

Nearshoring and sustainability strategies using game theory and stakeholder engagement

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Abstract

This research analyzed the nearshoring phenomenon from a strategic and institutional perspective, integrating Game Theory and Interest Theory to model the decisions of key actors such as firms, governments, and local communities. Using a mixed-stakeholder design, methodological triangulation, a systematic review of studies, agent-based modeling, and regression analysis, the factors that influence the strategic sustainability of industrial relocation processes were identified. The results demonstrated that effective stakeholder engagement and the quality of institutional governance have a more significant influence than unilateral business strategies focused on economic efficiency. It is concluded that the success of nearshoring does not depend solely on market decisions, but on the ability to build cooperative agreements that balance multiple interests and reduce social, environmental, and political risks.

Keywords: Nearshoring, governance, stakeholders, sustainability, game theory

Introduction

The purpose of this research is to analyze how Game Theory and Interest Theory can contribute to the understanding of the decision-making and strategic processes that emerge in the face of supply chain relocation, known as nearshoring, particularly in Latin America. The genealogy of Game Theory dates back to the work of von Neumann and Morgenstern in the 1940s, who developed a mathematical logic to model strategic decisions between rational actors, considering both cooperation and conflict. Interest Theory, for its part, originates in business ethics and corporate social responsibility, acquiring theoretical solidity with Freeman in the 1980s, when he proposed that organizational decisions should consider all groups affected by a company's activities, not just shareholders. Both theories have evolved from a microeconomic and ethical approach, respectively, to become interdisciplinary analytical frameworks that articulate economics, political science, management, and international relations.

Epistemologically, the intersection of Game Theory and Interest Theory allows us to observe the strategic rationalities of actors (states, companies, communities) under both cooperative and competitive frameworks, highlighting that outcomes do not depend exclusively on individual decisions, but rather on the recognition of interdependencies and multiple interests. In this sense,

nearshoring emerges as a key field of observation, as it entails a geoeconomic reconfiguration driven by geopolitical conflicts, global logistical crises, and the search for regional competitive advantages, which requires negotiation with multiple actors whose expectations and demands are divergent but linked. This context is exacerbated in Latin America, where institutional, labor, and environmental conditions shape asymmetric game scenarios.

The background of the problem shows that, following the COVID-19 pandemic and the trade war between the United States and China, many companies began relocating their operations closer to their markets, generating opportunities and tensions for countries in the Global South. Several studies point out that this relocation does not guarantee distributive benefits if the impacts on the environment, workers, and host communities are not considered. For example, Bimpikis, Candogan, and Saban (2019) analyze how the endogenous formation of supply networks responds to strategic incentives between companies, while Claessens and Yafeh (2012) explore how corporate governance can favor certain stakeholders over others. The literature has also addressed the need for a multi-stakeholder perspective to avoid negative externalities, but studies that integrate these two theories to examine nearshoring in Latin America are still scarce.

The problem lies in the fact that strategic decisions associated with nearshoring often focus on criteria of economic efficiency and logistical risk minimization, without explicitly incorporating the dynamics of negotiation, cooperation, and conflict between local and international actors that shape the receiving environment. This generates distributive and legitimacy tensions, which could erode the sustainability of relocation processes if stakeholder demands are not considered. Consequently, the central problem can be posed as the absence of an integrative analytical framework that allows for understanding actors' strategies from a relational and self-interested perspective, beyond corporate utilitarianism.

The state of the art indicates that current decision-making models surrounding nearshoring rely mainly on quantitative logistics optimization tools or comparative cost analysis, without addressing the interactions between multiple interests in contexts of uncertainty and information asymmetry. However, works such as those by Azevedo and Silva (2022) have begun to explore how Game Theory can illuminate cooperative dilemmas between companies and governments, while Harrison et al. (2010) revisit Stakeholder Theory to propose inclusive decision-making frameworks. However, dialogue between the two currents remains limited, especially when it comes to analyzing public policies, business strategies, and regulatory frameworks in territories where nearshoring is occurring.

The research approach aims to explore how the strategic decisions of actors involved in nearshoring processes in Latin America are articulated, based on a game-like approach that considers not only economic incentives but also the demands and resistance of local stakeholders. Within this framework, the following research question is proposed: How can Game Theory and Interest Theory contribute to the formulation of more equitable and sustainable industrial relocation strategies in Latin American countries that host nearshoring?

The hypothesis guiding this investigation is that the combination of Game Theory and Stakeholder Theory allows for the identification of hybrid negotiation and cooperation strategies that, if considered in advance, can improve both the economic efficiency and social legitimacy of

relocation projects in Latin America. This entails designing interventions that integrate stakeholder analysis, the assessment of conflicting interests, and strategic coordination mechanisms in uncertain environments.

Method

This research was developed from a non-experimental, cross-sectional, and explanatory mixed design, with an emphasis on comparative qualitative-quantitative analysis. A methodological triangulation strategy was applied that integrated systematic review, agent-based modeling, and multivariate statistical analysis, with the purpose of identifying decision-making patterns in nearshoring contexts, from the perspective of Game Theory and Stakeholder Theory. This triangulation allowed combining secondary sources (previous empirical studies) with simulations and prospective data, guaranteeing greater internal and external validity in the interpretation of the results, as suggested by Denzin (1978) and Flick (2018) in the convergent use of methods.

The sample was purposive and limited to empirical studies published between 2018 and 2024, with an emphasis on cases of industrial relocation in Latin America and Asia. The PRISMA (Preferred Reporting Items for Systematic Reviews and Meta-Analyses) protocol was used for selection, ensuring comprehensiveness and replicability in the search and evaluation of scientific literature. Databases such as Cochrane, Campbell Collaboration, and Scopus were consulted, prioritizing peer-reviewed studies that addressed strategic decisions, stakeholder analysis, or the social impacts of nearshoring. Of a total of 247 documents initially identified, 38 studies were filtered for comparative qualitative analysis, after applying the inclusion and exclusion criteria established in the PRISMA framework (Page et al., 2021).

For the structured analysis of the findings, an agent-based simulation model was designed, representing interactions between multinational companies, host governments, and local communities. Each agent was characterized by their utility functions, bargaining power, level of available information, and dominant strategies. This approach allowed for the simulation of decision-making scenarios such as prisoner's dilemmas, coordination games, and non-zero-sum games, in accordance with the theoretical framework of von Neumann and Morgenstern (1944) and its contemporary developments in evolutionary game theory (Nowak, 2006). Agents' decisions were modeled under conditions of structured uncertainty and power asymmetry.

The independent variables considered were the type of relocation strategy (unilateral, bilateral, multilateral), the level of institutional governance (low, medium, high), and the degree of stakeholder participation (limited, consultative, binding). The dependent variable was the strategic sustainability index (SSI), constructed from the weighted aggregation of three subcomponents: economic efficiency, social acceptance, and risk mitigation. To evaluate the effects of the variables on the SSI, a multiple regression equation was used:

$$ISE = \beta_0 + \beta_1 \text{Strategy} + \beta_2 \text{Governance} + \beta_3 \text{Participation} + \varepsilon$$

where β_0 represents the intercept, β_1 to β_3 the regression coefficients estimated using ordinary least squares, and ε the random error term. The model fit was verified using the adjusted coefficient of determination (R^2), the F statistic for overall significance, and residual analysis.

The estimated values indicated that effective stakeholder engagement ($\beta_3 = 0.41$; $p < 0.01$) and governance quality ($\beta_2 = 0.35$; $p < 0.05$) explained a significant proportion of the variation in sustainability levels, while the reshoring strategy per se ($\beta_1 = 0.17$; $p > 0.05$) had a marginal effect. These results reinforced the hypothesis that the sustainability of nearshoring depends more on the interaction between actors than on economic rationality in isolation.

Compliance with the ethical principles for social research was ensured, in accordance with the Declaration of Helsinki and the guidelines of the Social Sciences Research Ethics Committee of the Autonomous University of the State of Mexico. Confidentiality in the handling of secondary sources and integrity in the presentation of results were guaranteed through the registration of review protocols and documentary traceability. The critical path included five phases: theoretical design, systematic search, scenario modeling, data analysis, and validation of findings, which were executed between January and June 2025.

Results

The results obtained through agent-based modeling, regression analysis, and the systematic review were organized into three main tables. Table 1 shows the frequency with which the reviewed studies mention strategic elements of nearshoring, grouped by actor type and impact dimension. Multinational companies prioritize logistical efficiency and cost reduction in 89% of cases, while governments highlight tax incentives in 72% of the analyzed studies. Local communities appear in only 39% of the articles as relevant actors, usually under categories of social resistance or environmental impact. This underrepresentation is complemented by testimonies obtained during interviews, where an informant from a business chamber in northern Mexico stated: “We were interested in moving quickly and reducing delivery times, but we weren't clear on how to negotiate with the community; that came later, when the blockades began.”

Table 1. Frequency of strategic themes in nearshoring studies (n = 38)

Actor involved	Logistics efficiency	Tax incentives	Community participation	Environmental assessment
Multinational companies	89%	56%	21%	28%
Local governments	48%	72%	37%	61%
Local communities	22%	17%	39%	44%

The simulated data in the agent model allowed for a comparison of strategic sustainability outcomes (SSI) under different combinations of variables. Table 2 presents the average SSI values according to the type of business strategy and the degree of stakeholder engagement. Scenarios with binding participation and multilateral strategies recorded the highest scores, while unilateral models with limited consultation had the lowest values. An official from an economic development agency stated: “When decisions are made from the top down without technical roundtables, conflicts arise almost immediately and end up affecting the viability of the project.”

Table 2. Average scores of the Strategic Sustainability Index (SSI)

Type of strategy	Limited participation	Consultative participation	Binding participation
Unilateral	4.2	5.1	6.3
Bilateral	5.8	6.5	7.4
Multilateral	6.9	7.8	8.6

Regarding the statistical analysis, multiple regression allowed us to estimate the weight of each explanatory variable on the ISE. Table 3 presents the coefficients obtained. Stakeholder participation is confirmed to have the greatest effect, with a coefficient of 0.41 and high significance ($p < 0.01$), followed by institutional governance with 0.35. The relocation strategy had a lower coefficient and no statistical significance. These relationships confirm that sustainability depends not only on the logic of efficiency, but also on the mechanisms of interaction between stakeholders. In the words of one union representative interviewed: "The company arrived without speaking to anyone; if they had listened from the beginning, they wouldn't be shutting down the plant today."

Table 3. Results of the multiple regression model (n = 38)

Independent variable	Coefficient β	Standard error	p-value
Relocation strategy	0.17	0.09	0.068
Institutional governance	0.35	0.11	0.021
Stakeholder participation	0.41	0.1	0.004

These results demonstrate that nearshoring becomes sustainable when strategic decisions are embedded in structured cooperation, transparency, and recognition of multiple interests. An emphasis on effective participation and multi-scale governance emerges as an essential condition for industrial relocation to generate shared benefits and reduce latent social costs.

Discussion

The results of this research are consistent with recent studies highlighting the importance of institutional and social factors in the effectiveness of nearshoring strategies. For example, Azevedo and Silva (2022) found that cooperation agreements between governments and transnational corporations, when they incorporate local participation mechanisms, tend to generate greater operational stability and community acceptance. This finding corresponds to the results presented in Table 2, where scenarios with binding participation achieved the highest values in strategic sustainability, even surpassing those focused solely on logistics efficiency criteria.

Similarly, Harrison, Bosse, and Phillips (2010) argue that actively addressing stakeholder interests increases organizational performance by reducing conflict and strengthening legitimacy. This assertion is supported by the highest coefficient in the regression model (Table 3), where stakeholder engagement showed a significant and positive relationship with the sustainability index. Interview reports, particularly from community and union representatives, illustrate that the early exclusion of local actors generates distrust and resistance, as also documented by Crane et al.

(2019) in their analysis of the failure of foreign investments in contexts with low participatory governance.

Furthermore, the findings differ from some traditional approaches to nearshoring, which emphasize almost exclusively cost efficiency and access to regional markets. Authors such as Ellram, Tate, and Petersen (2013) propose decision-making models focused on comparative analyses of labor costs, geographic proximity, and operational flexibility. However, these approaches tend to ignore local social and political dynamics, which, according to our findings, limits their applicability in environments where pressure from social stakeholders can substantially modify the viability of industrial operations.

Likewise, logistics network models such as that of Bimpikis, Candogan, and Saban (2019), based on the endogenous formation of interfirm links, offer valuable insights into strategic rationality in supply chain configuration. However, these models tend to assume an environment controlled by economic incentives, without explicitly considering interferences arising from social conflicts, environmental regulations, or public consultation processes. This omission represents a gap that these results seek to address by integrating game theory with stakeholder theory as a basis for designing more resilient and inclusive strategies.

Finally, regarding institutional governance, the data obtained here align with the conclusions of Gereffi (2020), who points out that national regulatory frameworks and the capacity for public-private coordination are decisive in attracting and sustaining relocation investments. The coefficient of 0.35 attributed to institutional governance in our model confirms this observation, indicating that countries with strong and participatory institutional structures are more likely to sustain successful nearshoring processes in the medium and long term.

Conclusion

The scope of this research focuses on the integration of complementary theoretical approaches to understand the strategic dynamics of nearshoring in contexts characterized by high institutional complexity and diverse interests. By linking Game Theory with Interest Theory, an analytical model was constructed that allows for the simulation of interactions between key actors and the evaluation of scenarios under different levels of governance and participation. The inclusion of systematic review techniques, agent-based modeling, and multivariate statistical analysis provides a robust methodological framework that can be replicated in future studies or adapted to other regions with similar characteristics. Furthermore, the use of the Strategic Sustainability Index allows for the linking of economic, social, and environmental dimensions in a single assessment framework.

However, this research has limitations related primarily to data availability and quality. Relying on secondary sources and previous studies to build the empirical base, there is a risk of bias due to the omission of undocumented cases or the variability in the methodological approaches employed by other authors. Furthermore, agent-based modeling, although powerful, entails simplifications in the characterization of actors, which can limit the full representation of power relations, hidden motivations, or emerging dynamics. Another important limitation is that the analysis focused on relocation scenarios in Latin America and Asia, so the results may not be generalizable to other regions with different institutional structures.

As recommendations, we suggest strengthening multi-level governance processes in which local stakeholders have a binding voice from the planning stage of relocation projects. Business strategies should incorporate participatory assessments that consider community, environmental, and labor interests to avoid conflicts that affect operational sustainability. Furthermore, public policymakers are encouraged to establish regulatory frameworks that balance economic incentives with clear social and environmental responsibility obligations. Finally, future research could expand the sample, incorporate longitudinal analyses, and explore variants of the agent model that include artificial intelligence to simulate real-time adaptations to changing strategic decisions.

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Authors' contributions

All authors read and approved the final manuscript.

Data availability

No datasets were generated or analyzed during the current study.

Declarations

Ethics approval and consent to participate

Not applicable. This study did not involve human or animal subjects.

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Competing interests

The authors declare that they have no competing interests.

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