collaborations. Weak governmental policy support, characterized by insufficient incentives for joint projects, slows down the pace of cooperation between universities and industries. The absence of intermediary institutions to facilitate university-industry relationships complicates the establishment of effective collaborations. Economic pressures on industries, including financial crises, reduce their ability to participate in joint projects. Lastly, legal complexities, such as regulatory hurdles, obstruct pathways for effective university-industry interactions.

Emerging opportunities for advancing industrial and educational collaborations arise from technological, economic, and social changes, offering new pathways for innovation and competitiveness. However, the lack of

incentive-based policies specifically designed to encourage collaboration acts as a barrier to progress. Addressing these challenges requires legislative reforms to simplify regulations and remove obstacles, enabling smoother joint initiatives between universities and industries. Such legal adjustments are essential for creating a supportive framework that fosters collaborative governance.

The core category generally refers to the central theme or concept of the research. In the study on collaborative governance for linking education and industry, the core category represents the key element or issue around which all other dimensions revolve and that influences them. This category focuses specifically on weaknesses in governance structures, such as the lack of clear and coordinated models, deficiencies in inter-organizational interactions, and managerial challenges between education and industry.

**Table 4.** Core Category Conditions in Collaborative Governance Between Education and Industry

Open Codes	Axial Codes	Selective Codes
Ineffectiveness of macro-level management	Weakness in governance structures	Need for governance system reform
Lack of a clear interaction model	Insufficient operational models for coordination	Designing innovative governance models
Neglecting stakeholder feedback	Ignoring active participation in decision-making	Need to increase stakeholder involvement
Insufficient managerial capacity	Weakness in leadership and coordination	Training and enhancing managerial capabilities
Structural conflicts between education and industry	Inefficiency in cross-sector coordination	Bridging structural gaps

Macro-level management inefficiencies stem from a lack of proper coordination and planning at decision-making levels, particularly in collaborative governance. This inefficiency disrupts execution processes and decision-making. The absence of a clear model for interaction between universities and industries means that each party follows its own logic and processes, leading to confusion and inefficiency. Neglecting stakeholder feedback, such as from students or employers, results in a lack of trust and weak collaboration. Insufficient managerial capacities in individuals and institutions limit their ability to effectively manage joint university-industry projects. Structural conflicts between education and industry, arising from their differing frameworks, hinder effective cooperation.

Governance structures in both education and industry lack sufficient transparency and coordination, which are necessary for effective collaboration. This issue is

exacerbated by inadequate laws and the absence of intermediary institutions to facilitate cooperation. Developing new governance models that emphasize clarity and coordination is essential. Drawing from global experiences or local successes, these models can improve governance processes. Neglecting active stakeholder participation in decision-making overlooks real needs, leading to ineffective governance. Lastly, creating cross-sectoral structures and institutions can bridge gaps and foster better coordination and collaboration.

Strategies refer to the actions that can address existing problems and enhance the process of collaborative governance. These strategies primarily focus on strengthening collaborations, improving structures, driving cultural changes, and developing the necessary infrastructure to facilitate university-industry partnerships.

**Table 5.** Strategies for Collaborative Governance Between Education and Industry

Open Codes	Axial Codes	Selective Codes
Drafting new laws to facilitate collaboration	Reforming legal frameworks	Transparent legal support
Developing managerial skills among stakeholders	Organizing training programs	Enhancing managerial capabilities
Using modern technologies for communication	Implementing digital platforms	Leveraging technology for coordination
Defining joint projects	Encouraging synergy among entities	Sustained cross-sector projects
Increasing transparency in decision-making	Improving accountability	Building trust through transparency

Drafting new laws and amending existing ones are fundamental strategies for facilitating collaborative governance. These laws can promote collaboration through financial, legal, or other incentives. Developing managerial skills among stakeholders is another key strategy, involving training programs and workshops to enhance their capacity to manage projects. Modern technologies, including digital platforms, can simplify university-industry communication and streamline operational processes. Joint projects and long-term collaborations create mutual value and synergy between universities and industries. Lastly, increased transparency in decision-making processes helps build trust and encourages active participation from stakeholders.

Legal framework reforms are necessary to establish clear and supportive regulations for university-industry collaboration. Organizing educational workshops for

stakeholders can empower managers and staff with the skills needed for collaborative governance. Digital platforms for communication and project management improve operational efficiency and foster better interaction. Promoting synergy among different entities (government, universities, industries) enhances their cooperation for shared goals. Finally, establishing supervisory and supportive institutions ensures effective monitoring of joint projects and boosts the overall success of collaborative efforts.

Outcomes refer to the tangible and intangible results of successfully implementing collaborative governance. These outcomes highlight the benefits of fostering strong connections between education and industry and improving overall governance effectiveness.

**Table 6.** Outcomes of Collaborative Governance Between Education and Industry

Open Codes	Axial Codes	Selective Codes
Strengthening university-industry connections	Improving inter-organizational collaboration	Establishing sustainable and effective interactions
Enhancing the effectiveness of educational programs	Better alignment of education with market needs	Improving students' skill levels
Reducing stakeholder dissatisfaction	Building trust among sectors	Motivating collaboration
Improving organizational productivity	Optimal resource utilization	Increasing operational efficiency
Lowering operational costs	Reducing financial barriers to joint projects	Improving resource management

One of the key outcomes of collaborative governance is the establishment of a strong and sustainable connection between universities and industries. This enables universities to better understand industry needs and adapt their training programs accordingly. Industries, in turn, benefit from the expertise and innovation provided by universities, leading to mutual growth. Enhanced alignment of educational programs with market needs ensures that students acquire the skills necessary for the workforce, while industries gain access to skilled employees. Increased transparency and stakeholder participation reduce dissatisfaction and foster trust among participants, promoting active engagement in governance processes. Collaborative governance also optimizes the use of resources, reducing waste and improving overall productivity.

Improving collaboration between universities and industries enhances organizational efficiency and resource

utilization. Aligning educational content with industry requirements not only prepares students better but also ensures that industries can leverage a skilled workforce. By fostering transparency and trust, collaborative governance reduces operational dissatisfaction and motivates stakeholders to participate. Furthermore, efficient resource management under collaborative systems leads to lower operational costs and improved financial outcomes for participating organizations.

The paradigmatic model of this research was designed based on Strauss and Corbin's framework. Taking into account the identified factors and conditions, a comprehensive model addressing the challenges and barriers to implementing collaborative governance between education and industry was developed. This model explains the causal, contextual, intervening, and strategic factors influencing collaborative governance while providing actionable insights for overcoming identified challenges.

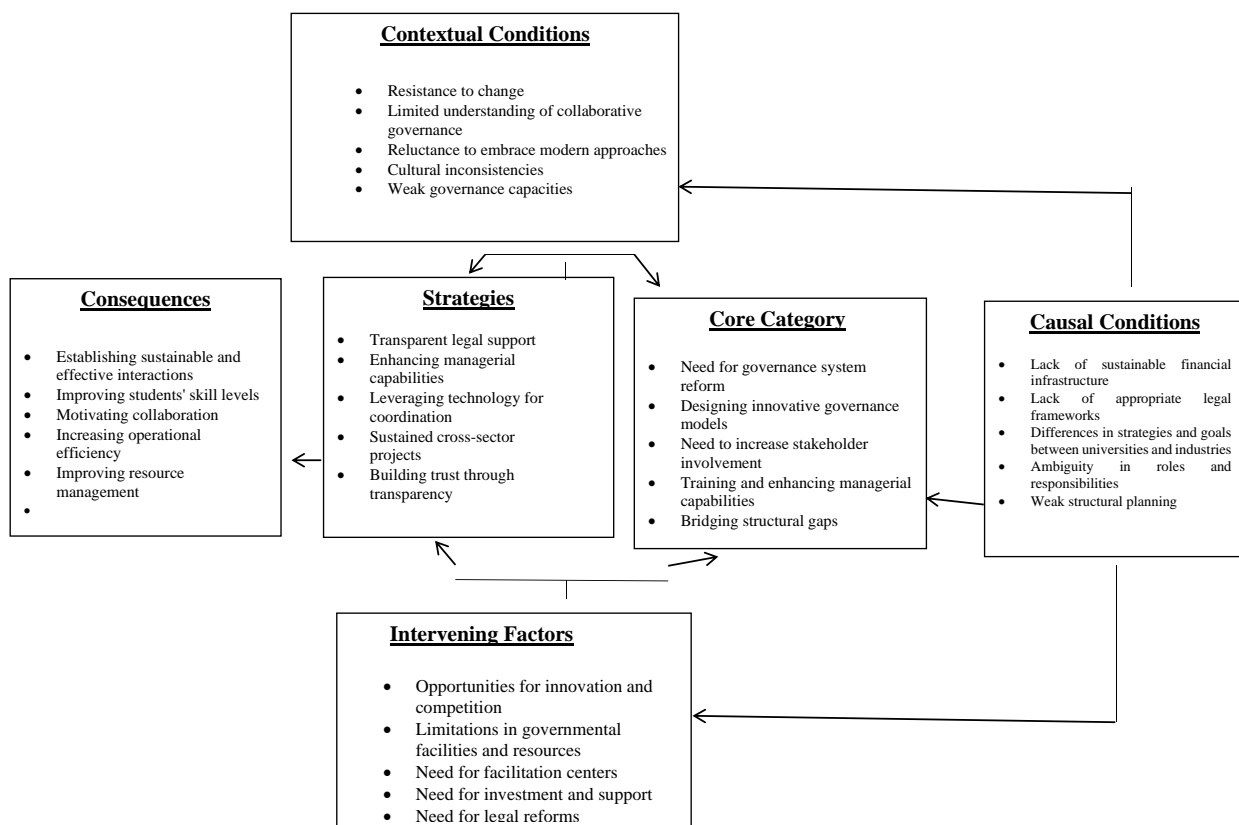


Figure 1. Paradigmatic Model of The Study

#### 4. Discussion and Conclusion

The findings of this study highlight the multiple barriers to implementing collaborative governance in the context of

university-industry interaction. Among these, structural and organizational problems, a lack of stakeholder alignment, and cultural challenges emerged as critical obstacles. Addressing these challenges requires effective mechanisms for fostering interaction between universities and industries,

as well as enhancing active stakeholder participation in decision-making processes. A deeper examination of the six conditions (causal, contextual, intervening, core category, strategies, and outcomes) reveals key insights into the current state of governance and the steps needed to overcome existing barriers.

Causal conditions, including the lack of financial resources, inadequate legal infrastructure, and structural complexities, were identified as significant contributors to the inefficiency of collaborative governance. These findings align with prior research by Mena and Provan (2010), which emphasized the importance of supportive legislation and transparency for successful inter-organizational collaboration [4]. Similarly, Amin and Zoghi (2022) highlighted financial challenges and a lack of stakeholder alignment as major obstacles [6]. To address these issues, clear supportive policies, joint funding mechanisms, and transparent legal structures are essential. For example, creating monitoring systems to oversee project implementation could help mitigate governance inefficiencies and enhance trust among stakeholders.

Contextual conditions, particularly organizational culture and stakeholder awareness, were shown to play a pivotal role. The absence of a collaborative culture and negative perceptions toward innovative governance methods were significant barriers. These findings resonate with Putnam's (1993) emphasis on social capital and mutual trust in improving governance effectiveness [19]. To address these cultural barriers, it is recommended that educational workshops and awareness campaigns be conducted to promote the advantages of collaborative governance. Strengthening social capital through trust-building and transparent interactions can also facilitate long-term collaboration between universities and industries.

Intervening conditions, including rapid technological advancements and weak policy support, were found to directly impact governance processes. These findings are consistent with Provan and Kenis (2008), who highlighted environmental changes and insufficient policies as key challenges for collaborative networks [18]. Establishing intermediary institutions, such as innovation accelerators and science parks, could bridge the gap between universities and industries. Additionally, long-term strategies to align educational and industrial policies are crucial to mitigating the effects of environmental instability and fostering sustained collaboration.

The core category of this research—ineffective governance structures—was identified as the central

challenge in university-industry interactions. This result supports the Triple Helix model [13], which underscores the importance of tripartite collaboration among universities, industries, and governments. Emerson et al. (2012) also emphasized the need for efficient governance frameworks to facilitate stakeholder interaction [21]. The findings suggest that developing new governance models that prioritize transparency, alignment, and coordination is essential. Reforming existing governance frameworks to simplify processes and enhance stakeholder engagement could significantly improve the collaborative environment.

Strategies proposed in this study include leveraging modern technologies, enacting new legislation, and promoting transparency in decision-making processes. These findings align with Perkmann et al. (2013), who stressed the importance of technology in facilitating communication and collaboration [14]. Similarly, Etzkowitz (2003) emphasized the need for clear legislative frameworks to support university-industry partnerships [13]. Digital platforms for project management and online learning systems could streamline communication and enhance operational efficiency. Additionally, fostering synergy among stakeholders through joint projects and transparent decision-making processes could drive effective collaboration.

The outcomes of effective collaborative governance, such as stronger university-industry ties, improved educational program effectiveness, and reduced stakeholder dissatisfaction, were also highlighted. These results are consistent with Brundenius et al. (2011), who examined the impact of collaborative governance on innovation and productivity [16]. Improved alignment between educational curricula and industry needs enables universities to better prepare students for the workforce, while industries benefit from access to skilled professionals. Building trust through transparent processes and addressing stakeholder concerns can further strengthen partnerships and enhance overall productivity.

The comparison with previous studies confirms that many of the identified challenges are predictable and require targeted interventions and structural reforms. The practical recommendations proposed in this study offer actionable strategies to overcome barriers and achieve more effective collaboration between universities and industries.

This study faced several limitations that should be considered when interpreting its findings. Access to comprehensive and up-to-date data on collaborative university-industry projects was limited, restricting the



depth of analysis. Cultural and structural differences between academic and industrial institutions also limit the generalizability of results across different contexts. Legal and bureaucratic constraints, such as intellectual property regulations and complex administrative processes, may have led to incomplete or restricted data on collaborations. Additionally, the geographical focus of the study may not fully represent the conditions in other regions or countries. Finally, while the qualitative grounded theory approach effectively identified patterns and concepts, integrating quantitative methods could provide additional validation of the findings.

Future studies should aim to address the identified limitations by incorporating broader and more diverse datasets, including data from multiple regions and sectors. Comparative studies across different countries or industries could provide insights into the generalizability of findings and identify best practices. Mixed-method research designs that combine qualitative and quantitative approaches could enhance the robustness of results and provide a more comprehensive understanding of collaborative governance dynamics. Investigating the long-term impacts of specific governance interventions on university-industry collaboration would also be valuable. Lastly, exploring the role of emerging technologies, such as artificial intelligence and blockchain, in facilitating governance processes could open new avenues for research.

Policymakers and practitioners should prioritize the development of clear and supportive legal frameworks to facilitate collaboration between universities and industries. Establishing intermediary institutions, such as science parks or innovation hubs, can bridge gaps and promote effective partnerships. Educational institutions and industries should invest in digital platforms to streamline communication and enhance project management. Regular workshops and training sessions to build managerial skills and foster a culture of collaboration among stakeholders are crucial. Encouraging stakeholder participation in decision-making processes and providing transparent feedback mechanisms can build trust and enhance governance effectiveness. Finally, creating joint funding mechanisms and incentive structures can ensure sustainable financial support for collaborative projects.

#### Authors' Contributions

Authors equally contributed to this article.

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#### Declaration of Interest

The authors report no conflict of interest.

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#### Ethical Considerations

All procedures performed in this study were under the ethical standards.

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