

Strategic Accounting Decisions and Business Cooperation in Nearshoring: A Simulation Approach

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Abstract

This research analyzed strategic business decisions in the context of nearshoring using game theory and double-entry theory, considering variables such as tax benefits, regulatory costs, reputational risk, and expected profitability. Using a mixed-agent design, multi-agent modeling, multiple linear regression, and documentary analysis using the PRISMA and Campbell approaches, it was identified that cooperative strategies between companies generate higher returns and lower variability in competitive contexts. Methodological triangulation, along with interviews with specialists and simulations, allowed us to understand how accounting not only reflects but also structures decision-making in industrial relocation processes. The results show that strategic cooperation, accounting transparency, and institutional design significantly influence the success of nearshoring, suggesting that accounting decisions should be evaluated based on their economic, social, and reputational impact.

Keywords: Nearshoring, game theory, accounting, strategic cooperation, computer simulation

Introduction

The objective of this paper is to analyze how Game Theory and Double Entry Theory allow us to understand and anticipate the effects of nearshoring on strategic, accounting, and tax decision-making within globalized value chains. The genealogy of both theories starts from different but complementary contexts: while Game Theory emerged in the 20th century as a mathematical model to predict rational behavior in situations of conflict or cooperation between strategic actors (Von Neumann and Morgenstern, 1944), Double Entry Theory dates back to the 15th century as an accounting practice developed by Luca Pacioli that allows the symmetrical recording of an entity's economic movements, ensuring equity balance and financial traceability. In epistemological terms, Game Theory is situated within the framework of instrumental rationalism and quantitative behavioral modeling, while Double Entry Theory is part of a practical accounting rationality, oriented toward the faithful representation of economic transactions and their evaluation in risk and control scenarios. The current context of productive reconfiguration derived from nearshoring—understood as the relocation of manufacturing and logistics processes closer to the final consumer market, especially in North America and with a strong impact in Mexico—generates new strategic

tensions between companies, states, and local communities, as well as more complex demands regarding accountability, regulatory compliance, and transparency in financial reporting.

The background shows that both Game Theory and financial accounting have been applied in strategic decision-making and the analysis of competitive scenarios; however, few studies have linked the two to examine recent phenomena such as nearshoring. Authors such as Brandenburger and Nalebuff (1996) have proposed the notion of coopetition as an intermediate form between competition and cooperation, applicable to the analysis of industrial clusters. On the other hand, accounting studies such as those by Hopwood (1987) warn that accounting systems are not neutral, but rather constructs economic and political reality. The central problematization is based on the fact that, although nearshoring has been promoted as a strategy to secure supply chains and attract investment, its distributive, fiscal, and environmental effects have not been sufficiently understood or managed from integrative models that articulate strategic decisions with verifiable accounting structures. The state of the art reflects an analytical gap: while game models have been developed to analyze industrial location decisions (Bauch et al., 2020), accounting approaches applied to nearshoring have been limited to financial reporting without integrating strategic behavior models.

The research approach argues that it is possible to construct an interpretive framework by combining Game Theory and Double Entry Theory to analyze investment, cooperation, and regulatory compliance decisions arising from nearshoring, allowing not only the representation of transactions but also the anticipation of behaviors in uncertain scenarios. The research question is: How can Game Theory be integrated with Double Entry Theory to interpret the accounting and strategic decisions of actors involved in nearshoring processes in Mexico? The hypothesis states that the joint application of Game Theory and Double Entry Theory allows for the modeling of strategic decisions in contexts of industrial relocation and improves accountability, financial traceability, and the responsiveness of economic actors in cooperative or conflictual scenarios.

Method

This research used a predominantly quantitative mixed-methodological approach, complemented by qualitative procedures through a non-experimental, cross-sectional, and explanatory design. Methodological triangulation was used to improve the study's internal validity by integrating systematic documentary analysis, agent-based modeling, and the simulation of strategic decisions using game theory tools. Triangulation allowed for the comparison of findings from different perspectives, generating a more robust analysis of industrial relocation linked to nearshoring and its accounting representation. This strategy was based on the recommendations of Denzin (1978), who posited that combining methods allows for the identification of consistent patterns in complex contexts.

The sample was purposive and comprised audited financial reports, tax returns, and sector studies from 25 manufacturing companies with operations in Mexico and the United States, selected based on their participation in cross-border industrial clusters. In addition, 10 semi-structured interviews were conducted with specialists in strategic accounting, international economics, and foreign trade. Document analysis was based on criteria from the PRISMA model for systematic reviews, prioritizing sources with methodological transparency, replicability, and contextual relevance. The Cochrane and Campbell approach was also used for critical appraisal of reviews and meta-analyses,

allowing for the establishment of empirical relationships between accounting evidence and industrial relocation decisions.

The process was governed by ethical principles of informed consent, confidentiality, and data protection as established by the Declaration of Helsinki, ensuring that the information obtained was not used for commercial or coercive purposes. The critical research path included five phases: theoretical and empirical delimitation, simulation design, documentary and testimonial information collection, agent modeling, and results validation. The modeling was developed using NetLogo, configuring a system of agents representing companies, governments, and local communities. The agents made strategic decisions under conditions of asymmetric information, tax incentives, and compliance costs, which allowed for the simulation of cooperative and conflictive scenarios in the face of nearshoring.

The variables analyzed were: regulatory compliance cost (X_1), perceived tax benefit (X_2), expected profitability (Y), and reputational risk (Z). The base equation used was a multiple linear regression of the type $Y = \beta_0 + \beta_1 X_1 + \beta_2 X_2 + \epsilon$, in which the relationship between tax incentives and regulatory costs on expected profitability was explored. Pearson's correlation coefficient was used to identify linear relationships between variables, complemented by the coefficient of determination R^2 to evaluate the proportion of explained variance. The simulation allowed assigning probabilistic values to the agents' strategic decisions, integrating cooperative (cooperative Nash) and non-cooperative (non-cooperative Nash) behaviors based on external conditions. This approach was consistent with previous studies that use agent models and game theory to analyze complex decisions in dynamic economic contexts (Tsfatsion and Judd, 2006; Bauch et al., 2020).

Results

The results of the analysis showed that companies participating in nearshoring processes in northern Mexico make strategic decisions considering a combination of tax incentives, regulatory costs, and reputational risk. As shown in Table 1, the most significant regression coefficient was that of the perceived tax benefit (X_2), with a value of $\beta_2 = 0.63$, indicating that the greater the perception of tax benefits, the higher the expected profitability. In contrast, the cost of regulatory compliance (X_1) presented a negative coefficient of $\beta_1 = -0.47$, suggesting that high levels of regulatory demand decrease investment intention.

Table 1. Results of the multiple linear regression model on nearshoring investment decisions

Independent variable	Coefficient β	Standard error	t-value	p-value
Constant (β_0)	1.12	0.21	5.33	0
Regulatory cost (X_1)	-0.47	0.08	-5.88	0
Tax benefit (X_2)	0.63	0.07	9	0
R^2	0.71			

The results indicate that the model explains 71% of the variability in expected profitability, reinforcing the relevance of the combined game theory and accounting approach. One of the companies interviewed stated: "The decision to move part of the operation to Mexico depended not only on labor costs but also on tax incentives; without these, nearshoring loses its appeal." This

statement corroborates the importance of tax benefits as a decisive variable, coinciding with the statistical strength observed in the model.

The agent-based simulation replicated 50 scenarios with variations in incentives and risks, allowing for the identification of patterns of behavior across firms. Table 2 shows the results of the simulated strategic decisions under two types of equilibrium: cooperative and non-cooperative. Firms that adopted cooperative strategies achieved an average expected return of 12.8%, while non-cooperative firms achieved only 7.4%, with a higher standard deviation.

Table 2. Expected return by type of strategy in the agent model

Type of strategy	Average return (%)	Standard deviation (%)
Cooperative (Cooperative Nash Equilibrium)	12.8	2.1
Non-cooperative (classical Nash)	7.4	4.5

One of the analysts interviewed commented: “In industrial parks where companies share infrastructure and jointly comply with environmental requirements, there is greater stability and benefits for all. When each company acts independently, risk is poorly dispersed and the cost of noncompliance increases.” This statement reinforces the results observed in Table 2, where cooperation generates higher returns with lower variability.

Furthermore, it was observed that reputational risk (variable Z), although not included as a predictor in the main regression, played a decisive role in the simulation scenarios. In contexts with high media exposure or community pressure, business actors prioritized cooperative and transparent decisions, even when tax incentives were lower. One of the public officials interviewed expressed it this way: "Some companies prefer not to risk their brand with local protests or legal disputes, even if it means less profit in the short term."

Overall, the findings show that strategic decisions associated with nearshoring do not respond solely to classic accounting rationales, but rather integrate dynamics of cooperation, reputation, and shared compliance. The agent model allowed these nuances to be captured, while regression analysis clearly quantified them, offering a solid framework for the multicausal analysis of industrial relocation.

Discussion

The results obtained in this research partially coincide with the findings of Bauch, Galvani, and Earn (2020), who modeled strategic decisions in public health contexts using game theory and demonstrated that cooperation between agents increases collective benefit, although in environments of high uncertainty some actors prioritize short-term individual benefits. Similarly, in the present study, simulations showed that firms that adopt cooperative strategies achieve higher returns and lower risk, validating the hypothesis that nearshoring is more efficient when actors collaborate on infrastructure, regulations, and tax compliance.

Regarding the relationship between tax benefits and expected profitability, Brandenburger and Nalebuff (1996) introduced the concept of coopetition as a strategy in which actors compete and cooperate simultaneously, which was reflected in this study by the positive correlation between

government incentives and investment decisions. Firms that operated in cooperative equilibrium reported higher expected returns, which is consistent with the idea that cooperation generates value when it is strategically managed within flexible institutional frameworks.

Regarding accounting theory, the findings presented here engage with those of Hopwood (1987), who argued that accounting systems are active mechanisms in the construction of organizational reality, rather than mere neutral representations. The empirical evidence from this research showed that accounting decisions, such as reporting compliance costs or declaring tax benefits, are not neutral but rather affect the strategic positioning of companies and their interaction with their environment. The interviews reinforced this idea by pointing out that accounting transparency is used not only for regulatory purposes but also to build trust among actors in the nearshoring ecosystem.

The findings also relate to those reported by Tesfatsion and Judd (2006), who demonstrated that agent-based models allow for the simulation of complex market environments where the decisions of each actor influence collective behavior. In this study, the use of agent-based modeling allowed us to observe that, even under the same external conditions, decisions vary according to the type of strategy adopted, revealing that rationality is not homogeneous and that the reputational context decisively influences the expected results.

Finally, comparing the results with the guidelines of the PRISMA model (Moher et al., 2009) and the methodological standards of the Campbell approach (2022), it is confirmed that the rigor in the selection and analysis of evidence contributes to the validity of the findings, especially when quantitative methods are integrated with qualitative perspectives. In this sense, the triangulation applied in this research reinforces the proposition that nearshoring, beyond being an economic phenomenon, must be understood as a field of strategic interactions where accounting control, business cooperation, and institutional design are key to sustainability.

Conclusion

The scope of this research lies in the theoretical and empirical integration of game theory and accounting theory to analyze strategic decisions in the context of nearshoring. It was possible to identify how tax incentives, regulatory costs, and reputational risk influence companies' expected profitability, both from a quantitative perspective and through agent-based simulations. Furthermore, progress was made in understanding the dynamics of cooperation and competition that structure cross-border industrial clusters, providing a useful framework for decision-making in public policy, accounting planning, and business strategies.

The limitations of this study relate primarily to its geographic scope and sample size. By focusing on a specific border region and a limited number of firms, the results cannot be generalized to the entire North American industrial ecosystem. Furthermore, although rigorous analysis and triangulation techniques were applied, agent-based simulations present a level of abstraction that may not fully capture the complexity of relationships between real actors. Interviews, on the other hand, provide valuable qualitative insights but are subject to biases related to interpretation, institutional position, and information availability.

It is recommended that the study be expanded to other industrial corridors also impacted by the nearshoring phenomenon, such as the Mexican Bajío region or the southeastern United States,

which would allow for validation or adjustment of the presented models. It is also recommended to further analyze the role of local governments and multilateral organizations in structuring sustainable and equitable incentives. Finally, it is pertinent to incorporate social and environmental indicators into future simulations to assess the systemic impact of nearshoring on quality of life, territorial governance, and accounting transparency.

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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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