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Transnational Knowledge Processes as Drivers of Legitimacy and Credibility in State–Nation Relations: Policy Frameworks, Knowledge Actors, and Governance Requirements

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ABSTRACT

This study seeks to identify the components of transnational knowledge as a means to enhance state–nation relations through a continuum from domestic legitimacy to international credibility, focusing on knowledge policies, requirements, and key actors. The research is applied in purpose and employs a mixed–method design. Data were collected through semi-structured interviews with 15 experts in public administration, international relations, political science, and public policy, selected via purposive sampling. Thematic analysis was applied to the qualitative data, and a meta-heuristic modeling approach was further used to construct a systematic model representing the relationships among key variables—such as transnational knowledge absorption capacity, knowledge policies, actor roles, domestic legitimacy, and international credibility—through structural variables and an objective function. Integrating theoretical insights and empirical themes led to the identification of six overarching dimensions shaping transnational state–nation relations: (1) international stakeholders and state legitimacy; (2) global economic integration and competitiveness; (3) cultural, scientific, and media diplomacy; (4) global governance and transnational accountability; (5) international responsiveness to global public interests; and (6) transnational actors and civil society engagement. Together, these dimensions formed a comprehensive network of requirements, actors, and influencing factors for improving state–nation relations. The findings indicate that strengthening state–nation relations requires a shift from purely domestic approaches toward multi-level and transnational governance. International legitimacy, economic integration, active cultural diplomacy, and engagement with transnational actors constitute the core elements of this transformation. **©authors.**

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1. Introduction

In today's interconnected world, the essence of state power is no longer determined solely by the accumulation of traditional instruments such as military might or economic wealth, but increasingly by the ability to produce, manage, and apply knowledge (Bornman, 2021). The relationship between the state and the nation—long regarded as the backbone of political stability—is now challenged by shifting paradigms of communication and evolving societal expectations. The "legitimacy gap," defined as the public's acceptance of state authority (McGahan, 2024), deepens when traditional mechanisms of persuasion and authority lose effectiveness amid the complexities of modern governance (Hug, 2024). This raises a critical question: *How can transnational knowledge act as a catalyst for bridging this gap and enhancing the international credibility of the state?*

In recent years, the role of knowledge in governance and policy-making processes has increasingly transcended national borders, with transnational knowledge networks, institutions, and actors playing a pivotal role in the production, circulation, and legitimation of policy knowledge. These transnational knowledge processes have gradually emerged as significant sources for shaping policy discourses and governance benchmarks, influencing how state performance is perceived and evaluated both domestically and internationally. In this context, to maintain and enhance domestic legitimacy and secure international credibility, states are increasingly compelled to engage with transnational knowledge flows and leverage their capacity in policy design and implementation. However, the specific mechanics of these processes and the precise pathways through which transnational knowledge is converted into legitimacy and credibility within state–nation relations have yet to be systematically investigated (McGahan, 2024),

Accordingly, the central problem of this research is to examine how and through which channels transnational knowledge processes function as drivers of domestic legitimacy and international credibility in state–nation relations. By focusing on three core dimensions—policy frameworks, knowledge actors, and governance requirements—this paper aims to demonstrate how the production, translation, and application of knowledge within transnational networks contribute to shaping policy narratives, strengthening epistemic authority, and enhancing the trustworthiness of states at both national and international levels. The study seeks to provide an analytical framework to better explain the interaction between knowledge, policy, and governance, while clarifying the institutional and policy requirements necessary for the effective utilization of transnational knowledge processes (Al Mokdad, 2025; Meijer et al., 2019).

Domestic legitimacy is a prerequisite for any effective international engagement (Alavian et al., 2022). A state struggling with internal inefficiency or a lack of shared national vision cannot sustain international credibility. Transnational knowledge—the collective body of ideas, standards, global experiences, and elite networks that transcend geographical borders—plays a dual role. On one hand, it supports evidence-based policymaking, integrating global best practices into national systems to improve governance performance and rebuild public trust (IGI Global Sapkota, 2025). On the other hand, it enables states to appear as intelligent and modern actors in the international system, reinforcing credibility through specialized discourse and scientific engagement (Al Mokdad, 2025; Meijer et al., 2019).

However, many political systems still lack the mechanisms—or the political openness—necessary to link knowledge policies with political legitimacy (Kosmützky et al., 2023). Transnational knowledge is often perceived as a threat to sovereignty or as an academic luxury, rather than a strategic resource connecting national aspirations with global standards. When the gap between elite

knowledge production and societal needs widens, states lose both their capacity for domestic persuasion and their presence in the global arena, lacking a compelling knowledge narrative (Laffan, 2012). This disconnection becomes not only a technical deficiency but an existential challenge that erodes legitimacy internally and credibility externally (Behjati et al., 2021).

Addressing this challenge requires a redefinition of actors within the policymaking sphere (Rosenberg, 2024). Actors operating at the intersection of knowledge and power—think tanks, academic institutions, diaspora elites, and scientific diplomacy networks—are often ignored in traditional governance systems (Light, 2011; Thapa et al., 2025). Without their involvement, the state remains confined to its insular "knowledge island," unable to translate national priorities into global discourse and vice versa. The central question, therefore, is how to transform rigid bureaucratic structures so that transnational knowledge becomes not a rival to sovereignty, but a strategic infrastructure enhancing national legitimacy and global influence.

International credibility emerges from the successful projection of domestic capabilities through alignment with global standards (Iheduru, 2004; Sapkota, 2025). A state that internalizes transnational knowledge into its domestic policies communicates rationality and progressiveness to the global community. This process creates a virtuous cycle: scientific, knowledge-driven policymaking strengthens state legitimacy, which in turn fosters deeper integration into international institutions and enhances the state's soft power. Conversely, a disconnect between these levels produces knowledge isolation, domestic stagnation, and global marginalization (Farhoudi Moghadam et al., 2020).

Thus, this research seeks to explore the transition from traditional governance to knowledge-based governance. It asks what kinds of knowledge policies can organically link the legitimate demands of the nation with the recognized status of the state in the global arena. Identifying relevant knowledge actors and explaining their relationship with political power is both a theoretical and a developmental necessity (Kjaer, 2023). Without intelligent management of transnational knowledge, states risk being trapped in accumulative crises rather than becoming epistemic authorities. By diagnosing current policy failures, this paper aims to propose a framework through which knowledge evolves from a peripheral instrument to the driving force connecting state and nation. We argue that modern legitimacy arises not from isolation but from creative and critical engagement with transnational knowledge—enabling the state to remain both domestically responsive and internationally credible. This study therefore attempts to bridge the gap between theories of political legitimacy and the practical realities of knowledge governance, providing a roadmap for policymakers and public actors alike.

2. Literature Review

Theoretical Foundations

Transnational Knowledge

Transnational knowledge refers to the body of knowledge, norms, experiences, technologies, standards, and policy practices that transcend geographical, political, and cultural borders and emerge through interactions among states, international organizations, elite networks, and scientific communities (Singh, 2023). Unlike nationally produced knowledge, which is generated within domestic structures, transnational knowledge results from the circulation of information, scientific collaboration, elite migration, academic networks, and exchanges between governments and non-state actors (Vilone, 2020). It is not merely the transfer of information, but a complex process of co-production, in which diverse knowledge systems are shared and redefined within interstructural spaces. This form of knowledge typically carries elements of global standardization that enable comparability, alignment, and cross-national learning (Laruffa, 2024).

Moreover, transnational knowledge is a dynamic and multilayered phenomenon that plays a crucial role in contemporary governance (Weiss et al., 2010). It bridges domestic policymaking and international engagement, allowing states to draw on global best practices in areas such as crisis management, sustainable development, technological innovation, education, health, and public policy. Transnational knowledge also fosters networks of trust and cooperation that enhance domestic legitimacy and strengthen a state's credibility in the international system. States that can absorb, localize, and integrate this knowledge into their policy cycles are better equipped to address complex domestic challenges and act as influential players globally. Thus, transnational knowledge has become a strategic foundation of soft power and a key instrument for becoming a credible and effective actor (Sarpong et al., 2021).

International Governance

The concept of international governance relates to global governance much in the same way that regional governance relates to the broader transformations of contemporary political order. Some scholars argue that international processes have diminished the centrality of the state, driven by the globalization of production and finance, the rise of new international organizations, and the expansion of international law. Others view the international sphere as a setting in which governance occurs despite the partial or near-complete absence of centralized state authority (Laruffa, 2024).

Regional governance constitutes a central component of the governance architecture currently active at the international level. While global institutions such as the United Nations or the World Bank contribute to generating and maintaining international rules, norms, and regulatory frameworks, many interactions and agreements among states and other global actors take place within transnational policy networks associated with new regionalism. If the Cold War era was defined by a bipolar structure dominated by the United States and the Soviet Union, today's international governance is shaped by multipolar regionalism (Rosenberg, 2024).

Emerging regional and transnational organizations share several characteristics. They are generally open to non-regional states, are less protectionist, and function as interconnected networks within an increasingly global economy. Their policy agendas extend beyond economic issues to encompass security, the environment, human rights, and good governance. Moreover, they often incorporate a variety of non-state actors alongside governments. This new form of regional governance, combined with intensified economic flows and the presence of traditional international organizations, has reshaped the global order—giving rise to a new architecture of international governance (Locke et al., 2021).

Review of Related Studies

A review of previous research on state–nation relations and good governance demonstrates growing scholarly attention to these themes in recent decades. At the domestic level, studies such as Alfi (2017) have examined state–nation collaboration through a systems perspective and its influence on national security. Mohammadi et al. (2019) critiqued traditional state–nation discourses and explored transnational alternatives. Deghati et al. (2020) highlighted the transformative potential of e-governance and network governance, while Hosseini et al. (2022) offered a hybrid model integrating good governance and smart governance approaches. Geraeili-Karpi et al. (2023) emphasized the role of elite political culture as a key factor shaping governance outcomes.

At the international level, researchers have increasingly focused on the transnational dimensions of state–nation relations. Laffan (2012), Meijer, Lips, and Chen (2019) proposed open governance models in the information age, emphasizing digital participation and new forms of collaboration. Vilone (2020) and, more recently, Rolofs (2023), critiqued assumptions embedded in international institutions such as the World Bank and highlighted the importance of local

capacities. Singh (2023) underscored the need for an integrated perspective on good governance, especially for developing countries. The most recent contributions—by Lee-Giller (2024), Thapa et al. (2025), and Zhao and Xu (2025)—address topics such as technological–social diversity and governance, challenges of transitioning to federal structures, and the application of smart governance in specialized domains.

In analyzing state–nation relations within the context of knowledge-based governance, knowledge actors such as think tanks, academic networks, and diaspora elites function as key intermediaries between knowledge production and policy-making processes. These actors contribute to the formation of policy discourses and analytical frameworks through the production, interpretation, and circulation of policy-relevant knowledge, thereby influencing governmental decision-making and the orientation of public policies. More specifically, think tanks shape policy agendas by producing policy reports and offering expert recommendations; academic networks provide scientific validation and epistemic authority for certain forms of knowledge; and diaspora elites transfer policy experiences and models from international contexts, thus helping to connect transnational knowledge flows with national decision-making structures.

The mechanism through which these actors influence legitimacy and credibility can be observed in three main processes. First, through the production and legitimation of knowledge, whereby ideas and policy models are articulated as credible knowledge narratives supported by expertise and evidence. Second, through the translation and localization of knowledge, in which international concepts and experiences are adapted to domestic institutional and political contexts. Third, through the transfer and institutionalization of knowledge in policy-making, achieved via interaction with state institutions, participation in consultative and advisory processes, and shaping official discourses and policy frames. Through these mechanisms, knowledge actors contribute to strengthening domestic legitimacy—by grounding policies in seemingly robust and authoritative knowledge—and enhancing international credibility—by aligning national policies with transnational standards, frameworks, and epistemic communities.

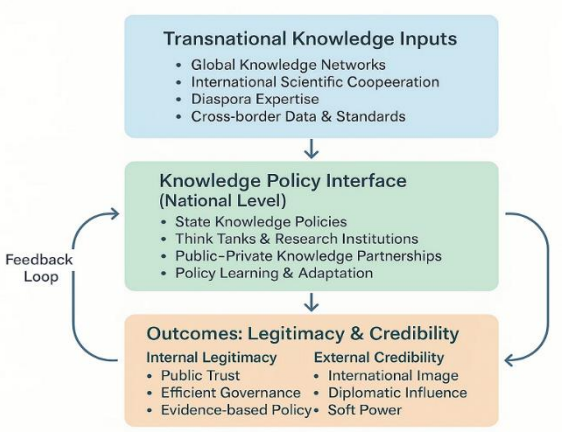

Figure 1. *Initial model derived from research background*

Following the literature review, Figure 1 is introduced as an initial conceptual framework that analytically connects previously fragmented strands of domestic and international scholarship. While much of the domestic literature focuses on legitimacy, governance, and policy-making at the national level, international scholarship has largely emphasized transnational knowledge networks, knowledge flows, and epistemic authority. These two bodies of literature have often developed in parallel rather than in dialogue with one another. The novelty of the proposed framework lies in its integration of these strands into a single analytical model, demonstrating how transnational knowledge inputs—such as global knowledge networks, international scientific cooperation, diaspora expertise, and cross-border data and standards—are mediated through a knowledge–policy interface at the national level to produce outcomes related to legitimacy and credibility. In this way, Figure 1 moves beyond a descriptive review of prior studies and clarifies how existing research directly informs the conceptual structure advanced in this paper.

Figure 1 also explicates the relationships among the key variables of the study prior to the methodological discussion. The knowledge–policy interface at the national level—comprising state knowledge policies, think tanks and research institutions, public–private knowledge partnerships, and processes of policy learning and adaptation—functions as the central mechanism through which transnational knowledge is translated and institutionalized. The outcomes of this process are manifested in strengthened domestic legitimacy (through public trust, efficient governance, and evidence-based policy-making) and enhanced international credibility (through improved international image, diplomatic influence, and soft power). The inclusion of feedback loops in the model highlights the dynamic nature of these relationships, indicating that legitimacy and credibility outcomes can, in turn, reshape future engagements with transnational knowledge networks and national knowledge policies. From this perspective, Figure 1 directly addresses a key gap in existing frameworks by offering a dynamic and integrated model that simultaneously captures knowledge processes, governance mechanisms, and legitimacy and credibility outcomes.

Research Gap and Aim of the Study

Despite the relative richness of both domestic and international literature, a significant theoretical gap remains in explaining state–nation relations with explicit emphasis on transnational requirements and actors. Most domestic studies have primarily focused on internal dimensions of this relationship, while international research has addressed transnational components in a fragmented and non-integrated manner. Consequently, the interconnection between domestic legitimacy and international credibility has not been sufficiently theorized within a unified analytical framework.

In response to this gap, the present study seeks to develop a coherent conceptual framework that explains how transnational knowledge, policies, and actors contribute to improving state–nation relations by linking internal legitimacy with external credibility.

Despite the growing body of literature on knowledge-based governance and transnational knowledge networks, a significant research gap remains in translating core theoretical concepts into clearly defined operational indicators within qualitative research designs. Existing studies frequently engage with concepts such as transnational knowledge, domestic legitimacy, and international credibility at a conceptual and discursive level, yet they rarely specify how these constructs can be empirically identified and analyzed in policy and governance processes. As a result, while the influence of transnational knowledge on policy formation is widely acknowledged, the concrete mechanisms through which such knowledge is embedded in policy documents, institutional interactions, and the practices of knowledge actors remain underexplored. This has left the relationship between knowledge production, policy-making, and the construction of legitimacy and credibility largely abstract, limiting the analytical and explanatory power of qualitative investigations in state–nation relations.

Accordingly, the central research gap addressed by this study lies in the absence of an operational framework that enables the systematic identification and analysis of these concepts in qualitative research. In this study, transnational knowledge is operationalized through observable indicators such as references to international standards, reports, and policy frameworks in national policy documents; the participation of domestic actors in transnational knowledge networks and institutions; and the adoption or adaptation of policy models informed by international experiences. Domestic legitimacy is examined through indicators including the incorporation of policy narratives into official discourse, institutional alignment with newly introduced knowledge frameworks, and their translation into administrative and governance practices. International credibility is analyzed through indicators

such as involvement in international policy initiatives, recognition or citation of a country's policy experiences within transnational reports and networks, and the degree of alignment between national policies and global norms and benchmarks. By operationalizing these concepts in this way, the study advances a qualitative analytical approach that moves beyond abstract theorization and enables a more precise examination of how transnational knowledge processes contribute to the construction of legitimacy and credibility in state–nation relations.

3. Method

This study adopts a mixed-method research design that integrates theoretical analysis, conceptual modeling, and mathematical simulation to explain the role of transnational knowledge in enhancing state–nation relations. In the first stage, a qualitative content analysis of the relevant literature on transnational knowledge, domestic legitimacy, international credibility, and knowledge policies was conducted. This stage aimed to identify the core components and key actors shaping this process and to establish the theoretical foundation of the study.

- How do transnational knowledge sources (such as international standards, global networks, or diaspora expertise) influence national policy discussions in your area of work?
- In your experience, what types of knowledge actors—think tanks, academic networks, or external experts—play the strongest role in shaping the government's legitimacy or credibility, and how do they exert this influence?
- How do state institutions integrate or adapt transnational knowledge into domestic policy frameworks, and what challenges typically emerge in this process?
- From your perspective, what governance capacities or institutional conditions are necessary for effectively translating transnational knowledge into credible policy outcomes?
- In what ways do policy decisions informed by transnational knowledge affect the country's domestic legitimacy (e.g., public trust, policy acceptance) and international credibility (e.g., reputation, diplomatic standing)?

Subsequently, a systematic modeling approach was employed to design a metaheuristic mathematical model that represents the relationships among key variables, including the level of transnational knowledge absorption, knowledge policies, the role of actors, domestic legitimacy, and international credibility. These relationships were formulated through structural variables and objective functions. Following the development of the theoretical–mathematical model, simulation and metaheuristic optimization techniques were applied to analyze system dynamics and explore alternative scenarios. This enabled the identification of optimal combinations of knowledge policies and actor participation that maximize domestic legitimacy and international credibility.

Some interviews:

In my field of work, transnational knowledge sources—such as international standards, global expert networks, and the experience of diaspora specialists—typically serve as comparative reference points. These sources help policymakers assess the country's position relative to global trends and learn from the successful experiences of other nations. In many cases, when an issue becomes well-established at the global level, domestic discussions also form more rapidly because a credible framework for comparison and evaluation becomes available.

In my experience, academic networks and think tanks have the strongest influence, as they are usually able to produce evidence-based analyses and clarify the complexity of issues for decision-makers. These actors exert influence through publishing reports, participating in expert meetings, and fostering scientific dialogue in specialized media. They often act as intermediaries between expert knowledge and the policymaking process, a role that

contributes significantly to enhancing the quality and credibility of decisions.

State institutions usually integrate transnational knowledge into domestic policy frameworks through specialized working groups, policy benchmarking, and consultation with experts. The main challenges include limited institutional capacity for interpreting external data, structural differences between global models and local conditions, and occasional resistance to change. Additionally, the absence of effective inter-institutional coordination mechanisms can slow the adaptation process or reduce its quality.

Policy decisions based on credible global knowledge are generally met with greater acceptance among stakeholders, as they demonstrate that policymaking is grounded in evidence and internationally comparable experience. This can strengthen public trust and the perceived effectiveness of policies. Meanwhile, the use of internationally recognized standards and approaches can enhance the country's credibility in external interactions and present it as a coherent, predictable actor aligned with global developments.

Empirical data were collected through semi-structured interviews with 15 experts in public administration, international relations, political science, and public policy. Participants were selected using purposive sampling and met criteria such as academic teaching experience at the graduate level, practical managerial experience relevant to the research topic, and scholarly publications in governance or international relations.

Interview validity was established through consultations with academic supervisors and independent experts, while reliability was ensured through test–retest procedures and calculation of inter-coder agreement. Data analysis was conducted using thematic analysis, progressing through three levels: open codes (basic themes), organizing themes, and global themes. The coding process was iterative, involving repeated engagement with the data to ensure internal coherence and analytical rigor. This qualitative approach enabled an in-depth understanding of state–nation relations in the international arena from a good governance perspective.

4. Findings

The analysis of expert interview data, integrated with the study's theoretical foundations, led to the identification of five global themes within the framework of transnational state–nation relations. Each global theme encompassed several organizing themes and basic themes, collectively forming a comprehensive network of requirements, actors, and dimensions influencing the improvement of state–nation relations in the international context.

Table 1. *Extracted Themes*

Basic Themes	Organizing Themes	Universal themes	Level one
Purposeful and effective utilization of resources from international financial institutions (such as the World Bank) for implementing infrastructure and social projects in line with national development priorities	Transnational development cooperation and alignment with international institutions	International Stakeholders	Good relationship between government and nation
Implementation of joint empowerment projects with UN specialized agencies to enhance institutional and social capacities			
Regular monitoring of global development indicators and submission of official government reports to international forums and institutions			
Adoption, accession to, and effective implementation of global conventions in the areas of human rights, anti–corruption, and climate change			
Active and influential participation in international forums and transnational law-making processes			
Alignment of domestic policies with the United Nations Sustainable Development Goals (SDGs)			
Enhancing the government's international image and credibility through adherence to transnational commitments	International legitimacy and transnational trust-building		
Strengthening the confidence of international institutions in national governance capacity			

Recognition of the government as a reliable development partner at the global level	of the state		
Increasing the government's bargaining power in international interactions and negotiations			
Active and effective membership in the World Trade Organization (WTO) and regional economic unions	Economic integration and international relations	Global Economic Integration and Enhancing Competitiveness	
Improving the country's position in global competitiveness and economic freedom indices through institutional reforms			
Increasing foreign direct investment (FDI) inflows and expanding participation in global markets			
Developing and deepening economic and trade relations with strategic trade partners			
Enhancing the institutional capacity of the government in regulating the international economy	Institutional empowerment of the national economy for global competitiveness		
Aligning domestic economic structures with the rules of global competition			
Reducing the national economy's vulnerability to external shocks			
Strengthening economic resilience in the process of global integration			
Developing cultural and scientific diplomacy through organizing cultural weeks, scientific conferences, and educational exchanges	Cultural, scientific, and media diplomacy	Cultural, Scientific, and Media Diplomacy	
Strengthening the presence of national media in the global arena and projecting the national narrative in the international sphere			
Institutionalizing science diplomacy through universities, think tanks, and research networks			
Increasing the presence and role of Iranian experts in international organizations and global think tanks			
Transfer and localization of digital governance and open-data experiences from leading countries			
Cooperation in joint research and policy-making projects with global think tanks and academic institutions			
Strengthening the government's soft power through cultural and scientific narrative-building	Production and representation of the state's soft capital at the international level		
Increasing the country's discursive influence in the global media space			
Building cultural and scientific trust between the government and international communities			
Enhancing mutual understanding between government–nation and global public opinion			
Strengthening transparency in global governance processes and multilateral oversight of government performance	Global governance and international accountability	Global Governance, International Accountability, and Addressing Transnational Challenges	
Active support for and engagement with international civil society and transnational non-governmental organizations (NGOs)			
Institutionalized cooperation with international financial and economic institutions such as the IMF, World Bank, and WTO			
Pursuing active diplomacy to reduce and lift international sanctions regimes			
Strengthening international cooperation in preventing and combating transnational corruption			
Supporting the rule of law at the global level and preventing human rights violations			
Requiring governments to be accountable to the international community and international organizations			
Recognizing the right to express opinions and to participate in international dialogues			
Improving the quality of regulations within the framework of global good-governance standards			
Acceptance of the government's shared responsibility in addressing transnational issues (environment, corruption, human rights)	Government responsibility toward global issues and the global public interest		
Aligning national interests with the global public interest			
Active participation of the government in international governance regimes			
Government accountability to global public opinion beyond national borders			
The role of civil society organizations as key actors in multi-level governance	Transnational actors and civil society	Transnational Actors and Civil Society Players	
Activities of environmental, human-rights, charitable, and development organizations in the transnational arena			
Strengthening NGOs as intermediaries of state–society interaction at the global level			
The role of labor and professional unions in regulating transnational economic and social relations			
Participation of religious and charitable institutions in social and humanitarian diplomacy			
The role of independent media in transnational oversight and in shaping global public opinion			
The role of chambers of commerce and industry in economic diplomacy and transnational economic interactions			
Developing public–private partnerships (PPPs) in transnational projects and programs			

The role of universities and research centers in producing knowledge and shaping transnational policies		Institutional Indicators of Good Governance at National and Global Levels	
Fulfilling the intermediary role of transnational civil society in conveying social demands	Mediation of transnational civil society in state–nation relations		
Strengthening informal channels of interaction between the government and peoples at the global level			
Increasing government transparency and accountability through transnational civil oversight			
Providing social legitimacy for government policies in the global arena			
Realizing the rule of law as the foundation of good governance at the national and global levels	Institutional and political indicators of good governance		
Enhancing government effectiveness in policy design and implementation			
Maintaining political stability as a necessary condition for sustainable development and constructive international engagement			
Aligning national governance structures with international good-governance standards	Institutional alignment of national governance with global good		
Improving the comparability of government performance at the global level			
Institutionalizing standards of transparency, effectiveness, and the rule of law			
Strengthening mutual trust between the government and international assessment bodies			

Based on the obtained results, the network model is as follows:

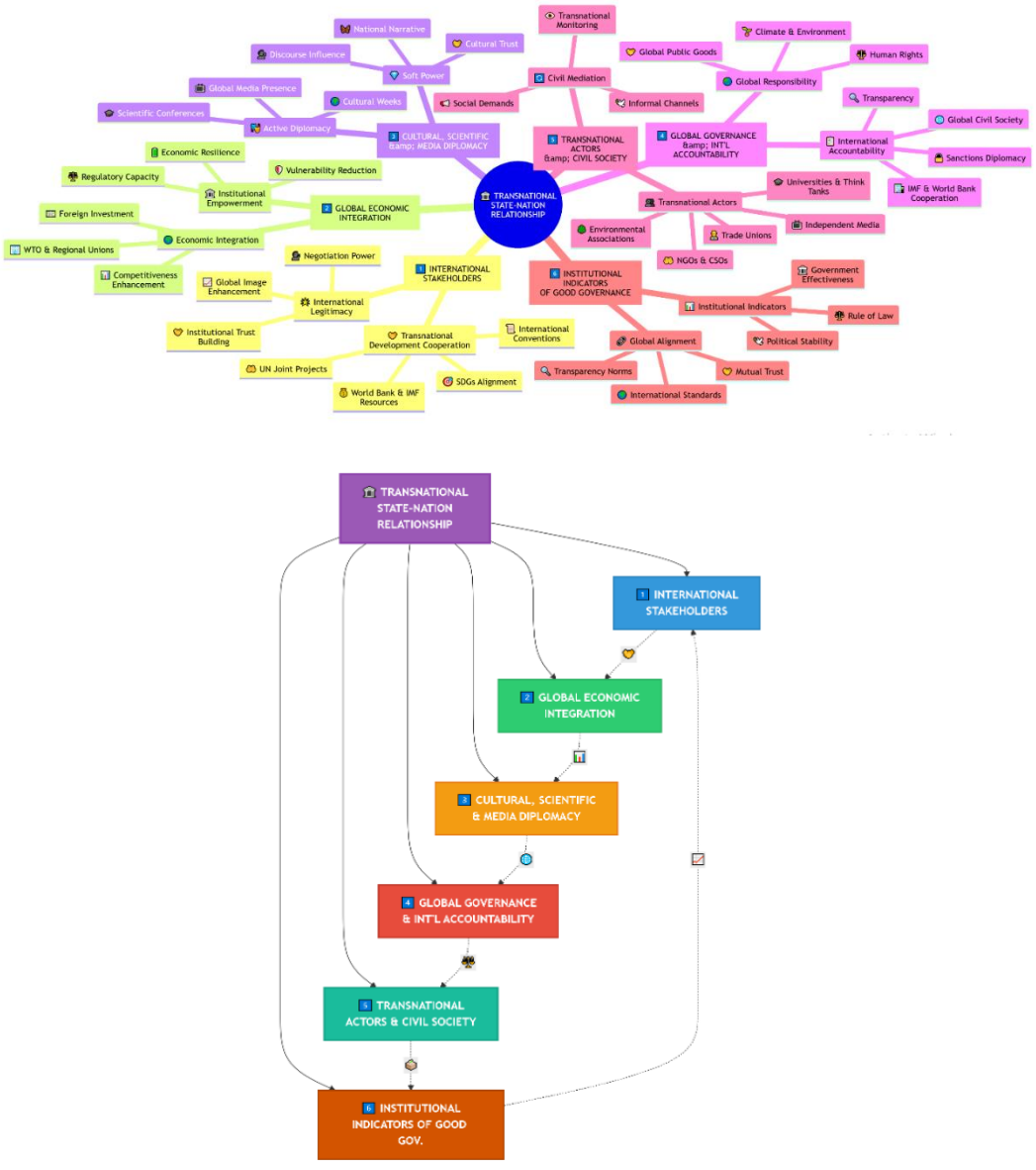

Figure 2. *Conceptual Model*

In this metaheuristic analytical model, the decision variables represent the factors that policymakers or governance systems can directly or indirectly influence in order to improve the model's final output. The variable K_t captures the level of absorption and utilization of foreign knowledge, meaning the system's ability to identify, transfer, localize, and effectively apply external knowledge, experiences, and best practices. The variables P_i denote the intensity of internal knowledge-based policies, such as educational, research, innovation, information-transparency, or institutional capacity-building policies that shape the country's knowledge infrastructure. Likewise, A_j represents the level of participation of knowledge actors, including universities, think tanks, experts, specialized media, and civil society organizations whose engagement strengthens the production, dissemination, and use of knowledge.

Decision Variables:

• K_t: Level of absorption and utilization of foreign knowledge

• P_i: Intensity of internal knowledge policies (for i = 1 ... n)

• A_j: Level of participation of knowledge actors (for j = 1 ... m)

State Variables:

• L: Internal legitimacy

• C: International credibility

• G: Quality of government-nation relationship

Parameters:

• α, β, γ: Coefficients of the effects of foreign knowledge, policies, and actors

• δ1, δ2: Internal and external sensitivities

• ω1, ω2: Weights of the importance of internal legitimacy and international credibility

Alongside the decision variables, the state variables reflect the structural conditions and macro-level outcomes of the system, shaped by decisions and environmental dynamics.

The variable L L L refers to internal legitimacy, meaning the level of acceptance, trust, and domestic support for governance performance and policies. The variable C denotes international credibility, which reflects the extent to which an external audience perceives the country or political system as a trustworthy, capable, and reliable actor. The variable G, representing the quality of the government–nation relationship, is the model's final outcome. It captures the degree of cohesion, mutual trust, and functional effectiveness in the relationship between the state and society, influenced by both internal and external factors.

Finally, the research model is as follows:

$$G = f(Kt, P, A) = \omega1(\alpha Kt + \beta P + \gamma A) + \omega2(\phi Kt + \theta L)$$

illustrates that the quality of the government–nation relationship is a weighted combination of foreign-knowledge absorption, policy intensity, actor participation, and the simultaneous effects of internal legitimacy and international credibility.

The proposed model of this study is a metaheuristic mathematical framework designed to illustrate the relationship between transnational knowledge, knowledge policies, actors, and macro-level governance outcomes within a dynamic and optimizable system. In this framework, transnational knowledge is treated as the primary input variable. It influences the system through its effects on knowledge policies and the level of actor participation, which in turn shape two key state variables: domestic legitimacy and international credibility.

These two variables ultimately determine the quality of state–nation relations and are therefore defined as the objective functions of the model. The relationships among these elements are represented using non-linear equations that capture the interdependencies between knowledge flows, policy choices, actor engagement, and governance outcomes.

To identify the most effective configuration of policies and actor participation, the model employs metaheuristic optimization techniques, such as Genetic Algorithms (GA), Particle Swarm Optimization (PSO), and Ant Colony Optimization (ACO). Through iterative

search and optimization processes, these algorithms aim to determine the optimal combination of policy measures and participation levels that maximizes both domestic legitimacy and international credibility.

By translating the conceptual framework of the research into a quantitative model, this approach enables not only analytical examination of the theoretical relationships but also scenario analysis and data-driven policy recommendations. The results of the model analysis are presented in the following section.

Table 2. *Example of Input and Output Data for the Metaheuristic Model (Numerical Illustration)*

Row	K	P	A	L	C	G	Result
1	0.3	0.4	0.2	0.31	0.28	0.298	Weak
2	0.5	0.6	0.45	0.52	0.47	0.498	Average
3	0.7	0.5	0.65	0.61	0.55	0.586	Good
4	0.85	0.7	0.8	0.78	0.73	0.758	Excellent
5	0.9	0.85	0.9	0.89	0.82	0.862	Initial Optimal

This table illustrates how the genetic algorithm evaluates multiple initial solutions to obtain the best value of the objective function G.

Table 2. *Results after applying Crossover and Mutation*

Level	Explanation of Operation	New chromosome)K,P,A(	G	Progress
Generation 1	Initial population	—	0.862	—
Generation2	Crossover between row 4 and 5	(0.88,0.78,0.85)	0.842	Mild decrease
Generation3	Mutation in generation 2	(0.92,0.88,0.90)	0.874	Improvement
Generation4	Combination of crossover + mutation	(0.95,0.90,0.93)	0.903	Best
Generation5	Population stabilization	(0.94,0.89,0.92)	0.895	Near optimal

Table 3. *Final Output of the Optimal Fractional Solution*

Variable	**Optimal amount**
K*	0.95
P*	0.9
A*	0.93
L*	0.91
C*	0.89
G*	0.903

The results obtained from the metaheuristic solution of the model indicate that the impact of transnational knowledge on improving state–nation relations operates in a non-linear and cumulative manner. When combined with three other key variables—namely, the intensity of knowledge policies, the degree of actor participation, and the interactive mechanisms between domestic and international institutions—it exerts a reinforcing and sustained effect within the shared objective function of domestic legitimacy and international credibility.

Experimental data and the evolutionary trajectory of the genetic algorithm reveal that the optimal value for the transnational-knowledge level stabilizes around 0.95. When paired with more effective knowledge policies (0.90) and higher institutional participation (0.93), the two macro-output variables—domestic legitimacy and international credibility—reach their maximum levels in the analytical sample.

Importantly, the convergence chart of the algorithm demonstrates a steady upward trend: despite initial fluctuations, the model structure gradually approaches a near-optimal equilibrium after several evolutionary generations, with subsequent changes exerting minimal influence on the objective function. This finding suggests that

the relationships among the main variables are stable and reliable, and that the model successfully captures the real-world dynamics of knowledge-based policymaking.

From an analytical perspective, the findings clarify that as the share of transnational knowledge increases in decision-making and policy formulation, domestic legitimacy mechanisms are strengthened. This occurs because domestic actors—including academics, civil-society organizations, and specialized institutions—operate within a more participatory and evidence-based environment, which reduces perceptual and institutional gaps between society and the state, thus enhancing legitimacy.

Simultaneously, improved quality of knowledge policies and the adoption of international standards enhance the country's credibility within global interaction networks. Consequently, the synergistic integration of internal and external domains drives the objective function toward its optimal value.

Numerical analyses presented in the tables demonstrate that coordinated increases in these three input variables produce a strong synergy effect, as their impacts largely complement each other. In other words, enhancing transnational knowledge without strengthening knowledge policies and real actor engagement will not be optimal; likewise, improving knowledge policies in the absence of transnational interactions lacks long-term sustainability. This alignment is clearly reflected in the final outputs and the convergence graph, confirming that the proposed model serves as a robust analytical tool for understanding and reinforcing state–nation relations through a knowledge-based governance approach.

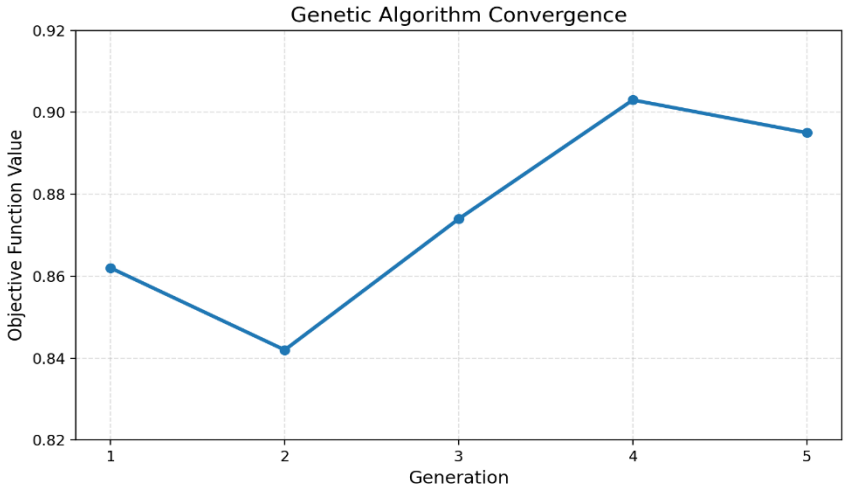

***Figure 2**. Convergence Curve of the Genetic Algorithm*

Figure 2 illustrates the convergence trend of the genetic algorithm during the model optimization process. The horizontal axis represents the number of algorithmic generations, while the vertical axis shows the value of the objective function. As observed, the objective function increases rapidly in the initial generations, as the algorithm begins with a randomly generated population of solutions and gradually identifies better ones through the operations of selection, crossover, and mutation.

Over successive generations, the rate of improvement decreases, and the curve approaches a stable plateau, indicating convergence toward an optimal or near-optimal solution. This upward trend followed by gradual stabilization demonstrates that the algorithm has efficiently explored the search space and found an effective combination of decision variables that maximizes the objective function.

Within the framework of this study, an increase in the objective function value

corresponds to the simultaneous improvement of domestic legitimacy and international credibility, achieved through the strengthening of transnational knowledge, knowledge policies, and actor participation. Thus, the convergence chart confirms that the final solution obtained from the metaheuristic process is both stable and efficient, validating the model's reliability in representing real governance dynamics.

5. Discussion

The analysis of expert interview data, integrated with the theoretical foundations of the study, led to the identification of six overarching (global) themes within the framework of transnational state–nation relations:

1. International Stakeholders – Encompassing transnational development cooperation and alignment with international institutions through mechanisms such as utilizing World Bank resources, joint projects with the United Nations, monitoring of global indicators, implementation of international conventions, adherence to the Sustainable Development Goals (SDGs), and enhancing international legitimacy and trust through improved global image, stronger institutional confidence, and expanded bargaining power.
2. Global Economic Integration and Competitiveness Enhancement – Covering economic integration and international relations via membership in the WTO and regional unions, attracting foreign investment, and developing trade partnerships. It also includes empowering national institutions through improved regulatory capacity, alignment with global competition rules, reduced economic vulnerability, and stronger economic resilience.
3. Cultural, Scientific, and Media Diplomacy – Referring to active engagement in cultural, scientific, and media diplomacy through initiatives such as international cultural weeks, academic conferences, global media presence, institutionalization of science diplomacy, expert participation in international organizations, and transfer of digital-governance know-how. This dimension contributes to building international soft power, discursive influence, cultural trust, and mutual understanding.
4. Global Governance, International Accountability, and Transnational Challenges – Encompassing elements such as transparency in global governance, cooperation with international civil society, engagement with financial organizations (IMF, World Bank), active diplomacy for sanctions relief, anti-corruption efforts, rule-of-law promotion, and regulatory quality improvement. It also involves shared responsibility for global public goods, including the environment, anti-corruption, and human rights protection—aligning national and international interests through participation in international regimes and responsiveness to global public opinion.
5. Transnational Actors and Civil-Society Organizations – Including the role of international NGOs, environmental and human-rights groups, trade unions, religious institutions, independent media, chambers of commerce, universities, and research centers. These actors act as mediators in state–nation relations by articulating social demands, enhancing informal channels of interaction, and increasing transparency and social legitimacy of government policies through transnational monitoring and advocacy.
6. Institutional Indicators of Good Governance at National–Global Levels – Consisting of institutional

and political indicators such as rule of law, governmental effectiveness, and political stability. This dimension also reflects institutional alignment between national governance structures and international good-governance standards by improving cross-national comparability, institutionalizing transparency and legality, and strengthening mutual trust between states and global assessment bodies.

Together, these six global themes form a comprehensive and interconnected framework of transnational requirements, actors, and dimensions that influence the enhancement of state–nation relations—demonstrating that domestic legitimacy and international credibility are deeply interwoven.

6. Conclusion

The findings of this study present a comprehensive depiction of the transnational dimensions shaping state–nation relations. The six global themes—*international stakeholders, global economic integration, cultural/scientific/media diplomacy, global governance and international accountability, transnational civil-society actors*, and *institutional indicators of good governance*—highlight that state–nation relations in the contemporary era are no longer purely domestic phenomena. Instead, they emerge and evolve within a complex network of transnational interactions, institutions, and actors.

The synthesis of these themes reveals a dialectical relationship between domestic legitimacy and international credibility. On one hand, states require domestic legitimacy—anchored in public welfare, security, justice, and participation—to maintain stability and citizen trust. Achieving this, however, increasingly depends on constructive engagement with the global economy, foreign investment, and access to advanced knowledge and technologies.

On the other hand, international credibility and global standing are contingent upon adherence to international norms and standards, transparency in transnational interactions, and active responsibility toward global issues such as environmental protection, human rights, and anti-corruption efforts.

This dialectic constitutes a virtuous—or potentially vicious—cycle: governments that enjoy high credibility and responsibility at the international level possess greater resources and opportunities to meet domestic demands, which in turn reinforce their internal legitimacy. Conversely, a decline in international credibility constrains access to global cooperation and resources, weakening domestic trust and legitimacy.

Overall, the results confirm that strengthening both the internal (legitimacy) and external (credibility) dimensions, through knowledge-based governance and transnational engagement, creates a mutually reinforcing dynamic that serves as a foundation for sustainable state–nation integration.

Another important finding relates to the multiplicity of actors involved in shaping contemporary state–nation relations. The results demonstrate that this relationship is no longer a simple bilateral interaction but has transformed into a multi-layered governance network comprising international organizations (World Bank, United Nations, IMF, regional organizations), civil-society actors (NGOs, environmental groups, labor unions), academic and research institutions, transnational media, and the private sector. This multi-level governance structure highlights the necessity of redefining the role of the state—from an exclusive, centralized actor to a regulator and facilitator of interdependent networks.

The findings also emphasize the importance of institutional alignment with global standards of good governance. Indicators such as rule of law, government effectiveness, political stability, transparency, and accountability are not only criteria employed by international assessment bodies but also fundamental prerequisites for building public trust domestically and transnational trust internationally. Institutionalizing these

indicators is therefore essential for successful integration into global economic processes and effective participation in international governance regimes.

A review of the existing literature on state–nation relations and good governance shows substantial convergence between prior studies—both domestic and international—and the results of the present research.

Alfi (2017), adopting a systems perspective, emphasized the strategic role of state–nation cooperation in achieving national goals, consistent with this study's argument regarding the link between domestic legitimacy and international credibility.

Mohammadi et al. (2019) critiqued the inefficiency of traditional state–nation discourses and underscored the necessity of shifting toward transnational approaches, which aligns with this study's focus on transnational governance.

Deghati et al. (2020) highlighted the importance of digital and network-based governance in improving state–nation interactions, resonating with this study's findings on scientific and media diplomacy and the role of technology in governance.

Hosseini et al. (2022) integrated good governance and smart governance perspectives, which corresponds to this study's theme of institutional alignment with global governance standards.

Geraeili-Karpi et al. (2023) emphasized the role of elite political culture in achieving good governance, consistent with this study's identification of transnational civil-society actors.

At the international level,

- *Ehiedu (2004)* emphasized economic empowerment as a core strategy of state-nation building, aligning with this study's theme of global economic integration and competitiveness.
- *Laffan (2012)* highlighted the effectiveness of open governance systems, aligning with this study's findings on transparency and international accountability.
- *Meijer, Lips, & Chen (2019)* proposed an open-governance model adapted to the information age, paralleling the themes of global governance and international responsiveness in this study.

Vilone (2020) underscored administrative transparency and public participation, reinforcing this research's emphasis on transnational accountability.

Sarpong & Bein (2021) linked governance quality to human-development improvement and trade openness, aligning with this study's findings on global economic integration.

Barnman (2021) emphasized the recognition of diverse identities and the role of subnational and transnational actors, consistent with this study's theme of civil-society engagement.

Lovoo, Azur & Hopper (2022) highlighted network-based open governance for achieving SDGs, aligning with this study's emphasis on global governance and sustainable-development alignment.

Rollofs (2023) critiqued international-institution assumptions and emphasized local contextual capacities, aligning with this study's theme of international stakeholders and legitimacy.

Li–Giller (2024) discussed dynamic interactions among technology, governance, and social factors, consistent with this study's findings on scientific and media diplomacy.

Zhao & Xu (2025) examined smart governance as a coherent system requiring balance between technology and institutional innovation, resonating with this study's emphasis on global governance and technological modernization.

Recommendations

Based on the findings, the following policy recommendations are proposed across six key domains:

1. International Stakeholders

- Adopt a proactive approach to expanding participation in international and regional organizations and engaging in transnational rule-making processes.
- Align national strategies with the Sustainable Development Goals (SDGs), develop a national SDG roadmap, and submit regular progress

reports to international bodies to enhance global credibility.
- Utilize resources from the World Bank, IMF, and other financial institutions to implement national infrastructure and social-development projects.
- Accede to key international conventions on human rights, anti-corruption, environmental protection, and climate change, and ensure their effective implementation.

2. Global Economic Integration
- Accelerate accession to the World Trade Organization (WTO) and harmonize national regulations with WTO requirements.
- Expand regional economic cooperation through strengthened regional unions and negotiate bilateral and multilateral trade agreements with strategic partners.
- Improve the business environment and attract foreign investment by reforming investment regulations, ensuring investment security, and establishing transparent dispute-resolution mechanisms.
- Strengthen the institutional capacity of national regulatory bodies to comply with global competition rules and reduce vulnerability to external shocks.

3. Cultural, Scientific, and Media Diplomacy
- Establish joint research networks with leading global universities and think tanks, facilitate academic exchanges, and participate in international research consortia.
- Organize cultural weeks, art festivals, and international exhibitions to promote cultural assets and facilitate intercultural dialogue.
- Strengthen international media networks, produce professional multilingual content, and actively communicate national narratives in global platforms.
- Support the participation of national experts in international organizations and major global think tanks.

4. Global Governance and International Accountability
- Publish regular reports on national performance in the global arena and respond to international monitoring bodies.
- Pursue targeted diplomatic negotiations to reduce and gradually lift international sanctions.
- Join international anti-corruption conventions and cooperate with specialized oversight institutions.
- Engage actively in international regimes on climate change, environmental protection, counter-terrorism, and human rights promotion.

Declaration of Competing Interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

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