KMANPUB | AI and Tech in Behavioral and Social Sciences Vol. 4 No. 3 (2026): 1-11

Article history:
Received 04 January 2026
Revised 12 May 2026
Accepted 06 June 2026
Initial Publication 15 June 2026
Final Publication 01 July 2026

A Comprehensive Model for FinTech Development in Iran's Banking System: A Grounded Theory Approach

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A r t i c l e I n f o

Article type:
Original Research

How to cite this article:
Arshadian, A., Namdarian, L., & Abbasi, R. (2026). A Comprehensive Model for FinTech Development in Iran's Banking System: A Grounded Theory Approach. *AI and Tech in Behavioral and Social Sciences*, *4*(3), 1-11.
https://doi.org/10.61838/kman.aitech.4942

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A B S T R A C T

FinTech has become a central driver of financial innovation, yet evidence on its development in Iran's banking system remains fragmented across regulatory, technological, managerial, and market-oriented studies. This study developed and empirically examined a comprehensive model of FinTech development using a sequential mixed-methods design. In the qualitative phase, 63 published studies were synthesized through a modified grounded-theory approach informed by qualitative meta-synthesis. Open, axial, and selective coding generated a paradigmatic model containing causal conditions, contextual conditions, intervening conditions, strategies and actions, and outcomes around the core phenomenon of FinTech development. In the quantitative phase, the structural relationships among the model components were examined using PLS-SEM with data from 384 banking and academic experts. The results indicate that contextual factors had the strongest direct association with FinTech development, followed by causal and intervening conditions. FinTech development was positively associated with strategies and actions, and strategies and actions showed the strongest association with expected outcomes. The findings provide an exploratory diagnostic framework for policymakers, banks, and FinTech actors seeking to strengthen financial innovation in Iran's banking sector while accounting for macro-institutional constraints.

Keywords: *FinTech, banking, Iran, grounded theory, PLS-SEM, financial innovation*

1. Introduction

Financial technology has reshaped banking by combining digital infrastructure, data-driven services, and new financial business models. FinTech is commonly understood as the application of innovative technologies to financial services and has been associated with improved access, efficiency, transparency, and personalized service delivery (Gai et al., 2018; International Organization of Securities, 2017; Thakor, 2020). The sector expanded strongly after the 2008 financial crisis, when public trust in traditional financial institutions weakened and digital alternatives gained broader legitimacy (Rabbani et al., 2022; Sun et al., 2023). In Iran, FinTech development is

shaped by the coexistence of opportunity and constraint. The country has relatively strong digital connectivity, a young and technology-oriented population, and a large pool of graduates in finance, engineering, and information technology. At the same time, the sector faces regulatory uncertainty, sanctions exposure, cybersecurity concerns, weak coordination among ecosystem actors, and uneven bank-FinTech collaboration (Maleki et al., 2023; Marvat & Nazari Zadeh, 2022; Mohammadi et al., 2022; Moradi et al., 2020). These conditions make Iran a useful setting for developing a context-sensitive model of FinTech growth in the banking system.

Previous research has examined important but separated aspects of FinTech development. Some Iranian studies emphasize regulatory documents and legal barriers (Azimi Nejad et al., 2022; Benlala, 2023), others focus on bank-FinTech collaboration (Hedayati et al., 2022; Hornuf et al., 2021; Tahmasebi Aghbelaghi et al., 2021), and still others discuss technological infrastructure, customer trust, cybersecurity, or financial performance (Hu et al., 2019; Lee & Shin, 2018; Stewart & Jürjens, 2018; Zhang et al., 2023). International models also provide valuable insights into FinTech ecosystems and bank-FinTech association patterns (Lee & Shin, 2018; Roy et al., 2025; Salleh et al., 2025), but they do not fully capture the institutional, regulatory, and economic conditions of Iran. This fragmentation creates a theoretical and practical gap. A model limited to technology adoption cannot explain why similar digital capacities lead to different outcomes under different regulatory, institutional, or political conditions. A model limited to policy barriers, in turn, cannot show how banks and FinTech firms translate sectoral potential into concrete strategic actions and outcomes. The present study therefore integrates causal conditions, contextual conditions, intervening conditions, strategies and actions, and outcomes within one explanatory framework. The study is guided by the following research question: What are the main dimensions and components of a comprehensive FinTech development model for Iran's banking system, and how are these dimensions structurally related?

The literature suggests that FinTech ecosystems are best understood as multi-actor arrangements rather than as isolated technological innovations. Banks, regulators, technology developers, FinTech start-ups, customers, payment infrastructure providers, and data-security actors jointly shape the pace and direction of development. In this sense, regulatory clarity and trust infrastructure are not external details; they are part of the operating environment that determines whether digital financial services can be scaled safely. Studies of bank-FinTech interaction show that collaboration often depends on whether banks have a clear digital strategy, internal innovation capability, and incentives to cooperate rather than merely defend incumbent market positions (Hedayati et al., 2022; Hornuf et al., 2021; Tahmasebi Aghbelaghi et al., 2021).

Trust is another central issue in FinTech development. Digital financial services require users to share financial, personal, and behavioral data through platforms that are often less familiar than conventional banking channels. Data security, privacy protection, transparent complaint mechanisms, and public confidence therefore condition adoption and long-term use (Stewart & Jürjens, 2018; Zhang et al., 2023). In countries where regulatory ambiguity, sanctions, or fragmented institutional responsibilities exist, trust becomes even more important because users and firms face uncertainty regarding accountability, licensing, and continuity of service. These considerations justify a model that includes not only technological readiness but also contextual and intervening conditions.

Another unresolved issue in the literature concerns the movement from FinTech readiness to observable outcomes. Many studies describe enabling conditions, yet fewer explain how those conditions become strategic actions and then produce measurable outcomes for banks, customers, and the wider financial system. In banking, innovation is not simply a matter of launching digital interfaces. It requires integration with legacy systems, regulatory compliance, risk controls, data protection, staff capability, customer education, and viable revenue models. This complexity is especially visible in emerging economies, where digital demand may be high but institutional support and regulatory consistency may be uneven.

For this reason, the present study distinguishes between antecedent conditions and strategic responses. Causal and contextual conditions can create the potential for FinTech development, but they do not automatically produce innovation growth, customer trust, or business performance. The model assumes that strategies and actions serve as the conversion mechanism through which development potential becomes outcomes. This distinction is important for policy and management because it prevents the article from treating favorable infrastructure, regulation, or human resources as sufficient by themselves.

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E-ISSN: 3041-9433

2. Methods and Materials

A sequential mixed-methods design was used. The first phase developed the conceptual model through qualitative synthesis, and the second phase examined the model quantitatively using Partial Least Squares Structural Equation Modeling (PLS-SEM). This design was appropriate because the study first needed to identify the dimensions of FinTech development and then test the proposed relationships among them.

In the qualitative phase, the study used a modified grounded-theory approach informed by qualitative meta-synthesis. Classical grounded theory usually relies on primary qualitative data such as interviews and observations, but grounded-theory logic can also be applied to systematically selected secondary qualitative evidence when the aim is theory building from published studies (Charmaz, 2006; Hoon, 2013; Noblit & Hare, 1988; Sandelowski & Barroso, 2007; Strauss & Corbin, 1998; Timulak, 2009). Articles were searched in international and domestic databases using combinations of FinTech, banking, technology, grounded theory, and FinTech development model. The search covered 2010-2025. After title, abstract, and content screening, 59 articles were retained; four additional articles were identified through snowballing, resulting in 63 studies for qualitative analysis.

Two coders independently extracted concepts from the selected studies and then compared the codes in consensus meetings. Open coding identified initial factors, axial coding grouped factors into higher-order categories, and selective coding integrated these categories around the core phenomenon of FinTech industry development. Cohen's kappa for initial coding agreement was 0.84, indicating substantial agreement. Three external experts in banking innovation and FinTech reviewed the final classification to assess conceptual clarity and relevance.

In the quantitative phase, data were collected from 384 banking and academic experts selected purposively. Respondents included banking managers and specialists involved in digital transformation and academics familiar with FinTech and digital banking. A structured questionnaire was developed from the qualitative categories and included 34 items distributed across five domains: causal conditions, contextual factors, intervening conditions, strategies and actions, and outcomes. Content validity was assessed by five experts using content validity ratio and content validity index criteria (Lawshe, 1975). A pilot test with 30 respondents supported preliminary reliability. The main data were analyzed using SmartPLS with 5,000 bootstrap subsamples.

The measurement model was assessed before the structural model. Sampling adequacy was checked through KMO statistics, internal consistency was assessed through Cronbach's alpha and composite reliability, convergent validity was assessed through factor loadings and AVE, and discriminant validity was assessed through the HTMT criterion (Hair et al., 2021; Henseler et al., 2015). The structural model was then examined through standardized path coefficients, t-values, p-values, R^2, Q^2, VIF, and effect-size interpretation. The global goodness-of-fit index was reported only as a supplementary descriptive statistic because current PLS-SEM practice places greater emphasis on component-level reliability, validity, predictive relevance, collinearity, and bootstrapped path estimates.

Because the qualitative phase relied on published studies rather than primary interviews, the study is described as using modified grounded-theory logic rather than classical grounded theory. This distinction is methodologically important. The analysis adopted open, axial, and selective coding procedures, but the empirical materials were textual findings and conceptual claims extracted from prior studies. The quantitative phase should therefore be read as an exploratory examination of a theory-informed model rather than as definitive causal validation.

The study also followed several safeguards to reduce interpretive bias. The use of two independent coders reduced reliance on a single researcher's interpretation. Consensus meetings were used to resolve disagreements in the naming and placement of codes. Expert review was then used to assess whether the categories were meaningful for the banking and FinTech context. These steps do not eliminate all subjectivity, but they improve transparency and make the movement from extracted factors to the final model more auditable.

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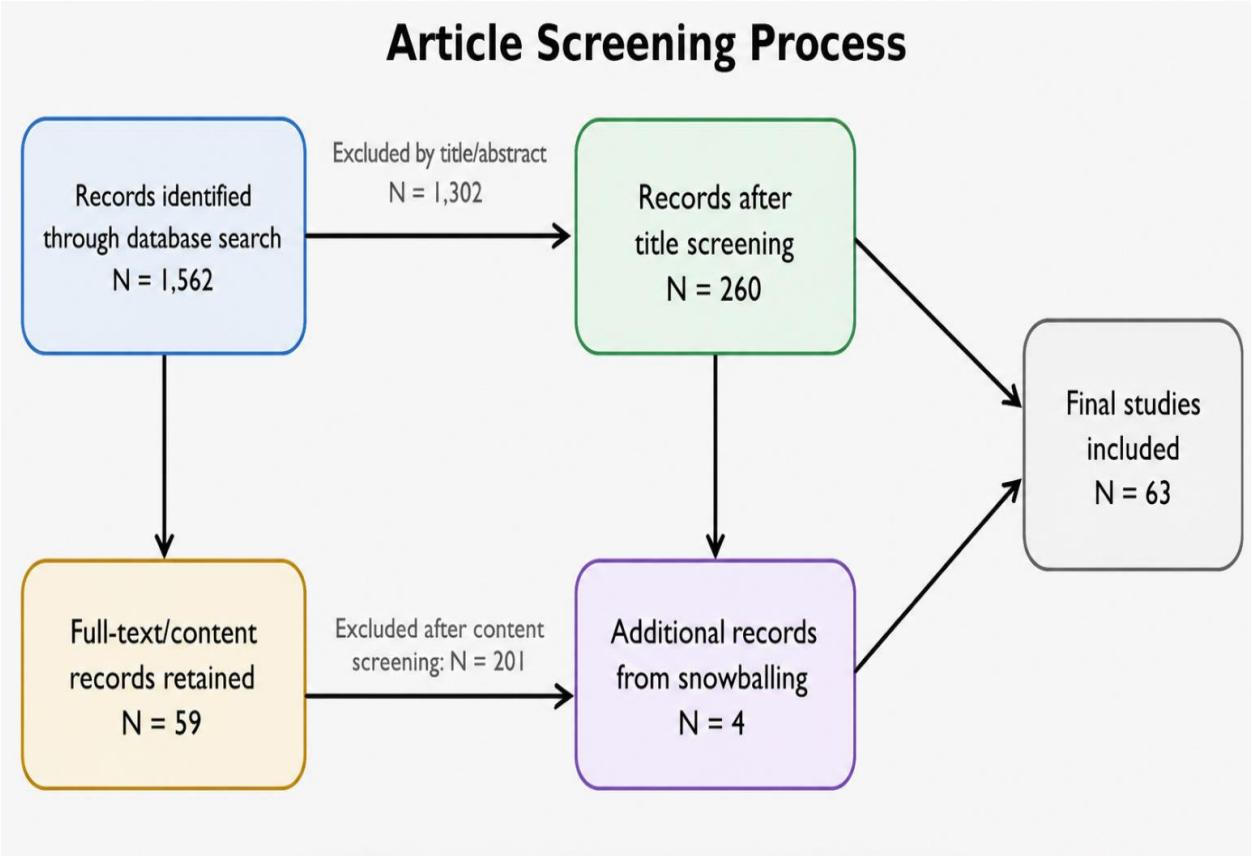
Figure 1

Article Screening Process



3. Findings and Results

The qualitative synthesis produced five main dimensions around the core phenomenon of FinTech industry development: causal conditions, contextual conditions, intervening conditions, strategies and actions, and outcomes. Causal conditions refer to organizational and technological drivers such as managerial support, ICT capacity, research and development, skilled human resources, and organizational structure. Contextual conditions include macro-political, economic, social, cultural, international, and environmental conditions. Intervening conditions include market dynamics, regulations, banking-system constraints, financial issues, and technology-infrastructure limitations. Strategies and actions include policymaking, bank-FinTech collaboration, implementation mechanisms, and innovation enablers. Outcomes include innovation growth, trust building, financial-industry impact, tailored products, business-performance improvement, and virtual banking.

Based on the qualitative model and prior literature, five hypotheses were formulated: causal, contextual, and intervening conditions positively affect FinTech development; FinTech development positively affects strategies and actions; and strategies and actions positively affect outcomes. Figure 2 presents the conceptual model.

The axial coding results also clarified the functional role of each category. Causal conditions were interpreted as factors that can directly initiate or support FinTech development at the organizational or technical level. Contextual conditions were treated as the broader environment in which banks and FinTech firms operate. Intervening conditions were placed between context and action because they can either facilitate or restrict the translation of readiness into development. Strategies and actions represented deliberate managerial and policy responses, while outcomes captured the expected effects of those actions on innovation, trust, performance, and service transformation.

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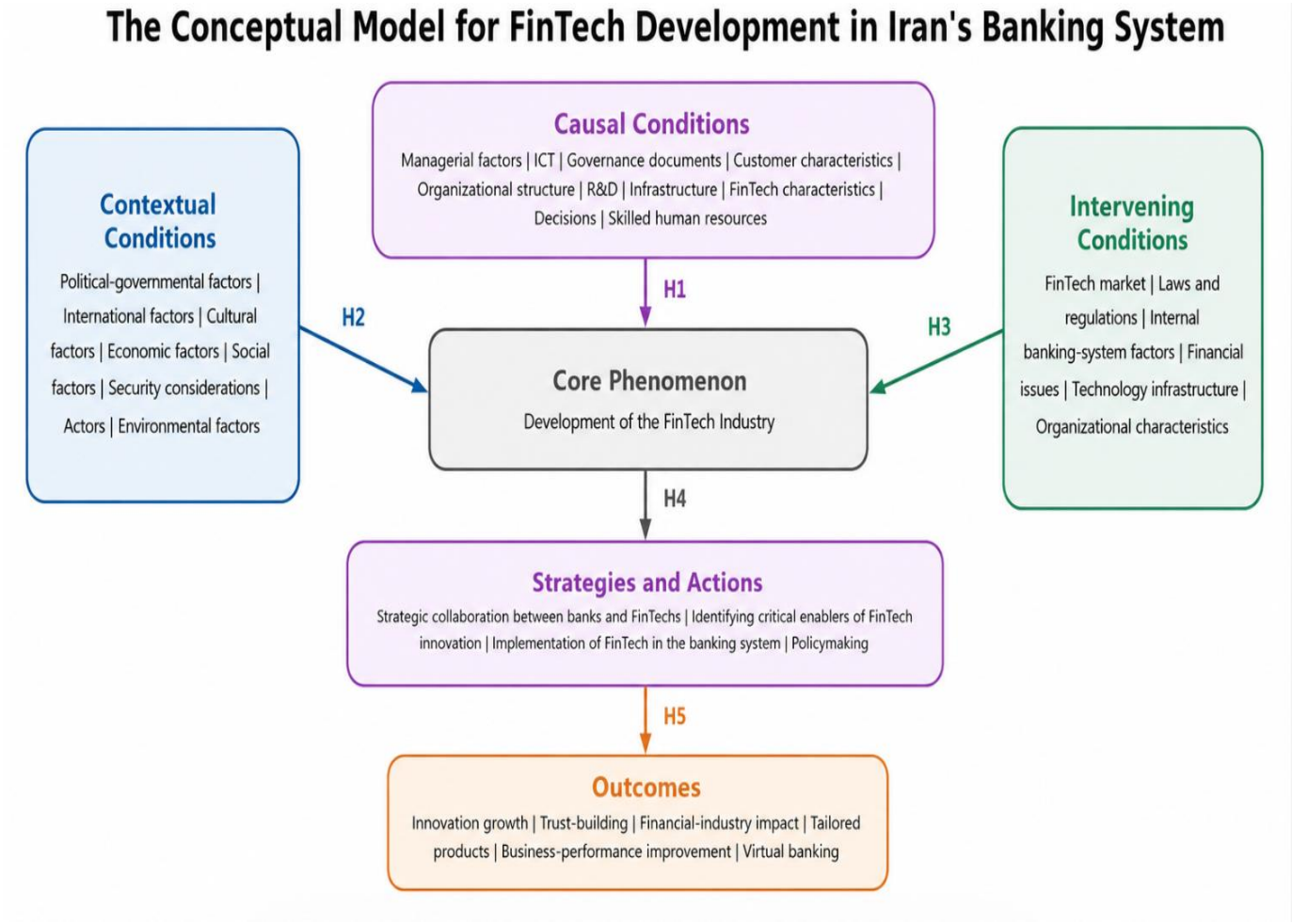
Table 1

Axial Coding Categories and Concepts

No.	Category	Concepts
1	Causal conditions	Managerial factors; ICT; governance documents; customer characteristics; organizational structure; R&D; infrastructure; FinTech characteristics; decisions; skilled human resources
2	Contextual conditions	Political-governmental, international, cultural, economic, social, security, actor-related, and environmental factors
3	Intervening conditions	FinTech market, laws and regulations, internal banking-system factors, financial issues, technology infrastructure, and organizational characteristics
4	Strategies and actions	Critical enablers of FinTech innovation, banking-system implementation, policymaking, and strategic bank-FinTech collaboration
5	Outcomes	Innovation growth, trust building, financial-industry impact, tailored products, business-performance improvement, and virtual banking

Figure 2

Conceptual Model for FinTech Development in Iran's Banking System



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The measurement model was evaluated before testing the structural model. KMO values were above 0.6 for all constructs, indicating adequate sampling adequacy. Factor loadings, Cronbach's alpha, composite reliability (CR), and average variance extracted (AVE) supported exploratory reliability and convergent validity. Several reliability coefficients were modest; therefore, the model should be interpreted as exploratory and refined in future studies.

All HTMT values were below 0.85, supporting discriminant validity (Henseler et al., 2015). Inner VIF values ranged from 1.243 to 2.876, suggesting that multicollinearity was not a major threat to the structural estimates (Hair et al., 2021).

The measurement results are adequate for exploratory model testing but should not be overinterpreted. Some alpha values are close to the lower boundary of acceptability, especially for strategies and actions and outcomes. This indicates that the constructs are theoretically meaningful but may require more precise item development in future research. For a submission version, the main implication is that the article should describe the quantitative results as exploratory evidence rather than as conclusive validation.

Table 2

KMO Index and Reliability Indicators by Construct

Construct	KMO	Items	Loadings	α	CR	AVE
Causal conditions	0.871	10	0.712-0.843	0.787	0.845	0.711
Contextual factors	0.961	8	0.701-0.789	0.798	0.889	0.566
Intervening conditions	0.711	6	0.742-0.874	0.719	0.853	0.764
Strategies and actions	0.875	4	0.705-0.821	0.698	0.737	0.632
Outcomes	0.798	6	0.704-0.812	0.673	0.778	0.676

Table 3

Discriminant Validity: HTMT Ratios

Construct	CC	CF	IC	SA	OUT
Causal conditions	-				
Contextual factors	0.687	-			
Intervening conditions	0.543	0.612	-		
Strategies and actions	0.498	0.567	0.654	-	
Outcomes	0.432	0.521	0.587	0.623	-

The structural model showed moderate explanatory power for FinTech development (R^2 = .430), low explanatory power for strategies and actions (R^2 = .048), and moderate explanatory power for outcomes (R^2 = .327). All Q^2 values were greater than zero, supporting predictive relevance. The supplementary goodness-of-fit index was .424, following Tenenhaus et al. (2004) and Wetzels et al. (2009); however, this index was not treated as the primary model-fit criterion because contemporary PLS-SEM assessment relies mainly on R^2, Q^2, collinearity, reliability, validity, and bootstrapped path coefficients (Tenenhaus et al., 2004; Wetzels et al., 2009).

All hypothesized relationships were statistically significant. Contextual factors had the strongest direct effect on FinTech development (β = .404), followed by causal conditions (β = .194) and intervening conditions (β = .165). FinTech development had a positive effect on strategies and actions (β = .220), and strategies and actions had the strongest effect on outcomes (β = .572). Effect-size analysis showed a medium effect for contextual factors and a large effect of strategies and actions on outcomes (Cohen, 2013).

The low R^2 for strategies and actions should be interpreted carefully. It does not invalidate the model, but it indicates that the path from FinTech development to strategic action explains only a limited portion of variance in that construct. This suggests that strategies and actions may also be affected by omitted variables such as ownership structure, leadership commitment, regulatory pressure, resource availability, or competitive intensity. This issue is reported explicitly to avoid overstating the structural model.

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Figure 3

Predictive Relevance and Explanatory Power

Endogenous construct	R^2	Q^2	Interpretation
FinTech development	0.430	0.454	Moderate
Strategies and actions	0.048	0.145	Low
Outcomes	0.327	0.288	Moderate

Table 4

Summary of Hypothesis Testing Results

Hypothesis	Path	β	t	p	Result
H1	Causal -> FinTech development	0.194	6.695	< .001	Supported
H2	Contextual -> FinTech development	0.404	6.777	< .001	Supported
H3	Intervening -> FinTech development	0.165	4.707	< .001	Supported
H4	FinTech development -> strategies	0.220	4.236	< .001	Supported
H5	Strategies -> outcomes	0.572	15.805	< .001	Supported

Figure 4

Structural Model: Standardized Path Coefficients

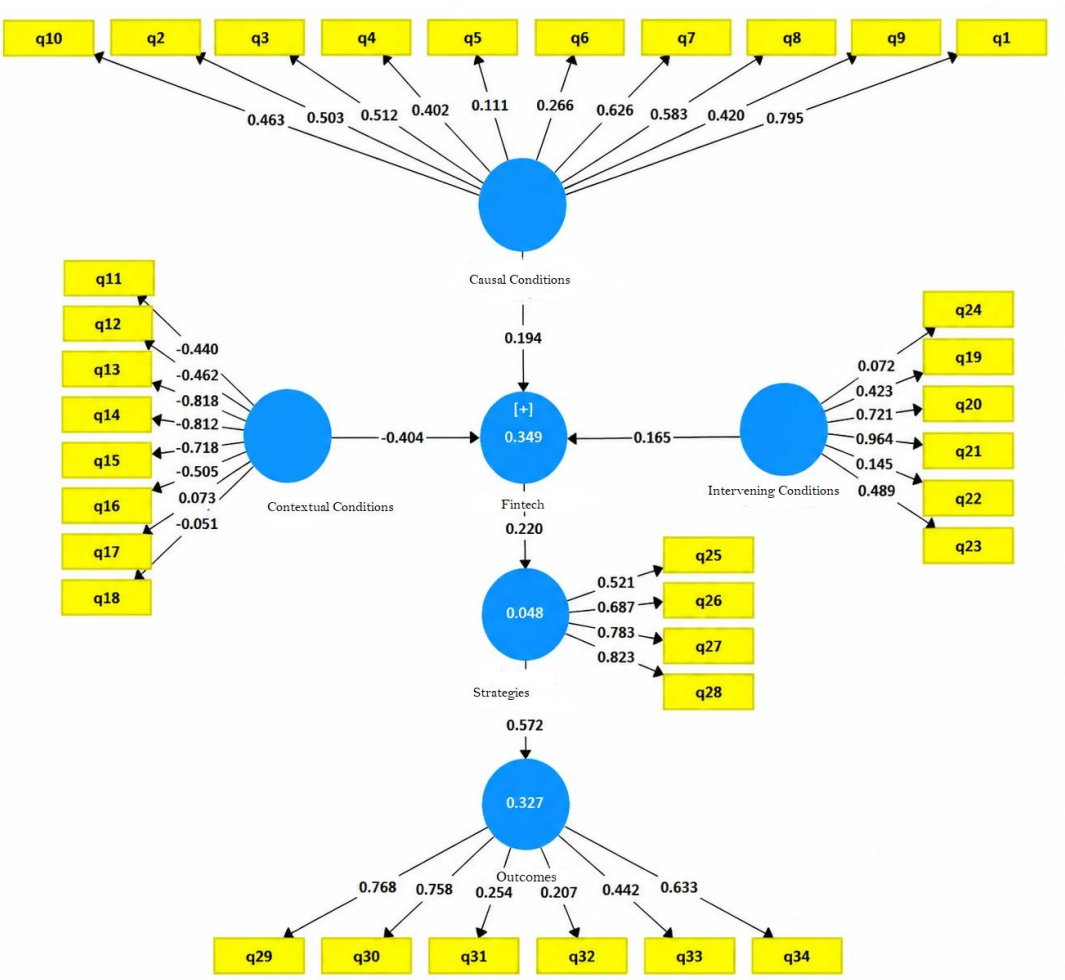
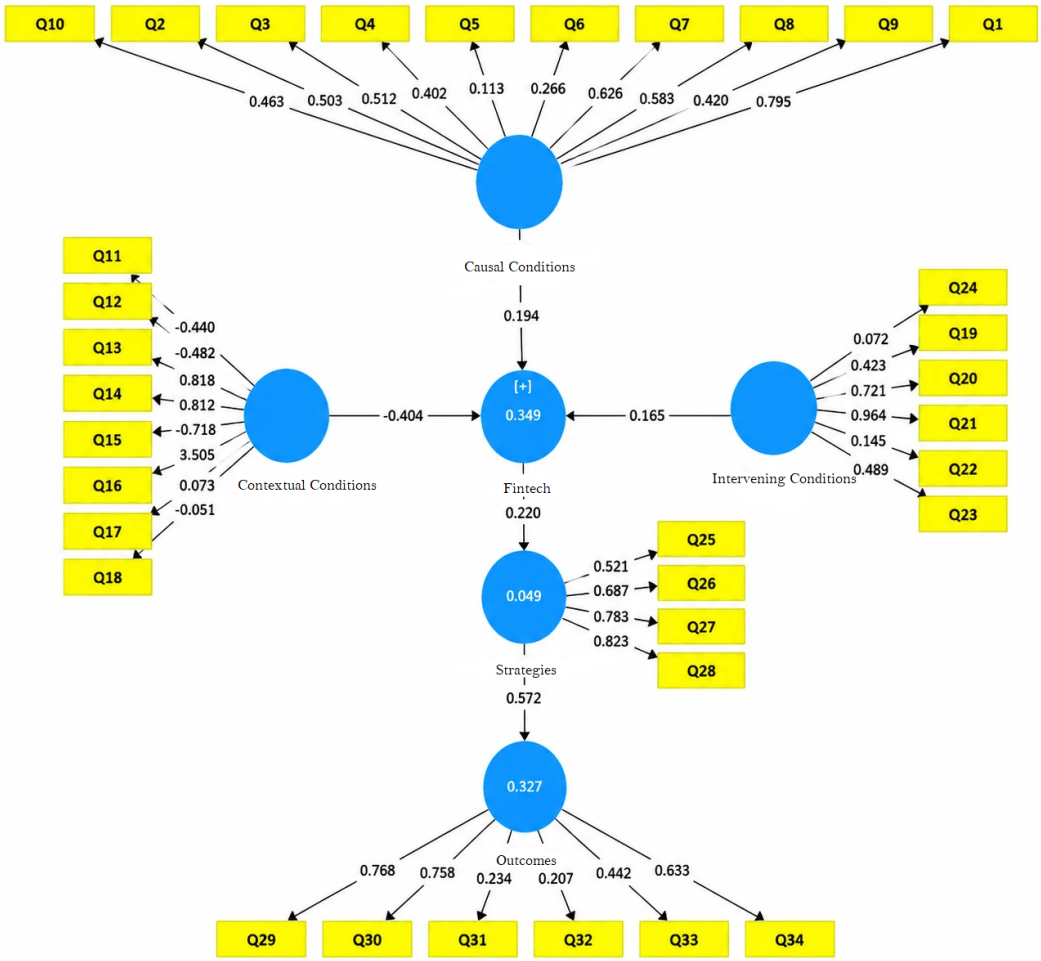


Figure 5

Structural Model Results: Bootstrapped t-values



4. Discussion and Conclusion

This study developed and empirically examined a comprehensive FinTech development model for Iran's banking system. The findings indicate that FinTech development is not driven by a single technological factor; rather, it depends on the interaction of institutional, organizational, market, regulatory, and strategic elements. The strongest antecedent was contextual conditions, which is consistent with the view that emerging-economy FinTech ecosystems are highly dependent on the quality of regulation, political-economic stability, sanctions exposure, and trust infrastructure (Azimi Nejad et al., 2022; Lee & Shin, 2018; Marvat & Nazari Zadeh, 2022).

Causal conditions were also significant, confirming that managerial support, skilled human resources, ICT capacity, and R&D remain necessary internal drivers of FinTech development. However, their effect was weaker than that of contextual factors, suggesting that organizational readiness alone is insufficient when the regulatory and macroeconomic environment is unstable. Intervening conditions also had a significant but smaller direct effect, indicating that market dynamics, specific regulations, banking-system constraints, and technology limitations may operate more as facilitators or constraints than as primary drivers.

The strongest path in the model was from strategies and actions to outcomes. This finding emphasizes that FinTech potential becomes valuable only when translated into deliberate action: collaboration between banks and FinTech companies, coherent policymaking, implementation mechanisms, and innovation support. For policymakers, the results suggest that transparent regulation, data protection, open banking rules, and coordinated institutional support are central to sectoral progress. For banks and FinTech firms, the results support investment in joint product

development, innovation units, and trust-building mechanisms.

The study contributes to the FinTech literature by linking the grounded-theory paradigm with PLS-SEM testing in a country-specific banking context. Rather than treating regulatory, technological, managerial, and strategic variables as separate lists, the model clarifies their structural positions. Contextual conditions shape the feasibility of development; causal conditions provide internal readiness; intervening conditions facilitate or constrain the process; strategies convert development potential into action; and outcomes represent the practical value of those actions for the banking and financial ecosystem.

The findings have several policy implications. First, FinTech development in Iran cannot be accelerated only through technical investment or start-up encouragement. Regulatory modernization, coherent licensing procedures, transparent data-protection rules, open banking governance, and coordination among supervisory bodies are necessary contextual conditions. Second, banks should not treat FinTech firms only as competitors. The positive path from strategies and actions to outcomes suggests that structured collaboration, joint products, innovation departments, and strategic investment mechanisms can help convert development capacity into measurable benefits. Third, because trust-related outcomes are central to the model, cybersecurity, privacy, and public communication should be treated as strategic development tools rather than as peripheral compliance issues.

For managers, the model can be used diagnostically. If contextual barriers are high, then internal readiness may not be sufficient. If causal conditions are weak, then regulatory reform alone will not produce innovation. If intervening constraints such as banking-system rigidity, market uncertainty, or technology limitations remain unresolved, strategic actions may be fragmented. The model therefore encourages simultaneous attention to institutional reform, organizational readiness, collaborative strategy, and outcome monitoring.

The findings also clarify the meaning of the relatively small coefficient for intervening conditions. These conditions may not act as the strongest direct driver because their effect is partly conditional and partly restrictive. For example, market dynamics, licensing barriers, or banking-system limitations may not initiate FinTech development independently, but they can shape whether organizational readiness and contextual support are converted into practice. This interpretation is consistent with the grounded-theory logic of intervening conditions, which are expected to modify, facilitate, or constrain the pathway between antecedents and the core phenomenon.

The study has limitations. The sample was purposive and limited to Iran; therefore, generalization to other contexts should be cautious. The design was cross-sectional and cannot establish causal change over time. Some reliability coefficients were modest, and future studies should refine the questionnaire, test measurement invariance across expert groups, and examine the model longitudinally. Further research should also test the effects of artificial intelligence, blockchain, open banking, and central bank digital currencies within the proposed framework.

Authors' Contributions

All authors equally contributed to this study.

Declaration

In order to correct and improve the academic writing of our paper, we have used the language model ChatGPT.

Transparency Statement

Data are available for research purposes upon reasonable request to the corresponding author.

Acknowledgments

We would like to express our gratitude to all individuals helped us to do the project.

Declaration of Interest

The authors report no conflict of interest.

Funding

According to the authors, this article has no financial support.

Ethics Considerations

The study protocol adhered to the principles outlined in the Helsinki Declaration, which provides guidelines for ethical research involving human participants.

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E-ISSN: 3041-9433

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AITBSS AI and Tech in Behavioral and Social Sciences
E-ISSN: 3041-9433

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