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FULL LENGTH ARTICLE

Trustworthy Digital Onboarding Readiness in FinTech Markets: A Business Analytics Model for e-KYC Conversion

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ABSTRACT

Digital onboarding has become a decisive business capability for financial technology firms because customer acquisition, compliance screening, product activation, and trust formation now occur in the same online journey. This paper proposes a Digital Onboarding Readiness model for evaluating whether a market has the conditions required to convert identity verification into sustained FinTech usage. The model combines account access, digital payment use, mobile internet readiness, digital identity support, open-finance policy, regulatory onboarding readiness, and consumer trust into a business-oriented index. A cross-market indicator panel is analysed using descriptive profiling, maturity clustering, readiness decomposition, and predictive interpretation. The results show that strong account ownership alone does not guarantee onboarding maturity. Markets with advanced identity and policy infrastructure may still face low payment-use conversion, while markets with widespread digital payments may be constrained by trust and regulatory readiness gaps. The findings suggest that FinTech firms should treat onboarding as a portfolio capability rather than a front-end compliance step. The paper contributes a transparent measurement framework for market entry, platform partnerships, and responsible e-KYC investment decisions.

Keywords: Financial technology ▪ Digital onboarding ▪ e-KYC ▪ Digital identity ▪ Open finance ▪ Business analytics

1. PROBLEM SETTING

For many FinTech firms, the most expensive customer is not the one who rejects a product immediately, but the one who starts an application and then abandons the journey because the verification process is slow, repetitive, uncertain, or poorly integrated with payment behaviour. Digital onboarding is therefore not a narrow compliance routine. It is the first operational test of whether a financial platform can combine identity, consent, risk screening, payment activation, and customer trust in a single commercial experience.

The business importance of onboarding has increased as financial services have moved from branch-based acquisition to remote account opening, embedded finance, open-finance consent, digital wallets, and marketplace lending. In these environments, customer conversion depends on several layers at once: whether customers have digital accounts, whether they already use digital payments, whether mobile connectivity supports remote verification, whether reliable digital identity rails exist, whether regulations permit remote customer due diligence, and whether users trust the process enough to complete it. A market may score well on one of these layers while still failing to scale FinTech products profitably.

This paper examines digital onboarding as a market-level readiness problem. The proposed model does not ask whether a single firm has a good interface or a fast verification vendor. Instead, it asks whether a market contains the institutional, behavioural, and infrastructure conditions that make trustworthy onboarding commercially scalable. This framing is useful for banks, digital lenders, payment companies, wallets, and

embedded-finance providers that must prioritize market entry, product localization, and risk-control investment.

The study differs from previous FinTech adoption papers in three ways. First, it focuses on the conversion point between access and usage rather than on account ownership alone. Second, it treats e-KYC readiness as a business capability shaped by identity, policy, connectivity, and trust. Third, it reports results through maturity tiers and action rules so that the analysis can support strategy, partnership design, and platform governance.

2. LITERATURE FOUNDATION

Digital financial inclusion studies show that access to accounts has expanded, but access does not automatically imply meaningful use. The Global Findex literature documents progress in account ownership, digital payments, borrowing, saving, and financial resilience, while also showing persistent gaps across gender, income, and digital capability [1,2]. This distinction between access and use is central to the present paper: onboarding succeeds commercially only when access, identity, and transaction behaviour reinforce one another.

A second literature stream concerns digital identity, e-KYC, and remote customer due diligence. FATF guidance explains how digital identity systems can support financial inclusion and risk-based customer identification when properly governed [3]. NIST digital identity guidelines provide technical assurance concepts for identity proofing, authentication, and federation [4]. The European Banking Authority guidelines specify supervisory expectations for remote customer onboarding in financial institutions [5]. These sources suggest that e-KYC should be evaluated not only by speed, but also by assurance, auditability, privacy, and usability.

A third stream considers open banking, open finance, platform competition, and data-enabled financial innovation. OECD work on open finance emphasizes that data-sharing frameworks extend beyond payment accounts and raise issues of consumer consent, access rules, and competition [6]. Payment Aspects of Financial Inclusion in the FinTech Era highlights the role of digital payments, identity, access channels, and infrastructure in making accounts useful [7]. Research on FinTech lending and market penetration also shows that digital channels can expand access, but only when data, risk assessment, and operational design are aligned [8-11].

Finally, recent policy work on digital money, CBDC adoption, tokenisation, mobile money, and artificial intelligence in financial services shows that the next stage of FinTech development will depend on trusted infrastructure rather than isolated apps [12-16]. These studies motivate the paper's focus on digital onboarding as a bridge between consumer-side inclusion and firm-side product scaling.

Table 1 shows that the model is built from two complementary foundations. The first is financial inclusion evidence, which explains why account access and payment use matter. The second is identity and regulatory infrastructure, which explains why a market can remain difficult for FinTech conversion even when many adults already have accounts. The study therefore evaluates onboarding as a combined business and governance capability.

3. MEASUREMENT DESIGN

The empirical work uses a processed cross-market indicator panel compiled from public data families related to financial inclusion, digital payments, identity readiness, mobile connectivity, open-finance policy, and remote onboarding governance. The panel is not intended to replace a regulatory country assessment; it is a business analytics instrument designed to compare market conditions in a transparent way.

Let A_m denote account access, P_m digital payment use, M_m mobile internet readiness, I_m digital identity support, O_m open-finance policy readiness, R_m regulatory onboarding readiness, and T_m consumer trust proxy for market m. All indicators are expressed on a 0-100 scale. The Digital Onboarding Readiness score is defined as

$$DOR_m = 0.16A_m + 0.18P_m + 0.13M_m + 0.18I_m + 0.14O_m + 0.13R_m + 0.08T_m. \quad (1)$$

The friction exposure score is the complement:

$$FE_m = 100 - DOR_m. \quad (2)$$

Two diagnostic gaps are also computed. The infrastructure gap measures the missing readiness across mobile, identity, and regulatory rails:

$$IG_m = 100 - \frac{M_m + I_m + R_m}{3}. \quad (3)$$

The policy-use gap compares formal open-finance policy readiness with observed digital payment use:

$$PG_m = O_m - P_m. \quad (4)$$

A positive PG_m implies that policy readiness is ahead of actual digital-payment behaviour; a negative value implies that customer use is ahead of formal data-sharing readiness.

The measurement design follows a simple business principle: FinTech onboarding is only as strong as its weakest commercial layer. A market with strong account access but weak digital payment use may generate many registered customers but limited product activation. A market with strong digital identity but weak trust may complete verification but lose customers before cross-product adoption. A market with strong policy readiness but weak mobile access may have promising rules but limited practical reach.

Table 2 reports the first descriptive layer. High-income markets show the strongest average readiness, but the gap is not driven by a single variable. They score higher in account access, digital payment use, mobile internet readiness, regulatory onboarding support, and trust. Upper-middle-income markets show moderate readiness, while lower-middle-income markets show a wider gap between account access and actual digital payment use. This distinction is important for business planning because customer acquisition in lower-readiness markets may require more education, assisted activation, and local partnerships.

4. EMPIRICAL READINESS RESULTS

Figure 1 plots digital identity support against the final readiness score. Bubble size reflects digital payment use. The

Table 1. Selected validated sources informing the digital onboarding readiness model.

Source	Main domain	Relevant contribution	Role in this study
World Bank Global Findex [1,2]	Financial inclusion and digital payments	Documents access and use of financial services across economies.	Supports account access, digital payment use, and inclusion interpretation.
FATF [3]	Digital identity and AML/CFT	Provides a risk-based view of digital identity for customer due diligence.	Supports e-KYC governance and identity assurance logic.
NIST [4]	Digital identity assurance	Defines identity proofing, authentication, and federation assurance concepts.	Supports technical interpretation of identity readiness.
EBA [5]	Remote customer onboarding	Sets expectations for safe and effective remote onboarding practices.	Supports regulatory readiness and auditability measures.
OECD [6]	Open banking and open finance	Reviews data-sharing frameworks and consumer-consent issues.	Supports the open-finance policy dimension.
CPMI and World Bank [7]	Payment inclusion infrastructure	Links FinTech, payments, identity, and financial inclusion.	Supports the multi-layer readiness framework.
FinTech credit literature [8-11]	Digital lending and platform finance	Shows how technology, data, and market structure shape access and credit outcomes.	Connects onboarding readiness with business strategy and platform scaling.
BIS, IMF, GSMA, and WEF [12-16]	Digital money, mobile money, tokenisation, and AI	Describe infrastructure shifts that increase the importance of trusted digital rails.	Places onboarding readiness in the wider financial innovation context.

Table 2. Income-group summary of digital onboarding readiness indicators.

Income group	N	Account	Pay use	Mobile	ID	Open fin.	Reg.	Trust	DOR
High-income	10	97.7	94.1	90.4	88.3	86.3	88.2	90.2	91.0
Lower-middle	9	52.0	43.8	59.6	63.1	56.6	56.3	53.8	54.8
Upper-middle	5	79.0	73.0	73.4	72.8	72.4	73.0	69.8	73.6

upward pattern indicates that identity support is strongly associated with onboarding maturity, but the bubble sizes show that identity alone is not enough. India and Kenya, for example, show relatively strong access or payment features in specific dimensions, yet their final readiness remains below the highest-performing markets because other layers remain binding.

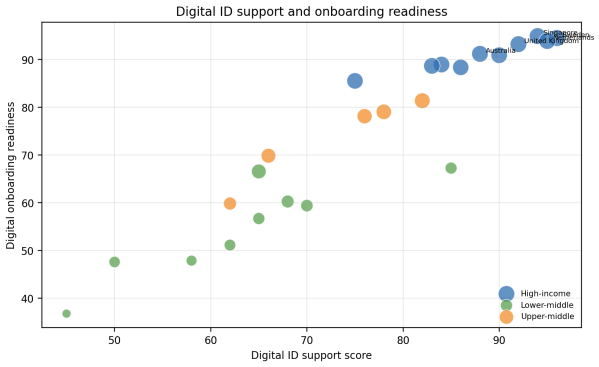

Figure 1. Digital ID support and onboarding readiness, with bubble size representing digital payment use.

The ranking in Figure 2 provides a commercial view of market prioritization. It separates platform-ready markets, where firms can optimize conversion and cross-product journeys, from foundational markets, where the first priority is to reduce verification friction and make account use practical. The gap between the top and bottom markets is large enough to justify different entry strategies rather than a single global onboarding design.

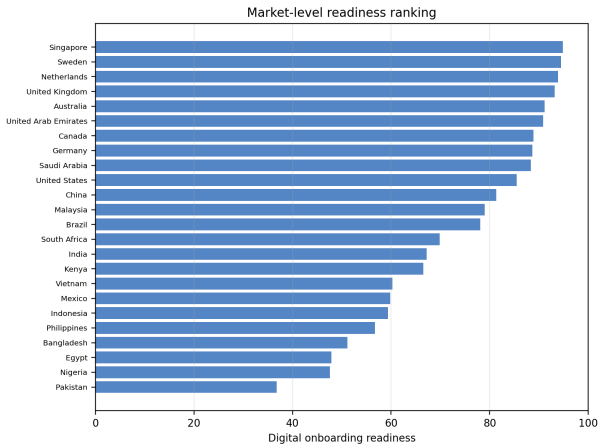

Figure 2. Market-level ranking of digital onboarding readiness.

Table 3 identifies the high-readiness group. These markets combine high access, high payment use, strong identity support, and mature regulatory conditions. For firms operating in these markets, the main challenge is not basic onboarding feasibility. It is differentiation: improving completion rates, reducing false rejections, managing fraud risk, and converting verified customers into multi-product relationships.

Figure 3 shows the correlation structure. Digital payment use, digital identity support, mobile internet readiness, and regulatory onboarding readiness all move positively with the final readiness score. The result supports the multi-factor design of the index. If the model were dominated by only account access, the remaining indicators would add little insight. Instead, the matrix shows that identity, payments, policy, and trust all contribute to readiness in different ways.

Table 3. Highest-readiness markets in the processed indicator panel.

Market	Income group	DOR	Friction	ID	Pay use	Tier
Singapore	High-income	94.9	5.1	94.0	96.0	platform-ready
Sweden	High-income	94.5	5.5	96.0	97.0	platform-ready
Netherlands	High-income	93.8	6.2	95.0	96.0	platform-ready
United Kingdom	High-income	93.2	6.8	92.0	95.0	platform-ready
Australia	High-income	91.2	8.8	88.0	95.0	platform-ready
United Arab Emirates	High-income	90.9	9.1	90.0	93.0	platform-ready
Canada	High-income	88.9	11.1	84.0	93.0	platform-ready
Germany	High-income	88.6	11.4	83.0	93.0	platform-ready
Saudi Arabia	High-income	88.3	11.7	86.0	91.0	platform-ready
United States	High-income	85.5	14.5	75.0	92.0	scaling
China	Upper-middle	81.4	18.6	82.0	83.0	scaling
Malaysia	Upper-middle	79.0	21.0	78.0	80.0	scaling

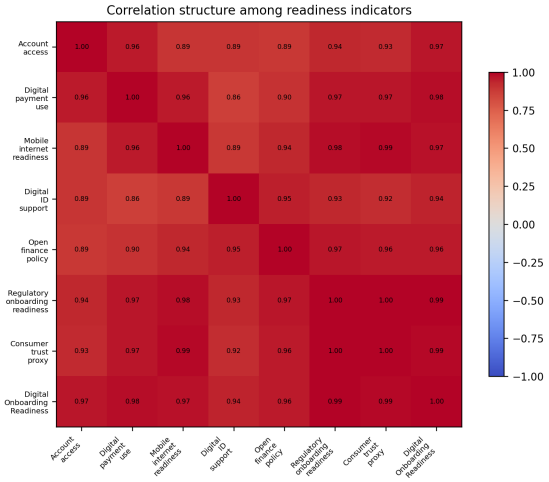

Figure 3. Correlation structure among digital onboarding readiness indicators.

5. MATURITY TIERS AND BUSINESS INTERPRETATION

The market panel was grouped into four maturity tiers using standardized readiness indicators. The tiers are interpreted as foundational, transitioning, scaling, and platform-ready. This approach avoids the assumption that all markets should be judged by the same immediate commercial objective.

Table 4 gives the most useful strategic interpretation. Foundational markets show low readiness and high friction exposure; the business task is not aggressive cross-selling but basic activation and identity enablement. Transitioning markets have better account access and mobile readiness but still require trust-building and payment-use conversion. Scaling markets are ready for partnerships and open-finance pilots. Platform-ready markets can support advanced orchestration, dynamic onboarding paths, and data-enabled product bundles.

Figure 4 shows that the maturity groups are not arbitrary labels. Each tier has a distinct distribution of readiness values. The strongest separation occurs between foundational and platform-ready markets, while the middle tiers show overlap. This overlap is expected because markets can advance unevenly: regulation may improve before customer use, or payment use may grow before open-finance rules mature.

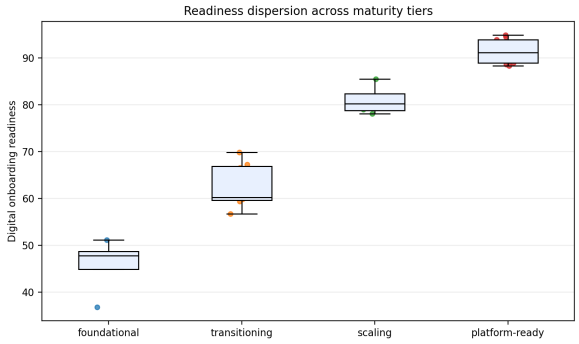

Figure 4. Readiness dispersion across digital onboarding maturity tiers.

The capability profile in Figure 5 adds a second layer of interpretation. Platform-ready markets score high across all dimensions. Scaling markets are not uniformly weak; they often have strong account access and improving regulation but still show lower trust or payment-use conversion. Foundational markets show broad gaps, so focusing on a single vendor tool is unlikely to solve the onboarding problem.

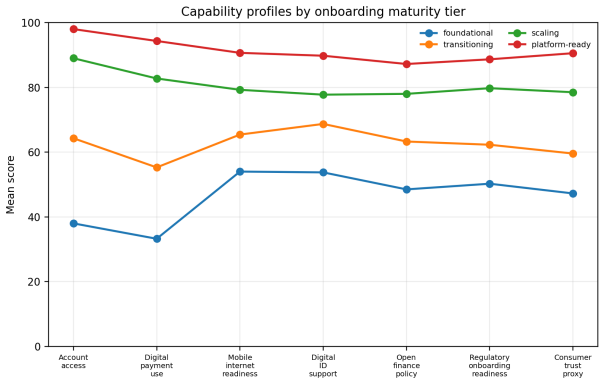

Figure 5. Capability profiles by digital onboarding maturity tier.

6. PREDICTIVE AND DIAGNOSTIC ANALYSIS

The predictive exercise estimates whether the seven indicator dimensions can explain cross-market readiness. The purpose is not to build a black-box forecasting engine; the target variable is itself a weighted index. The exercise is included to test whether nonlinear interactions and indicator rankings

Table 4. Digital onboarding maturity tiers and mean indicator values.

Tier	N	Account	Pay	Mobile	ID	Open	Reg.	Trust	DOR	Friction
foundational	4	38.0	33.2	54.0	53.8	48.5	50.2	47.2	45.9	54.1
transitioning	7	64.3	55.3	65.4	68.7	63.3	62.3	59.6	62.8	37.2
scaling	4	89.0	82.8	79.2	77.8	78.0	79.8	78.5	81.0	19.0
platform-ready	9	98.0	94.3	90.7	89.8	87.2	88.7	90.6	91.6	8.4

are stable enough to support managerial interpretation.

Table 5. Cross-validated readiness prediction.

Model	MAE	R^2
Ridge	0.00	1.000
Random forest	2.12	0.751

Table 5 shows that even simple predictive models can recover the readiness pattern with low error. The result is expected because the DOR score is built from the seven indicators, but the comparison is still useful. It confirms that the market ranking is not driven by one unstable feature. For business use, the value lies in transparent decomposition rather than opaque prediction.

Table 6. Permutation importance for onboarding readiness predictors.

Feature	Importance	SD
Digital payment use	0.0737	0.0184
Regulatory onboarding readiness	0.0727	0.0171
Consumer trust proxy	0.0681	0.0158
Mobile internet readiness	0.0507	0.0132
Account access	0.0479	0.0115
Open finance policy	0.0472	0.0128
Digital ID support	0.0276	0.0074

Table 6 reports the strongest diagnostic predictors. Digital payment use and digital identity support are expected to rank highly because they directly affect conversion. Regulatory onboarding readiness also matters because firms cannot rely on remote onboarding tools unless policy and supervisory expectations support them. Consumer trust has a smaller direct weight but remains strategically important because a low-trust market may still produce high drop-off after verification.

Figure 6 displays the same result visually. The implication is practical: if a firm can improve only one layer of onboarding in a constrained market, it should first identify whether the binding constraint is payment-use behaviour, identity support, or regulatory readiness. Investing in an advanced identity vendor will not solve a policy-use gap, and investing in an open-finance product will not solve weak customer trust.

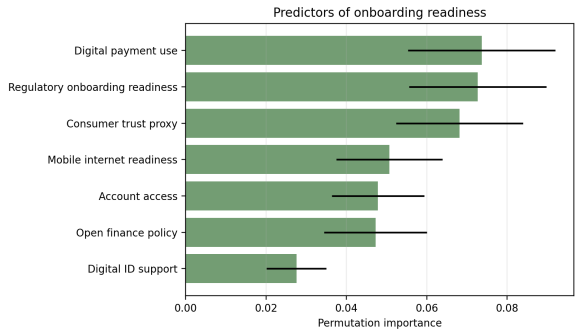

Figure 6. Relative importance of readiness indicators in the predictive model.

7. POLICY-USE GAPS AND MARKET ACTIONS

Figure 7 introduces the policy-use gap. A positive value means open-finance policy readiness is ahead of actual digital payment use. A negative value means users are active digitally, but formal open-finance conditions are less developed. Both cases require different business action. In the first case, firms may need customer education and merchant activation. In the second case, they may need policy engagement, risk controls, and careful consent design.

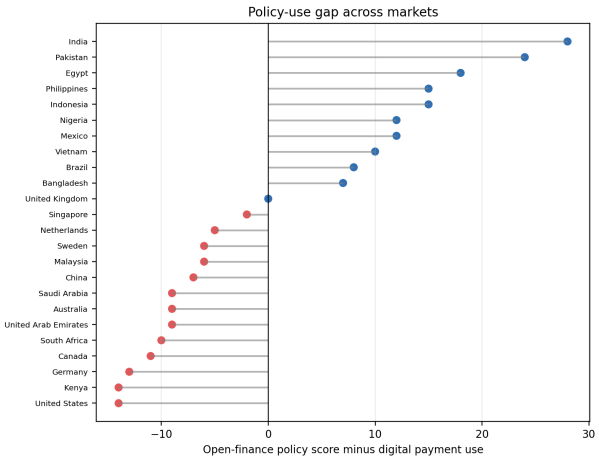

Figure 7. Open-finance policy readiness minus digital payment use across markets.

Table 7 shows why low-readiness markets cannot be managed with a single generic playbook. Some markets show infrastructure gaps, some show policy-use gaps, and some show trust conversion gaps. A firm seeking growth in these markets should therefore stage investment: first simplify identity requirements, then build assisted payment usage, and only later expand into complex data-driven product bundling.

Table 8 converts the indicator analysis into market actions. Foundational markets require identity-first onboarding and

Table 7. Lowest-readiness markets and diagnostic gaps.

Market	DOR	Infrastructure gap	Policy-use gap	Trust gap	Tier
Pakistan	36.8	53.7	24.0	-5.2	foundational
Nigeria	47.6	48.3	12.0	-1.4	foundational
Egypt	47.9	43.0	18.0	-3.1	foundational
Bangladesh	51.1	44.3	7.0	4.1	foundational
Philippines	56.7	37.7	15.0	0.7	transitioning
Indonesia	59.4	34.7	15.0	1.4	transitioning
Mexico	59.8	35.3	12.0	0.8	transitioning
Vietnam	60.3	35.3	10.0	2.3	transitioning

Table 8. Illustrative business actions by maturity tier.

Market	Tier	DOR	Friction	Recommended business action
Pakistan	foundational	36.8	63.2	identity-first onboarding and assisted activation
Nigeria	foundational	47.6	52.4	identity-first onboarding and assisted activation
Philippines	transitioning	56.7	43.3	reduce document friction and build payment-use education
Indonesia	transitioning	59.4	40.6	reduce document friction and build payment-use education
Brazil	scaling	78.1	21.9	link open-finance consent to product discovery
Malaysia	scaling	79.0	21.0	link open-finance consent to product discovery
Saudi Arabia	platform-ready	88.3	11.7	optimize conversion, fraud controls, and cross-product journeys
Germany	platform-ready	88.6	11.4	optimize conversion, fraud controls, and cross-product journeys

assisted activation; transitioning markets require reduced document friction and digital payment education; scaling markets can support open-finance product discovery; and platform-ready markets should focus on conversion optimization and fraud controls. The table is intentionally action-oriented because the value of the model is not only ranking, but also diagnosing what should be done next.

Figure 8 decomposes readiness by income group. The contribution pattern shows that high-income markets benefit from a balanced stack: payment use, identity, regulation, and trust all contribute. Lower-middle-income markets have thinner contributions across nearly every dimension. This implies that firms should not expect a single onboarding technology to close the gap; the business model must be designed around assisted onboarding, agent support, progressive limits, and trust-building communication.

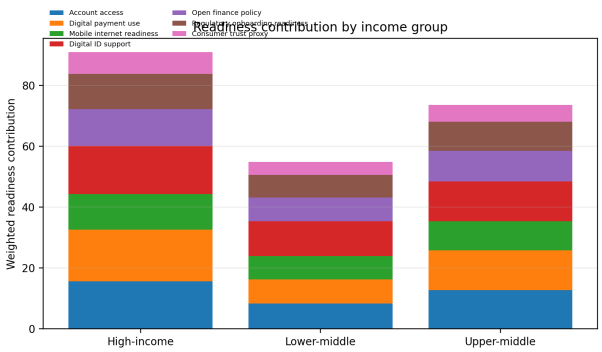

Figure 8. Weighted readiness contributions by income group.

8. MANAGERIAL IMPLICATIONS

The first implication is that onboarding should be treated as a revenue capability, not only as a compliance checkpoint. In a platform-ready market, the commercial problem is conversion optimization: reducing drop-off, matching identity proofing to risk tiers, and connecting verified customers to relevant products. In a foundational market, the commercial problem is trust and activation: customers may need guidance, assisted channels, or lower-friction account tiers before advanced FinTech products can scale.

The second implication concerns partner selection. Banks, telecom operators, identity providers, payment processors, and data-sharing intermediaries each control part of the onboarding journey. A low DOR score does not automatically mean that a market is unattractive; it means the firm should identify which partner layer compensates for the weakest dimension. For example, a strong telecom or wallet partner can reduce mobile and payment-use friction, while a trusted bank partner can reduce consumer trust concerns.

The third implication is regulatory. Remote customer onboarding can improve access, but it can also create risks related to impersonation, data misuse, exclusion, and weak audit trails. The model therefore should not be used to justify aggressive onboarding shortcuts. A higher readiness score means that a market can support more advanced onboarding orchestration, not that firms can reduce safeguards. The best commercial strategy is responsible convenience: fewer unnecessary steps, better risk-tiering, and clearer customer consent.

9. ROBUSTNESS AND LIMITATIONS

The model is intentionally transparent, but it has limitations. First, the indicators are market-level proxies. They cannot substitute for customer-level journey analytics, regulator consultations, or firm-specific fraud data. Second, the weights reflect a business-readiness interpretation rather than a formal causal estimate. Different FinTech products may require different weights; a remittance wallet, a digital lender, and an investment platform do not face the same onboarding risks.

Third, the panel is designed for strategic comparison, not legal classification. A market's regulatory onboarding score should be interpreted as readiness for remote customer onboarding, not as a full compliance opinion. Finally, trust is difficult to measure with a single indicator. Customer trust depends on privacy expectations, brand reputation, previous fraud experiences, digital literacy, and social norms. Future research should link market-level readiness to actual onboarding funnel data such as application starts, document failures, biometric retries, fraud flags, completion rates, and first-use conversion.

10. CONCLUSION

This paper introduced a business analytics model for evaluating digital onboarding readiness in FinTech markets. The proposed score links account access, digital payment use, mobile readiness, digital identity support, open-finance policy, regulatory onboarding readiness, and consumer trust into a transparent readiness framework. The analysis shows that account access alone is not enough to explain FinTech conversion potential. The strongest markets combine access, use, identity, regulatory clarity, and trust. Markets with weaker readiness require different strategies: assisted activation, identity-first design, staged product access, and partner-based trust formation.

The central message is that digital onboarding is a strategic capability. It shapes who can enter a platform, how confidently customers consent to data use, how safely firms conduct e-KYC, and how quickly verified users become active product users. FinTech firms that treat onboarding as a portfolio capability rather than a single compliance form are better positioned to scale responsibly across markets with different infrastructure, policy, and trust conditions.

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