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Article

Institutionally Contingent Technology Adoption Hierarchies: A Conceptual Framework for Trust, Utility, and Infrastructure in Digital Finance

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Abstract

Technology adoption theories developed in institutionally mature contexts assume stable hierarchies among determinants, with perceived usefulness typically dominating. This paper qualifies this assumption by proposing that adoption hierarchies are institutionally contingent. Drawing on institutional voids theory and digital finance research, the paper develops a framework identifying three adoption regimes that function as ideal types which may overlap within contexts: (a) institutional trust dominant, where strong market-supporting institutions enable usefulness-centered adoption; (b) vendor trust compensatory, where institutional voids elevate vendor-specific trust to primary importance; and (c) infrastructure-constrained, where basic access functions as a direct behavioral determinant. The framework extends technology acceptance theory by specifying when hierarchies change, theorizing trust as a compensatory mechanism, infrastructure as a hard constraint based on physical feasibility rather than perceptions, and a digital leveling effect explaining selective cultural influence. We derive propositions and outline a research agenda for cross-country and longitudinal validation, with implications for technology acceptance theory and digital financial inclusion practice.

Keywords: technology acceptance; institutional voids; digital finance; trust; financial inclusion; emerging markets

1. Introduction

Digital financial services are widely promoted as accelerators of financial inclusion, yet actual adoption patterns remain highly uneven across contexts (Gomber et al., 2017; Ozili, 2018). In some settings, relatively simple products such as mobile money achieve mass uptake, while more complex products like insurance lag behind despite similar digital infrastructure (Klapper et al., 2016). This unevenness cannot be explained by technological capability alone; it reflects deeper dynamics in how individuals evaluate digital financial services under varying institutional conditions.

Empirical work increasingly documents these dynamics. Studies in Ghana's digital insurance market found trust emerging as a stronger predictor than perceived usefulness, while infrastructure functioned as a direct behavioral determinant (Botchey, 2025). Similar patterns appear in Bangladesh fintech (Hassan et al., 2024), Kenyan mobile banking (Lashitew et al., 2019), and Mozambican mobile banking contexts (Baptista & Oliveira, 2015). These recurring departures from the standard hierarchy motivate a more context-sensitive account of technology adoption.

These observations pose a question that current technology adoption theory does not adequately address. The Technology Acceptance Model (TAM) and the Unified Theory of Acceptance and Use of Technology (UTAUT) implicitly assume that hierarchies among core determinants are stable across contexts (Davis, 1989; Venkatesh et al., 2003). Meta-analyses consistently position perceived usefulness as the dominant predictor (King & He, 2006; Scherer et al., 2018). Yet these models were developed predominantly in settings characterized by stable institutions, effective regulation, and reliable infrastructure, conditions that allow users to take basic trust and access for granted.

This paper addresses a specific question: Under what institutional conditions do trust, perceived usefulness, and infrastructure change their relative positions in the adoption hierarchy? Rather than arguing that TAM/UTAUT are fundamentally flawed, we propose that their established hierarchies represent one regime among several. This extends rather than overturns existing theory by specifying boundary conditions under which standard hierarchies hold and conditions under which they shift.

The paper develops a framework identifying three adoption regimes, each characterized by distinct institutional conditions and hierarchical orderings. We then theorize three mechanisms, trust as compensatory mechanism, infrastructure as hard constraint, and the digital leveling effect, that drive hierarchical variations. The contribution is threefold: qualifying the assumption of hierarchical stability in technology acceptance theory, developing theoretical devices for understanding when hierarchies shift, and proposing testable propositions for future empirical work.

2. Theoretical Background

2.1. Technology Acceptance Models and the Standard Hierarchy

The Technology Acceptance Model positions perceived usefulness as the primary driver of attitudes and behavioral intentions, with ease of use playing a secondary role (Davis, 1989). This hierarchy has proven robust across hundreds of studies, with meta-analyses confirming usefulness as the dominant predictor (King & He, 2006; Marangunić & Granić, 2015). Extensions including TAM2, TAM3, and UTAUT have added constructs without fundamentally altering this hierarchy (Venkatesh et al., 2003; Venkatesh & Davis, 2000).

Trust was integrated in subsequent research, particularly for e-commerce (Gefen et al., 2003; McKnight et al., 2002). However, trust is typically positioned as a parallel or antecedent construct rather than a dominant one, the implicit assumption being that institutional mechanisms provide baseline trust, allowing users to focus on functionality. Facilitating conditions occupy an even more peripheral position in UTAUT, influencing use behavior but not intention, reflecting an assumption that basic infrastructure is generally available (Venkatesh et al., 2003).

This standard hierarchy, usefulness primary, ease of use and social influence secondary, trust and infrastructure as background conditions, reflects the institutional contexts where these models were developed. The framework proposed by this paper nests this hierarchy as Regime A: valid under conditions of institutional maturity, but potentially shifting under different conditions.

2.2. Institutional Voids and Digital Finance

Institutional voids refer to the absence or weakness of market-supporting institutions taken for granted in developed economies, including contract enforcement, consumer protection, and regulatory oversight (Khanna & Palepu, 1997). In such contexts, transaction costs and risks increase substantially, requiring alternative coordination mechanisms (Mair et al., 2012; Puffer et al., 2010).

Digital finance in emerging markets operates within these constraints. Financial transactions involve information asymmetries, temporal separation between payment and benefit, and reliance on promises requiring institutional backing (Guiso et al., 2008). Research increasingly documents how voids shape adoption: reputation-based mechanisms substitute for institutional protections in China (Gao et al., 2017), trust relationships with agents prove critical in Kenya (Lashitew et al., 2019), and trust moderates acceptance factors in Bangladesh (Hassan et al., 2024). This evidence suggests voids fundamentally reshape which factors matter most.

2.3. Evidence of Context-Dependent Hierarchies

While mainstream research treats hierarchies as universal, scattered evidence suggests significant context dependency. Prior empirical work in Ghana's digital insurance market found that when trust, perceived usefulness, and ease of use were tested simultaneously, trust emerged as the strongest predictor of attitudes, surpassing perceived usefulness, while ease of use became non-

significant (Botchey, 2025). Infrastructure directly predicted adoption independently of attitudes and intentions.

Convergent patterns appear across emerging markets. In Mozambique, social influence had stronger effects on mobile banking adoption than performance expectancy (Baptista & Oliveira, 2015). In Jordan, trust and perceived risk dominated over perceived usefulness for mobile banking (Alalwan et al., 2017). Meta-analyses find that TAM construct explanatory power varies substantially across national contexts, with cultural factors playing larger roles in collectivist cultures (Jan et al., 2022). Infrastructure effects appear in sub-Saharan African mobile health studies (Hampshire et al., 2015) and agricultural digitalization research (Addison et al., 2024) but rarely in developed market studies. Collectively, this evidence from Ghana, Bangladesh, Kenya, Mozambique, Jordan, and China suggests that hierarchical variations are systematic rather than idiosyncratic, warranting theoretical explanation.

3. Conceptual Framework: Institutionally Contingent Adoption Hierarchies

The paper proposes a framework identifying three adoption regimes characterized by different institutional conditions and hierarchical orderings. These regimes function as ideal types rather than mutually exclusive categories. In practice, regimes may overlap within a single country, urban areas may exhibit Regime A characteristics while rural areas exhibit Regime C, and may shift over time as institutional conditions evolve. The value of the typology lies in specifying distinct configurations and their expected consequences, not in claiming that any context fits neatly into one category.

Table 1. Summary of Adoption Regimes.

Regime	Institutional Features	Expected Hierarchy	Typical Contexts
A: Institutional Trust Dominant	Strong regulation, contract enforcement, consumer protection, dispute resolution	Perceived usefulness strongest; ease of use and social influence secondary; trust as hygiene factor; infrastructure as background	Western organizational settings; mature digital markets
B: Vendor Trust Compensatory	Weak enforcement, limited consumer protection, regulatory gaps	Trust strongest and primary filter; perceived usefulness secondary; ease of use often insignificant	Emerging market fintech; digital insurance in institutional voids
C: Infrastructure-Constrained	Variable connectivity, power unreliability, limited device access, high data costs	Infrastructure as direct determinant; trust and usefulness relevant only among those with access	Rural emerging markets; early digitalization contexts

Note. Regimes are ideal types that may overlap within contexts.

3.1. Regime A: Institutional Trust Dominant

This regime characterizes contexts with strong market-supporting institutions: effective regulatory oversight, reliable contract enforcement, consumer protection mechanisms, and accessible dispute resolution. Users can rely on institution-based trust, that is confidence that structural safeguards protect their interests regardless of specific vendor characteristics (McKnight et al., 2002).

When institutional trust is high, vendor-specific trust becomes less critical; institutional mechanisms reduce uncertainty to manageable levels. Attention shifts to functional considerations: Does this technology offer meaningful benefits? Is it easy to use? This explains why TAM performs well in institutionally mature contexts where it was developed. In Regime A, the standard hierarchy holds: perceived usefulness dominates, with ease of use and social influence secondary. Trust functions as a hygiene factor rather than primary differentiator. This regime corresponds to the implicit assumptions of TAM/UTAUT and characterizes most Western organizational and consumer contexts in mainstream research.

3.2 *Regime B: Vendor Trust Compensatory*

This regime characterizes contexts marked by institutional voids: the weakness or absence of market-supporting institutions, which increases transaction costs and risks. Users cannot rely on regulatory protection, legal recourse, or systemic safeguards. This creates a trust deficit requiring alternative mechanisms.

Vendor-specific trust functions as a compensatory mechanism: when users cannot trust the system, they must trust specific providers. This compensation is hierarchically transformative, thus, trust becomes the primary filter through which other evaluations occur. A technology may offer benefits and be easy to use, but if users do not trust the provider to deliver on promises, these advantages become secondary. This mechanism is particularly salient for financial services with delayed benefits and information asymmetries, especially insurance where value exchange is not immediate.

In Regime B, trust supersedes perceived usefulness as the primary determinant. Ease of use may become insignificant when trust concerns dominate. Social influence may retain importance but operate as a trust signal rather than normative pressure.

3.3. *Regime C: Infrastructure-Constrained*

This regime characterizes contexts where basic digital infrastructure is unreliable, unevenly distributed, or prohibitively expensive: intermittent connectivity, frequent power outages, limited smartphone penetration, high data costs, and inadequate technical support.

In such contexts, access functions as a hard constraint based on physical feasibility rather than perceptions. No amount of positive attitude or strong intention enables adoption if basic connectivity is unavailable. This transforms infrastructure from a facilitating condition, that is, the UTAUT conceptualization, into a direct behavioral determinant. The relationship is structural: not about whether users perceive adequate support but whether physical prerequisites exist.

Infrastructure's role is contingent on access variability. When infrastructure is uniformly available (Regime A) or uniformly unavailable, it drops out as a discriminating variable. When access is variable, available to some users some of the time, infrastructure emerges as a direct predictor. In Regime C, infrastructure exerts direct effects on adoption potentially independent of attitudes and intentions.

4. Mechanisms and Propositions

4.1. *Trust as Compensatory Mechanism*

In institutionally strong environments, formal mechanisms, regulation, legal recourse, consumer protection reduce uncertainty about transaction outcomes. Users can assume providers will behave appropriately because institutional penalties for misbehavior are severe and enforcement reliable. Trust is effectively outsourced to institutions.

When institutional mechanisms are weak, this outsourcing is unavailable. Users must rely on vendor-specific signals, reputation, recommendations, track record, partnerships with trusted entities to assess trustworthiness. This evaluation becomes primary because it addresses the most salient risk: not whether the technology is useful, but whether the provider can be relied upon.

Proposition 1: *As institutional quality decreases, the relative importance of vendor-specific trust (versus perceived usefulness) for adoption attitudes increases.*

Proposition 2: *In institutional void contexts, trust substantially attenuates the direct effect of perceived usefulness on adoption intentions; usefulness primarily affects adoption to the extent evaluated within a trusted provider relationship.*

4.2. *Infrastructure as Hard Constraint*

Hard constraints operate through physical feasibility rather than perceptions. When connectivity is unavailable, devices inaccessible, or power unreliable, adoption is structurally prevented regardless of psychological states. Among those with access, intentions predict behavior; among those without, intentions are irrelevant.

Proposition 3: *Where digital infrastructure variability is high, infrastructure exhibits direct effects on adoption behavior not mediated by attitudes or intentions.*

Proposition 4: *The magnitude of infrastructure's direct effect increases with variance in infrastructure availability; in contexts with uniformly high or low access, this effect diminishes.*

4.3. The Digital Leveling Effect

Cultural dimensions have been extensively studied in technology acceptance, yet evidence is notably inconsistent (Jan et al., 2022). This article proposes this reflects selective influence: some dimensions matter for digital adoption while others are neutralized by digital delivery.

Power distance, acceptance of unequal power distribution influences adoption through authority endorsement in traditional contexts. However, digital channels disintermediate hierarchical relationships; users interact directly with platforms rather than through human intermediaries occupying social hierarchies. This leveling reduces salience of hierarchical cues and attenuates power distance effects. Masculinity-femininity orientation toward achievement versus care operates through value alignment rather than social structure. Digital delivery does not alter whether individuals prioritize competitive achievement or collective welfare; value-orientation dimensions should therefore retain influence.

The article focuses on power distance and masculinity-femininity because they represent structurally-mediated versus value-based dimensions respectively. Other dimensions such as individualism-collectivism, uncertainty avoidance may exhibit different patterns and represent extensions for future work.

Proposition 5: *Digital delivery channels tend to attenuate the influence of hierarchical cultural dimensions (e.g., power distance) on technology adoption while tending to preserve the influence of value-orientation dimensions (e.g., masculinity-femininity).*

Proposition 6: *The attenuating effect on hierarchical dimensions is stronger for direct-to-consumer platforms than for digitally-assisted channels preserving human intermediary relationships.*

5. Research Agenda

Testing this framework requires designs capturing variation in institutional conditions. We outline three complementary approaches.

5.1. Cross-Country Comparative Studies

The most direct test involves comparing adoption hierarchies across countries representing different regimes. Studies should select countries varying systematically on institutional quality indicators, specifically, the World Bank Worldwide Governance Indicators (particularly Rule of Law and Regulatory Quality dimensions) or the World Economic Forum Global Competitiveness Index institutional pillar, while controlling for technological development. Multi-group structural equation modeling can test whether path coefficients differ significantly across regime groups. The key dependent variable is not whether adoption occurs but relative effect sizes of trust, usefulness, and infrastructure predictors.

5.2. Longitudinal Studies

Tracking adoption hierarchies as institutional conditions evolve would provide strong evidence. If hierarchies shift predictably as conditions change, trust becoming less dominant as institutions strengthen, infrastructure effects diminishing as access universalizes, this would support the framework. Natural experiments such as fintech-specific regulation introduction or major infrastructure investments could provide quasi-experimental leverage.

5.3. Cross-Service Comparisons

Within a single context, different services may invoke different hierarchies. Services with immediate value exchange (mobile money) may be less trust-dependent than those with delayed benefits (insurance). Services requiring minimal infrastructure (USSD-based) may show different effects than smartphone-dependent services. Such comparisons test whether hierarchies vary predictably based on service characteristics while holding institutional conditions constant.

For testing Proposition 5 specifically, researchers could operationalize cultural dimensions using individual-level measures adapted from Hofstede's Values Survey Module or national-level indices from Hofstede Insights, comparing their predictive power across digital versus traditional channels within the same market.

6. Implications

6.1. Theoretical Implications

The framework qualifies the implicit universalism of technology acceptance models. TAM and UTAUT should be understood as describing adoption dynamics under specific institutional conditions, Regime A, rather than universal laws. This does not invalidate existing research but bounds its generalizability and suggests that technology acceptance models should be explicitly parameterized by institutional context.

This aligns with broader calls for context-sensitive theorizing in information systems research (Avgerou, 2008; Walsham, 2017). The framework contributes by specifying how institutional conditions systematically shape construct relationships, moving beyond noting that 'context matters' toward explaining when and why it matters.

6.2. Practical Implications

For practitioners, adoption strategies should be regime-specific. In Regime A, traditional approaches emphasizing functionality and user experience remain appropriate. In Regime B, substantial resources should be allocated to trust-building, partnerships with trusted institutions, transparent communication, reputation investments, human touchpoints, potentially at the expense of feature development. In Regime C, technology adaptation for low-connectivity environments takes priority; demand-side interventions have limited effectiveness when supply-side constraints bind.

For policymakers, financial inclusion strategies should diagnose institutional regime before selecting interventions. Promoting digital finance in institutional void contexts without addressing trust deficits may yield disappointing results; focusing on awareness when infrastructure constraints bind wastes resources.

7. Conclusions

This paper has argued that technology adoption hierarchies are institutionally contingent. Drawing on institutional voids theory and emerging market evidence, the paper developed a framework identifying three adoption regimes, institutional trust dominant, vendor trust compensatory, and infrastructure-constrained, each characterized by distinct hierarchical orderings among trust, utility, and infrastructure. We theorized three mechanisms driving these variations and derived testable propositions.

The framework extends rather than overturns established technology acceptance theory. Regime A corresponds to the conditions under which TAM/UTAUT were developed and validated; the standard hierarchy remains valid there. The paper's contribution is specifying the boundary conditions of this validity and theorizing what happens when those conditions do not hold.

The practical stakes are high. Billions remain excluded from formal financial services, and digital delivery is promoted as the solution. Yet if adoption dynamics vary systematically across institutional contexts, strategies designed for mature markets may fail elsewhere. Understanding institutionally contingent hierarchies is essential for realizing digital finance's potential for financial inclusion. The paper has offered propositions for future empirical testing; such testing will inevitably refine and potentially challenge elements of this framework.

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