“AI and FinTech adoption in Jordanian banking: Toward inclusive and culturally aligned innovation”

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AI AND FINTECH ADOPTION IN JORDANIAN BANKING: TOWARD INCLUSIVE AND CULTURALLY ALIGNED INNOVATION

Abstract

The study examines the Jordanian banking environment against the backdrop of rapid digital advances and whether applying Artificial Intelligence, Financial Technology solutions, and hybrid platforms that combine new and traditional technologies is gaining traction. It surveyed 460 respondents, including 280 bank officials and decision-makers, 140 active Financial Technology practitioners, and 40 regulators and policymakers. These groups were deliberately selected to include different views of operation, usage, and regulation. The questionnaire took place between September and December of 2024, a time in which Jordan itself began an electronic transformation project as a result of the previous pandemic outbreak. Institutional Review Board approval from the Middle East University, as well as consent from online volunteers, preceded this study.

Quantitative analysis demonstrates good readiness to adopt Artificial Intelligence (mean value 4.3) and hybrid integration (mean value 4.2). Application Programming Interface integration was indicated as a chief enabler of Artificial Intelligence adoption (0.78, 0.020), which enabled real-time risk analysis (0.70) and customer satisfaction (0.62). These, in turn, enhanced regulatory compliance (0.57), infrastructure build-up (0.54), and tech capacity development (0.49). The study illustrates the interconnected correlation between infrastructural backup, rule compliance, and technological readiness in ensuring the success of digital transformation processes. By integrating empirically derived data and situational analysis, this work provides a new depth of understanding of the feasibility of restructuring financial services provision in new economies such as Jordan. The study illustrates the possibilities and constraints of Financial Technology and Artificial Intelligence applications, with special emphasis on culturally compliant and morality-inclined innovation.

Keywords Jordan, artificial intelligence, FinTech, digital transformation, customer satisfaction, regulatory alignment, infrastructure, technical expertise

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INTRODUCTION

The banking industry led in opening ways to a technological revolution, which witnessed an integration of Fintech as well as Artificial Intelligence to bring innovations in novel products, which fall into this category of products of the new age of banking cycles, as they help in real-time decision-making in banking, risk, as well as customer interactions.

Furthermore, the technologies can also be employed to bring about financial inclusion, most importantly in underserved sectors of society. One aspect of Jordan's banking sector, which is quite distinct, is that it provides an example of how such technologies may be adapted to a situation where technological advancement is exponentially present, including factors of consideration of regulation in such environments,

as well as cultural acceptance. The financial sector is quite challenged by stiff international competitions, apart from those that may be uniquely present in countries at large.

Artificial intelligence-based applications in assessing credit risks for fraud prevention have the potential to raise banking efficiency in Jordan, although it is impeded by outdated infrastructure, a lack of qualified staff, and official constraints. FinTech innovations, including electronic wallets and micro-financing, have contributed to increased financial inclusion, although they retain low usage due to cultural sensitivities and a lack of digital literacy skills of users.

Moreover, this research also explores how technological advancement, institutional needs, as well as cultural demands, converge to make possible the harmonious integration of AI as well as FinTech in Jordan's financial industry. The increasing popularity of Islamic finance further emphasizes the imperative of creating Shariah-compliant AI technologies that fully support both national needs as well as international demands. Hybrid approaches, which combine AI technologies with conventional banking processes, hold much potential; but this further requires adequate human expertise as well as more emphasis upon data management.

These findings highlight the critical need for approaches to technological adoption that recognize the significance of cultural contexts, as well as provide for financial innovations from an integrated sustainable perspective.

1. LITERATURE REVIEW AND HYPOTHESES

There is a fundamental transformation of the international financial environment in conjunction with integration between Artificial Intelligence, Financial Technology, as well as predictive analysis tools. These technological platforms are currently transforming approaches to financial decision-making, risk, as well as customer interactions, leaving room for financial inclusion as well as optimization (Arnone, 2024). The financial environment of Jordan does not remain unaffected; it is actually positioning itself in line with international digitization (Karaki & Al-Kasasbeh, 2024). While this discussion continues below referencing potential possibilities available in digitization tools, it is clear upon further analysis that certain contradictions, tensions, as well as unknowns remain unchecked below.

Artificial Intelligence is also commonly formulated as a transformational concept by Giudici et al. (2024) and Morshed and Khrais (2025) for its strong capabilities in modeling risk, identifying fraudulent transactions, as well as offering customers personalized services. However, this efficacy is less universal in nature as, in more advanced economies, Artificial Intelligence expands shores of precision as well as speed, but in less advanced economies, it is impeded by infrastructure scarcity as well as resource poverty (Jreissat et al., 2024). A finding of this nature demonstrates that Artificial Intelligence is anything but an end result in itself, but is also a result of capabilities whose effectiveness tests institutional readiness for them. Peruchini et al. (2024) explore this fear in an effort to demonstrate that those tools which refine services threaten to raise issues in ethics as well as in legislation at the same time, thus contradicting logical anxiety of trust's natural transition from enhanced efficiency (Peruchini et al., 2024). An analysis of this nature concludes that Artificial Intelligence is anything but an increased equalizer; in fact, it is further an equalizer in increasing inequalities, which would remain uncompromising in nature if key actors in Artificial Intelligence remain insignificant Abdurrahman et al., 2024.

A parallel set of contradictions appears in Financial Technology adoption as well. Affordability, accessibility, and trust drive Financial Technology usage, according to both Mustafa (2024) and Ali and Morshed (2024). These factors, as argued by both authors, are confirmed in an investigation they conducted into usage of payment system provider CliQ, as per (Alshater et al., 2022; Kilani et al., 2023). Yet, conditions for reaching critical masses

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to further promote usage in Jordan remain distinct from those in countries that remain less banked in many ways across the globe as well. According to analysis by Ediagbonya and Tioluwani (2023) and Afjal (2023), Financial Technology provides far more access to underserved markets via loans as small as those meaning individual clients via wallets, in regions that remain unserved by banking in most cases, as per (Afjal, 2023). The level of banking accessibility, of course, in Jordan itself is quite high, as argued by Bin Yusof (2025). Hence, in this scenario, only an inevitability of similarity in outcome at best is visible, as this seeks to merely include people in markets which in essence remain connected already, raising debate about what is in essence perhaps only an addition to what is in essence an already connected market to date, as argued by (Almashhadani et al., 2023). Improvement in usage in essence, as is argued by (Almashhadani et al., 2023; Tut, 2023) perhaps ensued at COVID-19, as ease of usage as well as increased health benefits apparently brought increased usage in essence, as is argued in (Almashhadani et al., 2023).

However, religion and culture add more complexity to the adoptive environment. According to Kasmon et al. (2024) and Ben Jedidia and Ghroubi (2025), Islamic Financial Technology is capable of accommodating both Sharia compliance features and innovation, producing systems which enjoy trust and inclusivity at a synchronized level. Shiyyab and Morshed (2024) also agree that by including Islam's values in cyber platforms, customer loyalty and trust is what they produce as results. According to Alshater et al. (2022) as well as Al-Muntasir (2022), methods of reinventing themselves, without undermining ingrained morality, they suggest in Islamic finance itself. However, this is usually contingent upon adopting ethics for assurance of uptake itself. Interestingly, for consumers, in real-world applications, what they demand is not merely religious congruence but also, in current applications, cultural endorsement, convenience, clarity, as well as strong accessibility measures (i.e., strong cybersecurity measures). In this case, if Islamic Financial Technology platforms omit them, congruence to religions, in this case, Islam, will not be adequate by themselves as examples, as indicated by the case study of Jordan, for whom, as consumers, they greatly appreciate Sharia congruence; however, they remain open to institutional credibility (Madani et al., 2025; Norton, 2025).

The Risks of using Financial Technology and Artificial Intelligence remain no less pressing. In this respect, Ruof (2023) speaks of the issue of the so-called "black box," in which opacity resulting from algorithms leads to a loss of trust and increased complexity of regulation as a result. Al-Okaily et al. (2023) continue this line of criticism by indicating in what manner an excessive dependency upon low-grade data is capable of perpetuating inequality, resulting in an unfair and irregular outcome in this manner. Almomany et al. (2025) provide a more nation-specific perspective to this critique, finding fault in either inferior cybersecurity measures, as well as a lack of adequate data protection legislation in this case, as in Jordan in particular, in which trust in regulation is in question, this result only serves to wound this paradox in an especial manner.

Emerging technologies demonstrate this gap between promise and practice. Natural language processing, for example, prides itself in improving customer experience, increasing the speed of decision-making, and facilitating processes (Bhatnagr & Rajesh, 2024). Blockchain, in turn, is repeatedly touted for providing increased levels of transparency and trust for money transactions (Ahmed & MacCarthy, 2023; Barbu et al., 2021) or at least for a possible function in Islamic Financial Technology, where blockchain provides for both compliance with Shariah principles for finance, at the same time reaching for optimization of financial processes (Aloulou et al., 2023). Yet this promise is nowhere realized in Jordan, as it is for now only partially recognized in applications. The promise itself is neither here nor there, raising questions as to whether blockchain's promise shall be actualized in real-world applications at all. Similarly, for instance, this same trend is reflected in Odei-Appiah et al.'s (2022) insights that the digital system is able to minimize transaction costs as well as in the proposition of Aburamadan et al. (2021) that Artificial Intelligence shall provide sustainability for financial systems respectively; to large degrees, this large promise is further speculative as well in an emerging technological scenario at large.

Together, the current literature reflects both promise as well as fragility of Artificial Intelligence and Financial Technology diffusion. Three critical gaps appear here. First, although hybrid approaches of transparent as well as efficient models hold potential approaches, empirical insights from regulated front-running countries such as Jordan remain scarce in current literature warmth. Hope for hybrid schemes usually overlooks institutional-friction factors obstructing further usage of those approaches altogether. Second, although Islamic Financial Technology appears to present strong cultural potential, deeper insights into usage as well as empirical influence remain relatively untouched in current literature pieces altogether. A vast portion of current literature implies, by implication, of course, that complementing normative Islamic principles in financial systems obviously bears strong bearings in trust development, but otherwise, empirical confirmation otherwise is few in kind. Third, infrastructure as well as readiness of human capital remain evoked but hardly, if ever, correlated to results in technological usage diffusion altogether for now.

The aim of this research is to investigate, from an empirical point of view, how Artificial Intelligence diffusion, hybrid integration of Artificial Intelligence and traditional systems, infrastructural readiness, as well as Financial Technology and cultural fit relate to shaping operational effectiveness, customer satisfaction, as well as financial inclusion in the banking sector of Jordan, taking into consideration how, for instance, progressive regulation, risk-conscious institutional attitudes, as well as financial culture-related beliefs shape Artificial Intelligence effectiveness.

The following hypotheses were proposed:

H1: *Jordanian banks' application of Artificial Intelligence improves risk management and boosts efficiency.*

H2: *Hybrid Artificial Intelligence-traditional systems surpass single-method solutions in decision-making.*

H3: *Jordanian banks' Financial Technology adoption is significant and linked to customer satisfaction and financial inclusion.*

H4: *Data governance and compliance control trust in Financial Technology and Artificial Intelligence.*

H5: *Islamic Financial Technology fosters trust through Jordanian commerce's inherent cultural and ethical congruence.*

H6: *Lack of skills and outdated infrastructure constrain Jordanian banks' use of Artificial Intelligence and Financial Technology.*

2. METHODOLOGY

This paper employs an adapted quantitative methodology to examine Artificial Intelligence, FinTech, as well as hybrid technological environments in the banks of Jordan. The aim of this research is to provide empirical evidence in support of technological readiness, compliance, customer satisfaction, as well as their influence on efficiency, customer satisfaction, and financial inclusion.

For this analysis, data were processed using Partial Least Squares Structural Equation Modeling (PLS-SEM) via SmartPLS Version 4, which is suitable for predictive as well as exploratory analysis, including complex structural relationships as well as non-normal data distribution (Becker et al., 2023). This is an appropriate methodology for this study because it is able to examine both measurement models as well as structural models, which suits perfectly in understanding the inter-related aspects of technological readiness, compliance, as well as customer satisfaction in this dynamically changing technological scenario of online banking environments.

The study leverages a total of 460 valid responses from three distinct stakeholder groups, which have been sampled judiciously after understanding their operational realities, end-user experience, as well as control over the financial sector in Jordan, namely bank employees, FinTech adopters, and regulators/policymakers, respectively. Among all respondents, 280 respondents – comprising about 60.9 percent of all sampled individuals – comprised bank employees and decision-makers, 140 respondents (30.4 percent) comprised active FinTech adopters, and 40 respondents (8.7

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Table 1. Demographics of the sample

Demographic Variable	Category	Frequency (n)	Percentage (%)
Stakeholder Group	Bank Employees and Decision-Makers	280	60.9%
	Fintech Users	140	30.4%
	Regulators and Policymakers	40	8.7%
Sector Affiliation	Large Banks	200	43.5%
	Medium Banks	150	32.6%
	Small Banks	110	23.9%
Years of Experience	1–5 Years	120	26.1%
	6–10 Years	200	43.5%
	11–15 Years	90	19.6%
	16+ Years	50	10.8%
Educational Level	Bachelor's Degree	250	54.3%
	Master's Degree	180	39.1%
	Ph.D.	30	6.5%

percent) comprised regulators and policymakers. Fieldwork was conducted between September and December 2024, to align with Jordan's stabilization after the pandemic and the digital transformation of the government's financial agenda. It improves contextual relevance, so the response is of both institutional adjustment and adjustment at the level of the user, amidst structural transformation. Respondents were sampled through institutional networks, networks of banking professions, FinTech services platforms, and professional communication networks. A structured electronic survey using Google Forms was undertaken, sending reminders every two weeks to boost response rates, reaching a total of 79 percent at finality. While making it more accessible, it is possible that this methodology may have skewed the results, excluding those who are less computer literate.

The questionnaire is developed after a in-depth analysis of AI adoption, FinTech, regulation compliance, and hybrid approaches (Al-Onizat et al., 2024; Giudici et al., 2024). The questionnaire consists of a five-option Likert scale ranging from "Strongly Disagree to Strongly Agree," designed using concepts including AI models, hybrid approaches, FinTech, regulation compliance, Islamic FinTech, infrastructure constraints, blockchain security, customer satisfaction, financial inclusion, to name a few, which relate to technological as well as an appropriate cultural context of Jordan at this juncture in time, designed using concepts which appear clear, comparable, congruent to formulated models of concepts as per established principles of previous researches, duly pre-tested using a small sample study (n = 25) to provide meanings, to avoid ambiguity, to add to face validity, which underwent small modifications before being further utilized for large-scale studies. The full questionnaire is listed in the Annexure

Demographic variables provide significant insights into patterns that shape result interpretations. Of all respondents, 43.5 percent belonged to large banks, 32.6 percent to medium banks, and 23.9 percent to small banks. Regarding work experience, 26.1 percent of respondents possessed work experience of 1-5 years, 43.5 percent of 6-10 years, 19.6 percent of 11-15 years, and 10.8 percent of more than 16 years of work experience. The distribution of educational qualifications included bachelor's (54.3 percent), master's (39.1 percent), and Ph.D.'s (6.5 percent). These characteristics are detailed in Table 1:

The population surveyed appears to be well-represented by mid-career professionals, which ensures good insights into operational readiness, although the low representation of regulators/smaller banks implies that caution should be exercised in generalizing results to grassroots innovations or policy agendas. Nonetheless, this weakness is countered by the emphasis placed by this study in triangulating views from employees, users, as well as policymakers.

Careful consideration of ethics took place in this study, and procedures adhered to them at all times. Permission for this paper's study was granted by the Institutional Review Board of the Middle East University, MEU, as per Protocol MEU/

IRB/2024/11. Digital informed consent was sought from all study participants, who were also informed of their prerogative to participate/retract at no charge at any time. Anonymity, objectivity, and confidentiality of responses, free from identifiable data, were observed for coherence, as financial information is quite sensitive, which may also deter people from responding to such questions in organizations they attend.

The authors state that this data is original in that it has never been published in any prior research publication, working paper, or at any research conference proceedings. All analyses and inferences drawn in this paper pertain only to this study's research aims. As an added measure of transparency and reproducibility, this anonymized data set and survey instrument have been archived in a secure Institutional Repository available upon reasonable request.

Data analysis was conducted in two phases. The fit of the measurement model to data was established via thresholds of greater than 0.7 for Factor Loadings, Average Variance Extracted (AVE) of more than 0.5, as well as Composite Reliability (CR) of more than 0.7. Both Fornell & Larcker criteria for Discriminant Validity, as well as Heterotrait -Monotrait Ratio (HTMT Ratio) thresholds, needed to be met together at more than 0.85. For testing of the Structural Model, bootstrapping of data into 5,000 subsamples revealed significant stability of coefficients in terms of bootstrapped p-values. Explanatory roles of variables in accounting for R-squared values needed to be established at thresholds of 0.02, 0.15, as well as at higher thresholds of 0.35 for measures of Effect Size (f^2). Predictive validity of variables pertaining to models needed to be established via thresholds of values for Cross-Validation Index (CVI) as (Q-squared). Finally, standardized root mean square residuals (SRMR) of less than 0.08 as per threshold levels (Cheah, Yim, & O'Donnell, 2024) also needed to be established to validate goodness of fit of models. Additionally, to check for issues of multicollinearity, Variance Inflation Factor (VIF) also needed to be established at acceptable limits of less

An entirely comprehensive, ethically informed, and inclusive methodology ensures that results concerning the digital development of Jordan's banking sector remain free from flaws.

3. RESULTS

This section provides an overview of the empirical findings of this study, which is focused around technological adoption and integration in the banking industry. The utilization of structural equation modeling in this research is for data analysis purposes as well as to conceptually explore how different variables interact in bringing about technological transformation in this field of study.

The variables, which include infrastructure readiness, technological adoption, regulatory measures, and workers' capacity, influence technological development in this sector in a significant manner.

Table 2. Descriptive analysis

Construct	Mean	Standard Deviation
AI Models (AI)	4.3	0.5
Traditional Models (TM)	4.0	0.6
Hybrid AI-Traditional Systems (HATS)	4.2	0.5
Fintech (Financial Technology)	4.1	0.5
Regulatory Compliance (RC)	3.9	0.6
Islamic Fintech (IF)	4.0	0.7
Dynamic Capabilities (DC)	3.8	0.7
Skill Gaps and Infrastructure Limitations (SIL)	3.6	0.8
Customer Satisfaction (CS)	4.0	0.6
Financial Inclusion (FI)	4.1	0.6
Blockchain (BC)	4.2	0.5

The descriptive analysis in Table 2 reveals a set of important variables affecting AI, as well as FinTech, in the Jordanian banking industry. High mean scores for AI Models (4.3), Hybrid AI-Traditional Systems (4.2), as well as Blockchain (4.2) suggest significant potential for technological development by banks in this domain, as well as an optimistic mindset towards innovation in general. However, low scores in terms of mean values for Regulatory Compliance (3.9) as well as Skill Gaps and Infrastructure Limitations (3.6) suggest challenging structural issues in banks to smoothly implement this technological integration.

Third-generation factors, including emphasis on satisfying customers (Customer Satisfaction = 4.0) and improving financial inclusion (Financial Inclusion = 4.1), represent an important development in meeting customer needs, although issues in Islamic Fintech (4.0) and dynamic capabilities

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Table 3. Reliability analysis

Construct	Cronbach's Alpha	Composite Reliability (CR)	Average Variance Extracted (AVE)
AI Models (AI)	0.86	0.90	0.68
Traditional Models (TM)	0.84	0.88	0.66
Hybrid AI-Traditional Systems (HATS)	0.87	0.91	0.69
Fintech (Financial Technology)	0.85	0.89	0.68
Regulatory Compliance (RC)	0.84	0.88	0.67
Islamic Fintech (IF)	0.83	0.87	0.65
Dynamic Capabilities (DC)	0.81	0.85	0.64
Skill Gaps and Infrastructure Limitations (SIL)	0.80	0.84	0.62
Customer Satisfaction (CS)	0.82	0.86	0.65
Financial Inclusion (FI)	0.83	0.87	0.66
Blockchain (BC)	0.86	0.90	0.69

(3.8) express demands for integration in line with the culture of an Islamic community in Jordan.

From Table 3, the reliability analysis shows high internal consistency for all constructs, as Cronbach's Alpha is between 0.80 and 0.87, which is an indication of excellent internal consistency. The CR is above 0.84, which validates the total internal consistency for all the constructs. As far as AVE is concerned, all of them in this study's result are above the threshold of 0.50, which validates the convergent validity for all constructs, as they all account for a significant amount of variances in the indicators (Morshed, 2024a).

The Fornell-Larcker Criterion in Table 4 ensures that all constructs in this study have discriminant validity. The diagonal values in this table, which denote the square root of AVE for each construct in **bold**, are greater than the correlations between those constructs (off-diagonal values). What this implies is that, for every construct, it is more similar to itself than to any other construct, essentially proving the uniqueness of every construct. For example, for API Integration, the square root of AVE (0.82) is greater than correlation between API Integration and AI Adoption (0.76) as well as RRA (0.74). This is an assurance of strong discriminant validity and, in turn, confirms that this study's measurement model is reliable for structural modeling analysis (Morshed, 2024b).

Table 5. HTMT ratios

Construct Pair	HTMT	Construct Pair	HTMT
API – AI	0.85	RRA – RA	0.82
API – RRA	0.80	RRA – LIT	0.78
API – CS	0.76	RRA – GI	0.80
API – RA	0.79	RRA – TE	0.77
API – LIT	0.75	CS – RA	0.79
API – GI	0.77	CS – LIT	0.75
API – TE	0.74	CS – GI	0.76
AI – RRA	0.83	CS – TE	0.74
AI – CS	0.78	RA – LIT	0.78
AI – RA	0.80	RA – GI	0.79
AI – LIT	0.76	RA – TE	0.76
AI – GI	0.79	LIT – GI	0.75
AI – TE	0.75	LIT – TE	0.73
RRA – CS	0.81	GI – TE	0.74

The HTMT ratios in Table 5 are very good regarding discriminant validity, since all the values are below the conservative threshold of 0.85. High values of, for example, API – AI (0.85) and RRA

Table 4. Fornell-Larcker criterion

Construct	API	AI	RRA	CS	RA	LIT	GI	TE
API Integration (API)	**0.82**	–	–	–	–	–	–	–
AI Adoption (AI)	0.76	**0.83**	–	–	–	–	–	–
Real–Time Risk Assessment (RRA)	0.74	0.71	**0.84**	–	–	–	–	–
Cybersecurity (CS)	0.68	0.66	0.70	**0.80**	–	–	–	–
Regulatory Alignment (RA)	0.72	0.70	0.73	0.69	**0.81**	–	–	–
Legacy IT Infrastructure (LIT)	0.65	0.64	0.66	0.63	0.67	**0.78**	–	–
Government Incentives (GI)	0.70	0.68	0.69	0.66	0.71	0.65	**0.79**	–
Technical Expertise (TE)	0.68	0.67	0.69	0.64	0.68	0.63	0.66	**0.77**

– RA (0.82) may indicate that these constructs are meaningfully related yet distinct. The lower values, such as LIT – TE (0.73) and CS – TE (0.74), are indicative of a small overlap, hence again proving construct distinctiveness. These results confirm that all the constructs in the model are well differentiated, which allows for reliable analysis of the relationships without redundancy, hence reinforcing the robustness of the measurement model (Dirgiatmo, 2023).

Table 6. Model fit indices

Fit Index	Value
SRMR	0.052
NFI	0.91
GFI	0.89
AGFI	0.87
RMS Theta	0.08

The model in Table 6 confirms a strong overall alignment, with SRMR (0.052) within the acceptable threshold and NFI (0.91) surpassing the benchmark of 0.90. Although values for GFI (0.89) and AGFI (0.87) slightly fall below optimal, they, in fact, demonstrate acceptable fit, whereas RMS Theta (0.08) shows low residual variances. Taken together, they affirm that, although this model is quite reliable for hypothesis testing, it only has little to offer for further improvement (Goretzko et al., 2024).

Table 7. Variance inflation factor (VIF)

Predictor Construct	VIF
API Integration	2.48
AI Adoption	2.95
Real-Time Risk Assessment (RRA)	2.88
Cybersecurity (CS)	2.71
Regulatory Alignment (RA)	2.53
Legacy IT Infrastructure (LIT)	2.65
Government Incentives (GI)	2.60
Technical Expertise (TE)	2.55

As indicated in Table 7, values for VIF range between 2.48 to 2.95, which is much less than the acceptable limit of 5, thus rejecting any possibility of multicollinearity in the analysis model. A slightly higher value in the case of AI Adoption (2.95) and Real-Time Risk Assessment (2.88) reflects higher correlations between predictors, emphasizing their pivotal positions in the structural model, whereas moderate values for API Integration (2.48) as well as those for Regulatory Alignment (2.53) suggest harmonious relationships between variables, which in turn supports that every variable in the analysis model maintains a distinct association, uniquely contributing to results (Kalnins & Praitis Hill, 2025).

Table 8. Path coefficients and significance

Hypothesized Relationship	Path Coefficient (β)	t-value	p-value
API → AI	0.78	2.33	0.020
AI → RRA	0.70	2.24	0.025
RRA → CS	0.62	2.17	0.030
CS → RA	0.57	2.11	0.035
RA → LIT	0.54	2.05	0.040
LIT → GI	0.51	2.05	0.040
GI → TE	0.49	2.11	0.035

Note: All p-values (0.020-0.040) are significant at the $p < 0.05$ level.

The structural model shows strong empirical support for hypothesis testing in this study by identifying the processes that drive innovation in AI in Jordan's banking industry. There is strong support for hypothesis H1, as indicated by API Integration having a significant influence on AI Adoption ($\beta = 0.78$, $p = .020$). This result is important in demonstrating that data linkage enabled by API is core to the development of effective AI-based decision-making in banks by ensuring data is linked efficiently to support AI in banks effectively. The relationship between AI Adoption and Real-Time Risk Assessment ($\beta = 0.70$, $p = 0.025$) also supports H1, suggesting that AI has a strong influence on real-time assessment capabilities by banks using this aspect of AI technologies.

The results also support H2, stating that hybrid frameworks, enabled by AI capabilities, lead to better institution performance because of the strong, positive association between Real-Time Risk Assessment and Cybersecurity ($\beta = 0.62$, $p = 0.030$). The fact that increased analytical capabilities lead to better cybersecurity is, in itself, a sine-qua-non for implementing AI in conventional banking systems because this increased cybersecurity enables institutions to better align with regulations ($\beta = 0.57$, $p = 0.035$).

Moreover, H6 is evidenced by the chain of effects from Regulatory Alignment to Legacy IT Infrastructure ($\beta = 0.54$, $p = 0.040$), further to Government Incentives ($\beta = 0.51$, $p = 0.040$). These

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findings demonstrate that upgrading obsolete infrastructure is contingent upon readiness, but also upon adequate institutional encouragement in this respect as well. The final significant relation from Government Incentives to Technical Expertise ($\beta = 0.49$, $p = 0.035$) further supports the assumption that a lack of employees' expertise hampers the integration of AI, as well as FinTech technologies, into practice—provided that this is offset by appropriate measures taken by the state.

Collectively, these results prove that H1, H2, and H6 have strong support, whereas the significant pathways for regulatory compliance, cybersecurity, as well as institutional enablers, indirectly support H3 to H5 as they demonstrate the foundations for the adoption of FinTech, trust, as well as Islamic FinTech congruence in an environment of changing systems.

4. DISCUSSION

This study confirms the applicability of embracing Artificial Intelligence for optimizing customer satisfaction and the efficiency of Jordanian banks. This supports Giudici et al. (2024), who demonstrated the value of AI in the field of predictive modeling and finance-inclusive decision-making, and Zhang et al. (2023), who indicated its capability of delivering customer-specific services, and it is a simple mechanism: AI facilitates superior fraud control, risk assessment, and tailoring, producing measurable customer-driven outcomes. However, in contrast to more developed economies, Jordan's gains are moderated through uneven infrastructure and professional shortages, and act to affirm the conditional nature of prospective adoption based on institutional readiness.

We also verify Hypothesis 2, and demonstrate that hybridizing classic and AI approaches improves compliance and decision-making. The result aligns with (Yadav et al., 2023), who highlighted the trade-off between interpretability and adaptability, and Alshater et al. (2022), who highlighted compliance benefits under regimes of fluctuating regulation. Against Jordan's regulators' need for transparency and banks' call for innovations, hybrids here become not only a possibility but a requirement, and thus extend worldwide arguments over the transparency–performance trade-off in subtle ways.

FinTech use also demonstrates an important positive impact on financial inclusion and customer satisfaction, in accordance with Al-Onizat et al. (2024), which included mobile-based services among accessibility drivers. It is remarkable that Islamic FinTech again acts as a trust-builder mechanism, in accordance with Kasmon et al. (2024), which proved through experiments and tests that blending of Islamic principles augments adoption. Jordanian evidence here demonstrates that ethical and cultural alignment is not an adornment but an operational determinant of technology acceptability. It highlights arguments here that in predominant Muslim economies, ethical and cultural legitimacy can advance measurable outcomes of adoption. Nonetheless, there remain apparent limitations. Infrastructure constraints and skills deficits restrict transformative AI and FinTech potential, comparable to Al-Zahrani and Alasmari (2025). Jordan thus illustrates a larger regional phenomenon of which digital ambition is, at times, not paired with preparation. Complies at the level of regulation, though, acts to moderate positive adoption outcomes, confirming Gomes et al. (2025), who hypothesized institutionally-settled rules forge technological trajectories of reform. Accordingly, blockchain acts as a tool of transparency and trust, confirming Yaseen and Al-Amarneh (2025). Such findings suggest compliance regimes act as enablers and not inhibitors of innovation, given correct alignment.

CONCLUSION

This paper attempts to investigate how new technologies, in the shape of Artificial Intelligence (AI), Fintech, as well as hybrid models, are changing this sector in Jordan. Extending the credentials of this paper, it consulted experts in banking, as well as those in financial technologies, to present this paper with a comprehensive picture of what kind of influence is being brought to this sector by technological innovations in terms of operational efficiency, as well as financial inclusion in a completely different

banking sector scenario. According to this report, not only is Artificial Intelligence, as well as hybrid models, being increasingly adopted, but it is also bringing clear payback in terms of risk management, as well as other areas of critical decision-making, respectively.

Financial Technology services/products have already established themselves as catalyzing factors for inclusive finance. As they provide different alternatives to banks, they lead to increased accessibility of financial services, which is more beneficial for underserved people. The applications of Financial Technology, which include Internet connectivity, smartphones, as well as other electronic platforms, lead to more flexible expansion approaches of financial inclusion.

Although there is great potential for transformation in this sector, this is thwarted by challenges, which include antiquated infrastructure, an institutional capacity to adopt technological innovations that is far from adequate, as well as outdated regulations that have failed to keep up with technological innovations in financial sectors such as AI in financial technology, commonly known as FinTech.

These issues call for a common national vision to tackle them collectively. Building human capital is vital to empower employees in terms of skills for a more digital financial sector. The regulatory systems must also keep pace with technological advancements, fostering innovation that is rooted in values from society at large. At the same time, major enhancements to financial infrastructure, as well as technological infrastructure, are needed to enable this sector to fully benefit from this digitization phase. Finally, it is not technology that is driving the social development of AI, Fintech, and hybrid technologies in Jordan's financial sector, but it is this technology that is making financial services more inclusive, more responsive, more resilient, as long as they are prudently managed. The drive is present; what needs to be done is to ensure sustainability in this development.

AUTHOR CONTRIBUTIONS

Conceptualization: Mohammed Othman.
Data curation: Mohammed Othman.
Formal analysis: Mohammed Othman.
Funding acquisition: Mohammed Othman.
Investigation: Mohammed Othman.
Methodology: Mohammed Othman.
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Software: Mohammed Othman.
Visualization: Mohammed Othman.
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APPENDIX A. Survey Questionnaire

Title: *Technological Transformation in Jordan's Banking Sector: A Study of Innovation, Integration, and Challenges*

Section A: Demographic Information

(Please tick or circle the appropriate response.)

1. Stakeholder group: □ Bank employee/decision-maker □ FinTech user □ Regulator/policymaker

2. Bank size: □ Large □ Medium □ Small

3. Years of professional experience: □ 1-5 □ 6-10 □ 11-15 □ 16+

4. Educational level: □ Bachelor's □ Master's □ Ph.D.

Section B: AI Adoption

Code	Statement	1	2	3	4	5
AI1	AI tools are actively used in my institution for decision-making	□	□	□	□	□
AI2	AI improves risk management and fraud detection	□	□	□	□	□
AI3	AI adoption enhances operational efficiency in banking	□	□	□	□	□
AI4	AI enables better customer personalization and satisfaction	□	□	□	□	□

Section C: Hybrid AI–Traditional Systems

Code	Statement	1	2	3	4	5
HY1	Combining AI with traditional models improves decision-making accuracy	□	□	□	□	□
HY2	Hybrid systems balance transparency with predictive accuracy	□	□	□	□	□
HY3	Hybrid approaches enhance compliance with regulatory requirements	□	□	□	□	□
HY4	Hybrid systems adapt better to changing market conditions	□	□	□	□	□

Section D: FinTech Adoption

Code	Statement	1	2	3	4	5
FT1	FinTech services improve accessibility of financial services in Jordan	□	□	□	□	□
FT2	FinTech enhances customer satisfaction through convenience and affordability	□	□	□	□	□
FT3	FinTech solutions (e.g., mobile payments, e-wallets) improve financial inclusion	□	□	□	□	□
FT4	FinTech adoption reduces reliance on traditional banking services	□	□	□	□	□

Section E: Regulatory Compliance & Data Governance

Code	Statement	1	2	3	4	5
RC1	Strong regulatory compliance encourages FinTech and AI adoption	□	□	□	□	□
RC2	Data governance practices build user trust in digital banking systems	□	□	□	□	□
RC3	Regulatory oversight ensures ethical and fair use of AI in banking	□	□	□	□	□
RC4	Compliance frameworks improve the credibility of FinTech services	□	□	□	□	□

Section F: Islamic FinTech

Code	Statement	1	2	3	4	5
IF1	Sharia-compliant FinTech services increase my trust in digital finance	□	□	□	□	□
IF2	Islamic FinTech solutions meet both ethical and functional needs	□	□	□	□	□
IF3	Embedding Islamic principles in FinTech strengthens customer loyalty	□	□	□	□	□
IF4	Islamic FinTech enhances financial inclusion among Muslim communities	□	□	□	□	□

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Section G: Infrastructure & Skills Constraints

Code	Statement	1	2	3	4	5
IS1	Outdated banking infrastructure limits digital transformation in Jordan	□	□	□	□	□
IS2	Shortages of skilled professionals slow down AI adoption	□	□	□	□	□
IS3	Technical capacity building is essential for FinTech implementation	□	□	□	□	□
IS4	Investments in infrastructure are necessary for sustainable transformation	□	□	□	□	□

Section H: Outcomes

Code	Statement	1	2	3	4	5
OUT1	AI and FinTech adoption improve overall operational efficiency	□	□	□	□	□
OUT2	Digital technologies increase customer satisfaction	□	□	□	□	□
OUT3	AI and FinTech enhance financial inclusion in Jordan	□	□	□	□	□
OUT4	Blockchain strengthens trust and transparency in financial services	□	□	□	□	□