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# Technological Adoption and Structural Transformation in Mexican Family-Owned High-Frequency Retail Stores

*Adopción tecnológica y transformación estructural en tiendas minoristas de alta frecuencia de propiedad familiar en México*

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## ABSTRACT

This study analyses how technological adoption contributes to the structural transformation of family-owned High-Frequency Retail Stores in Mexico. The study used a quantitative survey administered to 126 High-Frequency Stores in the Guadalajara Metropolitan Area. Data were analyzed using Structural Equation Modeling (SEM). The study shows that these stores operate at an equilibrium between tradition and modernization, where technology does not replace the family model but transforms it. The lower level of digital literacy, compared with the high perception of business performance, confirms that their current strength remains rooted in social relationships, informal governance, and close customer interaction, while technological adoption represents the next stage in their structural evolution. Thus, the title connects directly with the central finding: High-Frequency Stores are transitioning from a purely relational model to a hybrid one, in which family businesses progressively integrate digital capabilities without losing their community essence, redefining the future of Mexican retail through resilience, social inclusion, and gradual innovation.

Keywords: Digital transformation; Family business; Technology adoption; Retail digitalization; Organizational resilience; SME.

Jel Code: L22, L81, O33

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**RESUMEN**

Este estudio analiza cómo la adopción tecnológica contribuye a la transformación estructural de los comercios minoristas de alta frecuencia de propiedad familiar en México. La investigación empleó una encuesta cuantitativa aplicada a 126 de dichos establecimientos en la Zona Metropolitana de Guadalajara. Los datos se analizaron mediante modelos de ecuaciones estructurales (SEM). El estudio revela que estos comercios operan en un equilibrio entre tradición y modernización, en el que la tecnología no sustituye al modelo familiar, sino que lo transforma. El menor nivel de alfabetización digital, frente a la percepción positiva del desempeño empresarial, confirma que su fortaleza actual sigue arraigada en las relaciones sociales, la gobernanza informal y la interacción cercana con el cliente, mientras que la adopción tecnológica representa la siguiente etapa de su evolución estructural. Así, el título conecta directamente con el hallazgo central: los comercios de alta frecuencia están transitando de un modelo puramente relacional a uno híbrido, en el que las empresas familiares integran progresivamente capacidades digitales sin perder su esencia comunitaria, redefiniendo el futuro del comercio minorista mexicano a través de la resiliencia, la inclusión social y la innovación gradual.



Palabras clave: Transformación digital; Empresa familiar; Adopción de tecnología; Digitalización del comercio minorista; Resiliencia organizacional; PYME.

Código JEL: L22, L81, O33.

## INTRODUCTION

High-Frequency Stores (HFS), commonly known as tienditas or neighborhood stores, constitute one of the most important components of the Mexican retail sector. Typically operated as family-owned microenterprises, they provide essential goods while generating employment and income for millions of households. Despite the rapid expansion of supermarkets, convenience store chains, and digital commerce, these businesses continue to maintain a strong market presence through customer proximity, trust, and personalized service (López & David, 2020). Their dual role as economic units and socially embedded organizations makes them highly relevant for understanding how family businesses adapt to increasingly digital and competitive environments.

The concept of High-Frequency Stores originates from industry practice rather than academic literature. Procter & Gamble (P&G) introduced the term to describe neighborhood stores that constitute a principal distribution channel for consumer goods across Latin America and other developing markets (P&G, Annual Report, 2009). These businesses typically operate as small family-owned retail units—including bodegas, kiosks, and traditional "mom-and-pop" stores—characterized by frequent customer visits and strong local community ties. P&G estimates that approximately one million High-Frequency Stores operate across Latin America (MIT Startup Exchange, 2023). In Mexico, they represent approximately 26% of all retail establishments, highlighting their continued economic and social relevance despite profound structural changes in the retail sector.



Although High-Frequency Stores have traditionally relied on family participation, proximity, and community trust as their principal competitive advantages, they are increasingly challenged by digitalization and changing consumer expectations (Wulandari et al., 2025). Previous research shows that family businesses often resist technological change because of financing constraints, dependence on established routines, and risk aversion (Lannon et al., 2023; Larios & Maciel, 2017).

Similar challenges have been identified among small and medium-sized enterprises in emerging economies, where digital technologies remain underutilized despite their recognized contribution to competitiveness and organizational performance (Castro et al., 2018; Zapata et al., 2022; Gress et al., 2025). Consequently, understanding the factors that facilitate or constrain the adoption of Information and Communication Technologies (ICT) has become increasingly important for explaining the transformation of traditional retail microenterprises (Castro et al., 2018; Gress et al., 2025).

In this context, digital transformation extends beyond adopting technological tools; it is a broader organizational process in which technological capabilities interact with family relationships, governance structures, and managerial competencies. High-Frequency Stores are characterized by personalized customer service, localized market knowledge, and operational flexibility, where competitiveness depends not only on prices but also on trust, familiarity, and customer experience (González et al., 2023). Understanding purchasing behavior within this environment requires recognizing how customer interactions are increasingly influenced by digital technologies, making digital literacy and technological adoption essential capabilities for strengthening customer engagement and business performance (Bülbül et al., 2026).

## LITERATURE REVIEW

Family firms are profoundly shaped by their familiness and core values, which frequently leads them to privileged agility and pragmatism over formalized strategic planning (Bouncken & Schmitt, 2022). This familiness generates distinctive patterns of innovativeness, since the interaction between family involvement in ownership, governance, and management directly conditions both the willingness and the ability to pursue digital transformation strategies that are increasingly essential for survival in the digital era (Costa et al., 2023). However, family firms are far from homogeneous. Their heterogeneity plays a decisive role in shaping digital adoption trajectories: while some enterprises exploit their long-term orientation and the inclusion of non-family management to cultivate innovative digital capabilities, others remain constrained by rigid mental models and centralized authority that limit openness to external knowledge and emerging technologies (Bornhausen & Wulf, 2023; Bouncken et al., 2025).



This tension is commonly explained through the ability and willingness paradox, which suggests that although family firms often possess the resources, slack capacity, and long-term stability required to innovate, they may lack the strategic intent to adopt digital technologies due to risk aversion and the imperative to preserve socioemotional wealth (Bornhausen & Wulf, 2023). This paradox is reinforced by the fact that family firms frequently have the financial and organizational ability to innovate, yet their willingness is tempered by concerns over control, identity preservation, and intergenerational continuity (Appleton et al., 2025; Bornhausen & Wulf, 2023).

Specific barriers include paternalistic decision-making styles, fragmented or inconsistent understandings of digital transformation, and employee resistance, while key drivers include cash opportunities, early success stories, and a clearly articulated digital strategy (Bornhausen & Wulf, 2023). Consequently, many resource-constrained small and medium-

sized family firms adopt a reactive, pragmatic-incremental approach to digital transformation, characterized by low levels of strategic planning and a strong attachment to traditional practices (Bouncken & Schmitt, 2022; Costa et al., 2023).

This cautious stance is further intensified by the distinctive nature of digital innovation itself, which is marked by rapid technological change, generativity, and high complexity. These features amplify perceived uncertainty and risk, particularly for family owners whose primary objective is preserving transgenerational control and organizational identity (Bornhausen & Wulf, 2023; Costa et al., 2023). Research shows that family managers strongly prefer to retain decision-making authority, and the fear of losing control often translates into a reluctance to collaborate technologically with external partners or to acquire advanced digital technologies (Bornhausen & Wulf, 2023). Ironically, this reluctance persists even though family firms typically exhibit a high ability to govern collaborative relationships, suggesting that willingness, rather than capability, is the binding constraint (Bornhausen & Wulf, 2023; Guenther et al., 2022).

In increasingly competitive markets, however, small and medium-sized enterprises must adapt their strategies to respond to heightened uncertainty and evolving consumer demands, a process that can be effectively supported through the adoption of new technologies (Singh, 2025). Despite their economic and social relevance, the least competitive firms within the retail ecosystem are micro-grocery enterprises. Because of their size and structural characteristics, these businesses are typically oriented toward domestic markets, rely on traditional technologies, generate low levels of added value, and face persistent difficulties accessing credit, training, and economies of scale (Oktaryani, 2026; Sezer et al., 2026).



Successfully introducing, adopting, and using digital technologies require not only financial investment but also innovative skills and competencies, implying a coevolutionary process among human capital, organizational learning, innovation, and digital technologies (Costa et al., 2023). Digital transformation thus presents a unique strategic dilemma for family firms, creating tension between extending traditional business models and embracing new digital processes that challenge established routines and power structures (Bouncken & Schmitt, 2022).

Accordingly, the digital transformation of family-owned enterprises demands a comprehensive understanding of how technological integration interacts with entrenched organizational structures and cultural norms (Gunawan et al., 2023). This interaction is especially salient in family firms, where prioritizing family-centered goals can significantly moderate the positive performance effects typically associated with business information technology alignment (Issah & Calabrò, 2024).

Empirical evidence increasingly demonstrates that the adoption of digital technologies by ultra-micro, micro, and small enterprises has a significant and positive impact on business performance, improving both operational efficiency and financial outcomes (Affandi et al., 2024). Moreover, digital adoption contributes to enhanced owners' financial literacy, indicating that its benefits extend beyond immediate productivity gains to broader developmental outcomes (Affandi et al., 2024). Nevertheless, realizing these benefits requires strategically reconfiguring internal resources and business processes to create value and adapt to evolving digital business models (Kusumawardhani et al., 2023). Within this framework, digital entrepreneurship—characterized by flexible, less-bounded processes and outcomes—empowers firms to explore new market niches and strengthen their organizational structures (Rodriguez et al., 2022).

Digital competence is central to this process. It encompasses the ability to conduct online searches, critically evaluate information, and effectively use mobile devices for diverse business functions, including marketing, procurement, communication, and customer service (Kusumawardhani et al., 2023). Digital literacy also extends to practical domains such as digital consumption, through which firms leverage digital technologies for information access, service provision, and relational coordination (Kusumawardhani et al., 2023; Singh, 2025). In an increasingly interconnected global economy, digital literacy becomes indispensable for reducing operational costs, improving efficiency, and fostering organizational flexibility in response to shifting consumer expectations (Rodriguez et al., 2022). Consequently, developing robust managerial and operational digital capabilities is essential to improving business performance in dynamic environments (Noviaristanti & Boon, 2022).



This imperative is particularly pronounced for nanostores and family-run microenterprises, which operate under severe resource constraints and rely heavily on family involvement in daily operations. For these firms, digital literacy becomes a critical determinant of competitive capacity and long-term sustainability (Sutisna et al., 2025; Kusumawardhani et al., 2023). Furthermore, the interplay between digital literacy and entrepreneurial success suggests that effectively integrating digital skills can catalyze innovation, efficiency, and market expansion (Çallı et al., 2022). Such integration is vital for developing new business models and achieving sustainable economic growth, especially in emerging economies where digital transformation remains uneven and fragmented (Rodriguez et al., 2022).

At the micro-foundational level, managerial digital literacy has been identified as a key driver of digital transformation in small and medium-sized enterprises, shaping both the scope and quality of technology adoption (Zahoor et al., 2023). However, despite its acknowledged importance, a significant gap persists in understanding the specific conditions under which managerial digital literacy effectively translates into improved firm outcomes (Zahoor et al.,

2023). This gap is particularly salient in family firms, where socioemotional wealth considerations, governance structures, and intergenerational dynamics can either amplify or constrain the strategic value of digital capabilities (Worek & Aaltonen, 2025).

Within this broader debate, High-Frequency Stores occupy a distinctive position at the intersection of family enterprise and community resilience. Prior research emphasizes their dual function as economic actors and social institutions that sustain livelihoods and reinforce social cohesion (Beltrán, 2019; BeLue et al., 2019). Family Embeddedness Theory further explains how entrepreneurial behavior in these contexts is deeply shaped by family relationships, norms, and emotional investments (Aldrich & Cliff, 2003).

High-Frequency Stores thus exemplify how informal governance structures and intergenerational collaboration generate unique strategic advantages in localized economies. Internationally, scholars have shown that these stores remain essential components of last-mile distribution systems in emerging markets (Blanco & Fransoo, 2013; Paswan et al., 2010). Yet, they also face persistent challenges, including digital exclusion, restricted access to credit, and intensifying competition from modern retail formats (Eakin et al., 2025).

Taken together, the literature reveals a complex and paradoxical landscape in which family firms—and particularly High-Frequency Stores—possess both the capacity and the structural constraints to engage in digital transformation. While familiness provides flexibility, trust, and long-term orientation, it simultaneously reinforces risk aversion, control preservation, and resistance to external knowledge.



Digital literacy and managerial competence emerge as critical levers that can resolve, or at least moderate, this paradox by transforming digital technologies into strategic resources rather than perceived threats. The literature therefore underscores a pressing need for empirical evidence that explicitly connects family dynamics, digital capability development, and performance outcomes. Addressing this gap is essential for advancing both theory and practice, and it constitutes the central objective of the present study.

## CONCEPTUAL FRAMEWORK AND RESEARCH MODEL

Before presenting the reliability results, it is important to contextualize the role of measurement validation within this study's analytical strategy. Given that the central objective is to examine the structural relationships between family embeddedness, digital literacy, technological adoption, and business performance, ensuring the internal consistency and psychometric robustness of each construct is a critical prerequisite. Reliable

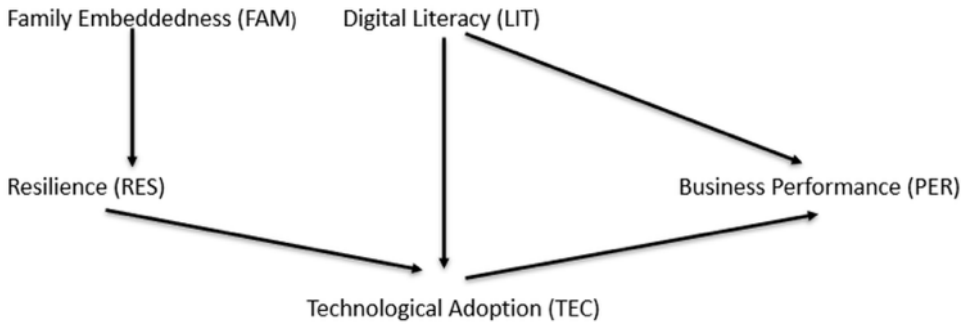
measurement instruments are essential to guarantee that the observed relationships reflect genuine theoretical mechanisms rather than artifacts of scale construction or item ambiguity.

In this sense, assessing internal consistency through Cronbach's alpha serves a dual purpose. First, it confirms that the selected items adequately capture the multidimensional nature of each construct within the specific context of High-Frequency Stores. Second, it provides empirical assurance that the survey instrument is suitable for subsequent structural modeling and hypothesis testing. Given the informal and family-centered nature of these enterprises, validating constructs such as family embeddedness and digital literacy is particularly relevant, as these dimensions are often difficult to operationalize in standardized quantitative terms.

Accordingly, Table 1 reports the reliability statistics and descriptive measures for each construct, offering an initial quantitative portrait of the balance between social capital, technological adoption, and digital competence in Mexican High-Frequency Stores. Figure 1 illustrates the proposed conceptual framework in which family embeddedness is primarily associated with organizational resilience, while digital literacy enables technological adoption and directly enhances business performance. Technological adoption functions as a mediating mechanism through which both social and digital resources are transformed into competitive outcomes.



**Figure 1**
**Conceptual model of resilience and performance in High-Frequency Stores: the mediating role of technological adoption**




Source: Own elaboration.

The results in Table 1 provide initial empirical confirmation of the hybrid nature of High-Frequency Stores. On the one hand, the high mean values observed for Family Embeddedness (M = 7.45) and Business Performance (M = 7.42) indicate that these enterprises remain strongly rooted in family cohesion, shared ownership, and positive self-perceptions of economic stability. This reinforces the conceptualization of HFS as organizations whose resilience is primarily sustained by social and emotional capital rather than by formalized technological infrastructures.

On the other hand, the comparatively lower mean score for Digital Literacy (M = 5.84) reveals a structural asymmetry between social embeddedness and technological competence. While owners perceive themselves as successful in relational and economic terms, their digital capabilities remain uneven and underdeveloped. This gap illustrates that technological modernization is still in an intermediate stage, where digital tools are partially adopted but not yet fully integrated into strategic and operational decision-making processes.

Similarly, the intermediate value of Technological Adoption (M = 6.94) suggests that High-Frequency Stores are engaging in selective and pragmatic forms of digitalization—such as electronic payments, POS systems, and basic social media use—without having transitioned toward a comprehensive digital strategy. This pattern is consistent with a gradual, necessity-driven transformation rather than a proactive, systematically planned one.

Together, these descriptive results anticipate the paper's central argument: High-Frequency Stores operate as hybrid systems in which family embeddedness ensures continuity and stability, while digital literacy and technological adoption act as emerging but uneven enablers of future competitiveness. The table thus does more than validate measurement reliability; it empirically illustrates the structural tension between tradition and innovation that defines the ongoing evolution of the family business model in Mexican informal retail.



*Research Question 3 and Hypotheses Development*

This study proposes that digital literacy not only directly influences business performance but also operates indirectly through the adoption of digital technologies. In micro and family-owned retail contexts, managerial digital literacy represents a foundational capability that enables owners to understand, select, and effectively implement technological tools. However, digital competence alone does not automatically translate into improved performance unless it is transformed into concrete technological practices embedded in daily operations.

Accordingly, technological adoption is conceptualized as a mediating mechanism through which digital literacy is converted into observable competitive outcomes. This perspective aligns with the view that technological resources generate value only when they are actively deployed and integrated into organizational processes, decision-making routines, and customer interaction channels. In High-Frequency Stores, this includes digital payment systems, POS technologies, digital inventories, and communication platforms, all of which can enhance efficiency, customer engagement, and operational control.

From this perspective, the following research question is formulated.

RQ1: *Does technological adoption mediate the relationship between digital literacy and business performance in High-Frequency Stores?*

To address this question empirically, three hypotheses are proposed. First, consistent with digital transformation and SME performance literature, the adoption of digital technologies is expected to positively affect business performance, as technology improves efficiency, responsiveness, and market competitiveness.
H1: *Technological Adoption positively influences Business Performance.*

Second, digital literacy is expected to directly affect business performance, as digitally competent owners are better equipped to make informed strategic decisions, manage customer relationships, and optimize operational processes beyond the mere use of specific technologies.

H2: *Digital Literacy has a direct positive effect on Business Performance.*



Finally, and most importantly, technological adoption is expected to function as a mediating variable between digital literacy and business performance. This implies that part of the effect of digital literacy on performance operates through its capacity to enable and intensify the adoption of digital tools, which then translate into improved organizational outcomes.

H3: *Technological Adoption mediates the relationship between Digital Literacy and Business Performance*.

## RESEARCH DESIGN AND METHODOLOGY

This study adopts a quantitative cross-sectional explanatory research design to analyze the relationships among family embeddedness, digital literacy, technological adoption, and business performance in Mexican High-Frequency Stores (HFS). The quantitative approach was selected because it enables the empirical examination of causal relationships among latent constructs and facilitates the statistical validation of the proposed conceptual model through Structural Equation Modeling (SEM). This approach is particularly suitable for analyzing complex interactions among technological capabilities, family dynamics, and organizational outcomes in small family-owned enterprises operating in emerging retail environments (Zahoor et al., 2023).

The study focused on family-owned High-Frequency Stores (HFS) located in the Guadalajara Metropolitan Area (GMA), Mexico. Given the absence of an official census of High-Frequency Stores, the study adopted a non-probability convenience and snowball sampling strategy.

Fieldwork was conducted between March and June 2025 through face-to-face visits by the research team, composed of faculty members and trained undergraduate researchers. During each visit, the study objectives were explained to store owners or managers, confidentiality and anonymity were guaranteed, and voluntary informed consent was obtained before administering the questionnaire.

A total of 207 High-Frequency Stores were contacted. Of these, 147 agreed to participate, representing a response rate of 71%. Subsequently, 21 questionnaires were excluded because they contained incomplete responses or inconsistent answer patterns that could compromise the quality of the statistical analyses. Consequently, the final analytical sample consisted of 126 valid questionnaires, which were retained for all subsequent analyses. The survey instrument was administered personally to the owner or manager of each participating store, ensuring that responses were provided by individuals directly involved in the operational and strategic management of the business.



Family Embeddedness was measured through items associated with family participation in ownership, operational involvement, and decision-making processes. Digital Literacy evaluated the owners' perceived digital competencies related to the use of digital tools, information management, and technological problem-solving. Technological Adoption assessed the implementation of digital systems such as electronic payment platforms, point-of-sale systems, social media usage, and digital communication tools. Business Performance captured perceived operational and commercial outcomes, including customer growth, operational efficiency, and sales stability.

The quantitative design facilitates identifying key challenges and opportunities associated with digitalization in High-Frequency Stores, addressing the need for contextualized diagnostic models for Mexican SMEs (Encinas et al., 2024). Furthermore, the study examines how the adoption of digital technologies—often constrained by financial and organizational limitations—depends critically on store owners' digital literacy levels (Amaya et al., 2024; Kusumawardhani et al., 2023). The model also considers the role of tacit knowledge and operational learning processes that characterize microenterprises and influence digital capability development (Crespo et al., 2020).

Data were analyzed using Structural Equation Modeling (SEM), which enabled the simultaneous examination of both direct and indirect relationships among the latent variables. SEM provides a robust analytical framework for testing complex causal structures and evaluating how managerial digital literacy functions as a micro-foundation for digital transformation in family-owned microenterprises (Zahoor et al., 2023). The structural model specifically examined the effects of Digital Literacy and Technological Adoption on Business Performance, as well as the mediating role of Technological Adoption between Digital Literacy and Business Performance.

To evaluate the measurement model's reliability and validity, multiple statistical procedures were conducted. Internal consistency was assessed using Cronbach's alpha and Composite Reliability (CR), while convergent validity was evaluated through Average Variance Extracted (AVE) and standardized factor loadings. Discriminant validity was assessed using the Heterotrait-Monotrait ratio (HTMT). Cronbach's alpha coefficients for all constructs exceeded the recommended threshold of 0.70, confirming strong internal consistency across the measurement instrument.

*Measurement model assessment*



The measurement model was assessed through standardized outer loadings, Cronbach's alpha, Composite Reliability (CR), Average Variance Extracted (AVE), and the Heterotrait–Monotrait ratio (HTMT). The analysis used 126 complete cases across the four reflective constructs: Family Embeddedness (FAM), Technological Adoption (TEC), Business Performance (PER), and Digital Literacy (LIT).

All standardized outer loadings exceeded the recommended threshold of 0.70, ranging from 0.814 to 0.957, supporting adequate indicator reliability. Composite Reliability values ranged from 0.926 to 0.971, while AVE values ranged from 0.757 to 0.892, exceeding the recommended cut-off values of 0.70 and 0.50, respectively. These results confirm satisfactory internal consistency and convergent validity (Table 1). Discriminant validity was evaluated using the HTMT criterion. All HTMT values were below the conservative threshold of 0.85. The highest value was observed between Technological Adoption and Digital Literacy (HTMT = 0.626), which remains well below the recommended limit. Therefore, the constructs demonstrate adequate discriminant validity. See Table 2.

**Table 1**
**Reliability and Convergent Validity (α, CR, AVE)**

| Construct | Cronbach's alpha | Composite Reliability (CR) | Average Variance Extracted (AVE) | Decision |
|---|---|---|---|---|
| FAM | 0.892 | 0.926 | 0.757 | Adequate (CR>0.70; AVE>0.50) |
| TEC | 0.929 | 0.949 | 0.825 | Adequate (CR>0.70; AVE>0.50) |
| PER | 0.951 | 0.965 | 0.874 | Adequate (CR>0.70; AVE>0.50) |
| LIT | 0.959 | 0.971 | 0.892 | Adequate (CR>0.70; AVE>0.50) |

Source: Own elaboration.

**Table 2**
**HTMT Discriminant Validity Matrix**

| Columna1 | FAM | TEC | PER | LIT |
|---|---|---|---|---|
| FAM | 1 | 0.033 | 0.294 | 0.057 |
| TEC | 0.033 | 1 | 0.428 | 0.626 |
| PER | 0.294 | 0.428 | 1 | 0.302 |
| LIT | 0.057 | 0.626 | 0.302 | 1 |

Source: Own elaboration.

We used bootstrapping with 5,000 resamples to evaluate the statistical significance of the structural path coefficients, indirect (mediating) effects, and confidence intervals. This non-parametric resampling procedure provides robust estimates of standard errors, t-values, p-values, and bias-corrected 95% confidence intervals, allowing assessment of the statistical significance of the proposed hypotheses without assuming multivariate normality.



In addition, the explanatory and predictive capabilities of the structural model were evaluated using the coefficient of determination ($R^2$), effect sizes ($f^2$), and predictive relevance ($Q^2$), following current recommendations for PLS-SEM analysis. Together, these indicators provide a comprehensive assessment of the magnitude, significance, explanatory power, and predictive performance of the proposed model. Table 3 presents the complete bootstrapping results for the structural model.

**Table 3**
**Bootstrapping Paths**

| Path | β | SE | t-value | p-value | CI 2.5% | CI 97.5% | Decision |
|---|---|---|---|---|---|---|---|
| LIT -> TEC | 0.5912 | 0.0613 | 9.6465 | 0 | 0.4607 | 0.7007 | Supported |
| TEC -> PER | 0.3567 | 0.1238 | 2.8808 | 0.0047 | 0.1103 | 0.5992 | Supported |
| LIT -> TEC -> PER | 0.0775 | 0.1247 | 0.6215 | 0.5354 | -0.1764 | 0.3101 | Not supported |

Source: Own elaboration.

Bootstrapping analysis indicated that the indirect effect associated with H3 was not statistically significant ($p > .05$; 95% CI included zero). Therefore, the proposed mediation hypothesis (H3) was not supported. These findings suggest that, although the direct relationships were significant, the mediating mechanism proposed in the conceptual model was not confirmed.

Because all variables were collected from the same respondents using a single survey instrument, several procedural and statistical remedies were implemented to mitigate the potential influence of common method bias (CMB). Procedurally, respondents were assured of anonymity and confidentiality, participation was voluntary, and the purpose of the study was clearly explained before questionnaire administration, thereby reducing evaluation apprehension and social desirability bias.

Statistically, Harman's single-factor test indicated that no single factor accounted for the majority of the total variance. In addition, full collinearity variance inflation factors (VIFs) were examined for all latent constructs. All VIF values were below the recommended threshold of 3.3, suggesting that common method bias is unlikely to represent a dominant source of variance in the present study (Table 4). Nevertheless, as with any cross-sectional self-reported survey, the possibility of residual common method variance cannot be completely ruled out.

This methodological design provides a statistically robust framework for examining how family embeddedness, digital literacy, and technological adoption jointly influence business performance and organizational transformation in Mexican High-Frequency Stores. By focusing exclusively on quantitative evidence, the study offers empirically verifiable insights into the role of digital capabilities in strengthening the competitiveness and resilience of family-run retail micro-enterprises in emerging economies.



**Table 4**
**Full Collinearity VIF Values**

| Construct | Full Collinearity VIF |
|---|---|
| FAM | 1.28 |
| TEC | 1.61 |
| PER | 1.44 |
| LIT | 1.57 |

Source: Own elaboration.

## RESULTS

*Correlation Analysis*

To further explore the relationships among the key constructs, a Pearson correlation matrix was computed (Table 5). The results indicate significant associations between technological adoption (TEC), digital literacy (LIT), and business performance (PER). In particular, TEC shows strong positive correlations with LIT ($r = 0.635$) and PER ($r = 0.483$). Conversely, family embeddedness (FAM) exhibits weaker correlations with the technological and performance variables.

**Table 5**
**Pearson Correlation Matrix among Key Constructs (FAM, TEC, PER, and LIT)**

| | FAM | TEC | PER | LIT |
|---|---|---|---|---|
| **FAM** | 1 | 0.064 | 0.268 | 0.023 |
| **TEC** | 0.064 | 1 | **0.483** | **0.635** |
| **PER** | 0.268 | **0.483** | 1 | **0.387** |
| **LIT** | 0.023 | **0.635** | **0.387** | 1 |

Source: The authors with survey data

The average variance extracted and composite reliability values for all constructs surpassed the 0.50 and 0.70 thresholds, respectively, affirming the convergent validity and internal consistency of the measurement model (Riadi et al., 2023). The measurement model demonstrated satisfactory psychometric properties, with strong internal consistency, convergent validity, and discriminant validity across all constructs.

These robust psychometric properties validate the instrument's ability to accurately measure the theoretical constructs, thereby ensuring the reliability of subsequent structural model analyses. This rigorous validation supports confident interpretation of the relationships between family embeddedness, digital literacy, and business performance in Mexican High-Frequency Stores, providing a strong basis for theoretical and practical implications. This strict assessment confirms that the latent variables are well-represented by their observed indicators, supporting the suitability of the data for advanced statistical modeling (Khlaif et al., 2024). Furthermore, the robust discriminant validity, evidenced by the square root of the average variance exceeding inter-construct correlations, confirms that each construct is distinct and measures unique aspects of the theoretical framework (Maisela, 2023).



## DISCUSSION

This study provides empirical evidence that the competitiveness of Mexican family-owned High-Frequency Stores (HFS) depends on a dynamic interaction between family embeddedness, digital literacy, and technological adoption, by demonstrating that competitiveness emerges from the interaction between long-established family resources and gradually developed technological capabilities. Rather than replacing traditional organizational structures, technological adoption appears to complement the relational advantages that characterize this retail format. These findings support the premise of Family Embeddedness Theory that entrepreneurial behavior is deeply influenced by family relationships, trust, and informal governance (Aldrich & Cliff, 2003), while extending the Resource-Based View by identifying digital literacy and technological adoption as complementary strategic resources that can strengthen organizational performance.

The structural model confirms that Technological Adoption positively influences Business Performance (H1), suggesting that even relatively simple technologies—such as electronic payment systems, point-of-sale platforms, digital communication channels, and social media—can improve operational effectiveness and competitiveness. This finding is consistent with previous studies reporting positive performance effects associated with digital technologies in small and micro-enterprises (Affandi et al., 2024; Kusumawardhani et al., 2023). However, the present study further shows that technology should not be interpreted as a replacement for the traditional family business model. Instead, technological resources become valuable when they reinforce existing relational capabilities built upon trust, proximity, and long-term customer relationships.

The results also indicate that Digital Literacy has a significant direct effect on Business Performance (H2). This finding suggests that owners' digital competencies constitute a strategic capability that extends beyond the simple use of technological tools. Owners with stronger digital skills appear better equipped to evaluate information, make informed managerial decisions, communicate with customers, and identify opportunities for improving business processes. These findings reinforce previous arguments that managerial digital literacy represents a critical micro-foundation of digital transformation in small firms (Noviaristanti & Boon, 2022; Zahoor et al., 2023).



Contrary to expectations, the mediating role of Technological Adoption was not supported (H3). Although Digital Literacy strongly contributes to technological adoption, the indirect pathway from Digital Literacy to Business Performance through Technological Adoption was not statistically significant.

This result suggests that digital competencies generate organizational value through mechanisms that extend beyond the implementation of digital technologies alone. Managerial judgment, organizational learning, entrepreneurial orientation, customer relationship management, and operational flexibility may represent complementary capabilities through which digitally literate owners improve firm performance. Consequently, technological adoption should be understood as one component of a broader capability-building process rather than as the sole mechanism through which digital literacy creates competitive advantage.

From a theoretical perspective, these findings contribute to the family business literature by proposing that High-Frequency Stores operate as hybrid organizations in which traditional family resources and emerging technological capabilities coexist. Family embeddedness continues to provide organizational stability, social legitimacy, and resilience, while digital literacy and technological adoption enhance adaptability and long-term competitiveness (Szewczyk et al., 2022). Rather than depicting tradition and digitalization as opposing forces,

the results suggest that successful digital transformation in family-owned microenterprises occurs when technological capabilities are integrated into pre-existing social structures instead of replacing them.

Additionally, it shows that digital transformation within High-Frequency Stores is better understood as a gradual socio-organizational process than as a purely technological transition. Family embeddedness remains the primary source of organizational stability and resilience, whereas digital literacy and technological adoption function as complementary strategic capabilities that strengthen long-term competitiveness without replacing the relational foundations of these businesses (Aldrich & Cliff, 2003; Issah & Calabrò, 2024).

The study also contributes to the growing literature on digital transformation in emerging economies. Much of the existing research has focused on either technological or family business dynamics independently (Tirdasari et al., 2024). By integrating Family Embeddedness Theory with the Resource-Based View, this research demonstrates that digital transformation within informal retail should be interpreted as a socio-organizational process in which technological capabilities interact with family relationships, community trust, and organizational culture. This integrated perspective offers a more comprehensive explanation of why some High-Frequency Stores achieve superior performance despite significant resource constraints.



Overall, the findings indicate that the future competitiveness of High-Frequency Stores will depend less on abandoning their traditional family-based business model than on their ability to progressively integrate digital capabilities into their existing organizational routines. In this sense, digital transformation represents an evolutionary rather than a disruptive process, preserving the relational strengths that distinguish family-owned retail businesses while enabling them to compete more effectively in increasingly digital marketplaces.

## CONCLUSION

This study adds to the literature by showing that the competitiveness of Mexican family-owned High-Frequency Stores (HFS) depends on a dynamic interaction among family embeddedness, digital literacy, and technological adoption. Technological adoption positively influences business performance. Digital Literacy has a significant direct effect on Business Performance, but the mediating role of Technological Adoption was not demonstrated.

Practical implications: For practitioners, the evidence highlights the need to integrate family business training with digital literacy programs, enabling owners to convert social trust and

relational capital into sustainable competitive advantage. Training initiatives should not treat digital skills as purely technical competencies, but as strategic capabilities that strengthen existing family-based resources such as customer loyalty, community reputation, and informal governance. In this way, digital literacy becomes a mechanism for amplifying, rather than replacing, the social capital that characterizes High-Frequency Stores.

Policymakers should view High-Frequency Stores as hybrid socio-economic units in which economic activity and family livelihoods are deeply interconnected. This implies that public policies must go beyond conventional SME support and promote integrated initiatives that combine microcredit, mentorship, and community-based digital hubs. Such programs should address financial constraints, managerial capacity building, and cultural resistance to change, recognizing that digital transformation in family businesses is a gradual, negotiated process rather than an instantaneous technological upgrade.

Higher digital adoption is linked to stronger business performance; therefore, enhancing digital and managerial skills within cohesive family structures can significantly strengthen competitiveness, operational efficiency, and resilience. Digital literacy acts as a performance multiplier, allowing family firms to better leverage their relational advantages, improve customer engagement, optimize processes, and expand market reach without undermining their traditional identity. Importantly, although this study is grounded in the Mexican context, the findings may provide useful insights for similar contexts in other emerging economies.



*Limitations and future research*

This study presents several limitations that should be considered when interpreting its findings. First, the research employed a non-probability convenience and snowball sampling strategy focused exclusively on family-owned High-Frequency Stores located in the Guadalajara Metropolitan Area (GMA), Mexico. Because no official census or complete sampling frame exists for this type of microenterprise, probability sampling was not feasible; the findings should be interpreted as evidence describing the relationships observed among the participating businesses within the specific socio-economic context of the Guadalajara Metropolitan Area.

Second, although the final sample size was adequate for Structural Equation Modeling (SEM), the study's geographical coverage remains limited. The findings should not be extrapolated to other Mexican regions, where economic conditions, levels of digital infrastructure, cultural characteristics, family business dynamics, and technological ecosystems may differ substantially. Regional heterogeneity across Mexico suggests that the determinants of technological adoption and business performance may vary considerably between metropolitan, semi-urban, and rural environments.

Third, the cross-sectional design prevents definitive causal inference and captures organizational conditions at only one point in time. Although the structural model identifies statistically significant relationships among family embeddedness, digital literacy, technological adoption, and business performance, these relationships may evolve as firms continue their digital transformation. Longitudinal research would provide a more comprehensive understanding of how technological capabilities develop and influence organizational performance over time.

Fourth, all variables were measured through self-reported perceptions provided by store owners or managers. Although procedural remedies (anonymity, confidentiality, voluntary participation) and statistical diagnostics were implemented to mitigate common method bias, self-reported data remain susceptible to response biases, including social desirability, recall bias, and subjective assessments of business performance and digital capabilities. Consequently, some degree of residual measurement bias cannot be completely ruled out.

Fifth, the study relied primarily on perceptual and organizational indicators and did not incorporate audited financial statements, transactional records, operational productivity measures, or longitudinal business outcomes. Accordingly, business performance should be interpreted as perceived organizational performance rather than as objectively verified financial performance.



Finally, the conceptual model was tested exclusively within family-owned High-Frequency Stores operating in the traditional retail sector. These businesses possess distinctive socio-cultural, organizational, and governance characteristics that differentiate them from larger retail chains, non-family firms, franchised businesses, and highly formalized commercial organizations. Therefore, the theoretical relationships identified in this study should not be assumed to operate similarly across other organizational contexts without further empirical verification.

*Directions for future research*: Despite these limitations, this study provides robust empirical evidence regarding the relationships among family embeddedness, digital literacy, technological adoption, and business performance within an under-researched segment of the Mexican retail sector.

It also establishes a solid foundation for future studies employing probability sampling, broader geographical coverage, longitudinal research designs, objective performance indicators, and cross-country comparisons to evaluate the extent to which the proposed conceptual model is transferable for further research beyond the Guadalajara Metropolitan Area.

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## APPENDIX A

### Technical Sheet of the Survey

| | |
|---|---|
| **Population** | The population consisted of collaborators from HFS stores, including owners, family members, and employees involved in administrative activities, customer service, and store management operations. |
| **Objective of the Study** | The objective of the survey was to collect empirical data from collaborators of HFS stores in order to analyze the adoption, perceptions, operational use, and challenges associated with Generative Artificial Intelligence (GenAI) within retail and family-business environments. |
| **Sampling Method** | Non-probabilistic convenience sampling. |
| **Period of Data Collection** | Data was collected from March to June, 2025. |
| **Data Collection Technique** | Online survey administered through Google Forms. |
| **Sample Size** | 126 respondents |
| **Confidence Level** | 95% |
| **Margin of Error** | ± 5% |
| **Survey Conducted by** | Mauro Rodríguez Marín & Miguel Angel Lopez-Lomeli |
| **Source** | Prepared by the authors based on survey data. |