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Factor Affecting Blockchain Adoption in Indian Banking

A Comprehensive Review of Literature, Theoretical Frameworks and a Consolidated Adoption Model

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Abstract

Blockchain technology is widely regarded as one of the most consequential innovations facing the banking industry, promising gains in transaction security, settlement speed, transparency and cost efficiency. Indian banks—both public and private—have begun experimenting with the technology in areas such as trade finance, cross-border remittances, Know Your Customer (KYC) compliance and vendor financing, yet actual deployment remains limited and largely confined to pilot programmes. This paper reviews the growing body of empirical and conceptual literature on blockchain adoption in banking, with particular attention to studies set in the Indian context, and synthesises the findings into a single conceptual framework. Drawing on the Technology Acceptance Model (TAM), the Unified Theory of Acceptance and Use of Technology (UTAUT) and the Technology–Organization–Environment (TOE) framework, the paper groups the factors reported across the literature into four broad categories: technological factors, organizational factors, environmental/ecosystem factors, and individual or employee-level factors. The review finds that while technology-centric variables such as ease of use and relative advantage consistently predict favourable attitudes, the pace of blockchain adoption in Indian banking is shaped as much by external, ecosystem-level conditions—regulatory certainty, the presence of an influential lead adopter and the scale of network participation—as by any single bank's internal capability. The paper further presents a SWOT analysis, a comparative table of five major empirical studies, an illustrative case discussion of the State Bank of India-led blockchain consortium, and a phased roadmap for accelerating adoption. It concludes with implications for bank managers and policymakers and directions for future empirical research in the Indian banking context.

Keywords

Blockchain technology · Indian banking sector · Technology adoption · TAM · UTAUT · TOE framework · Employee awareness · Financial technology · Ecosystem readiness

1. Introduction

Banking has always evolved in step with the technologies available to it—from ledger books and wax seals to core banking systems, automated teller machines, internet banking and, most recently, mobile-first digital payments. Blockchain technology, first popularised through Bitcoin's peer-to-peer electronic cash system, extends this trajectory by offering a decentralised, tamper-resistant and transparent record-keeping mechanism that does not depend on a single trusted intermediary. For an industry built on trust, settlement and verification, the appeal is obvious: blockchain has been proposed as a solution to slow cross-border settlements, duplicated KYC effort, fraud-prone trade-finance documentation and the high cost of reconciliation between counterparties.

India presents a particularly interesting setting in which to study this phenomenon. The country's banking sector has undergone rapid digital transformation over the last decade, driven by financial-technology (FinTech) growth, the Unified Payments Interface, and regulatory encouragement from the Reserve Bank of India (RBI). Several major banks—including the State Bank of India, HDFC Bank, ICICI Bank, Axis Bank, Kotak Mahindra Bank and Yes Bank—have run blockchain pilots covering vendor financing, trade-finance documentation, cross-border remittances and consortium-based KYC sharing. The State Bank of India's 2017 blockchain consortium with ten other commercial banks is often cited as the first major institutional commitment to the technology in Indian banking. Despite this activity, deployment remains largely at the pilot or proof-of-concept stage, and widescale production use is still the exception rather than the rule.

This gap between technological promise and actual uptake has motivated a stream of research that asks a simple but consequential question: what determines whether a bank, and the people who work within it, will actually adopt blockchain? The present paper reviews this literature, with an emphasis on studies conducted in the Indian banking context, and organises the reported determinants into a coherent framework.

1.1 Objectives of the Study

- To review the theoretical frameworks most commonly used to explain blockchain adoption in banking (TAM, UTAUT and TOE).
- To synthesise the empirical evidence on blockchain adoption in Indian banking, with attention to employee-level, bank-level and ecosystem-level studies.
- To classify the reported determinants of adoption into a consolidated, four-layer conceptual framework.
- To assess the strengths, weaknesses, opportunities and threats facing blockchain adoption in the Indian banking sector.
- To derive practical implications for bank managers, technology leaders and regulators, and to propose a phased roadmap for accelerating adoption.

1.2 Scope and Structure of the Paper

The remainder of the paper is organised as follows. Section 2 provides a technical overview of blockchain relevant to a banking audience. Section 3 describes the current state of blockchain adoption in Indian banking, including a timeline of key milestones. Section 4 reviews the three theoretical frameworks most frequently applied in the literature. Section 5 reviews five major empirical studies in depth and presents a comparative summary table. Section 6 synthesises the findings into a consolidated conceptual framework. Section 7 presents an illustrative case discussion of the SBI-led blockchain consortium. Section 8 discusses challenges and barriers, Section 9 presents a SWOT analysis, Section 10 discusses implications for practice and policy and proposes a phased roadmap, Section 11 discusses limitations and future research directions, and Section 12 concludes.

2. Blockchain Technology: A Banking-Oriented Overview

Blockchain is a distributed ledger in which transactions are recorded across a network of participating nodes rather than in a single centralised database. Each block of transactions is cryptographically linked to the one before it, making the historical record extremely difficult to alter after the fact without the collusion of a majority of network participants. This structure gives blockchain four properties that are especially relevant to banking: immutability, transparency, decentralisation and cryptographic security.

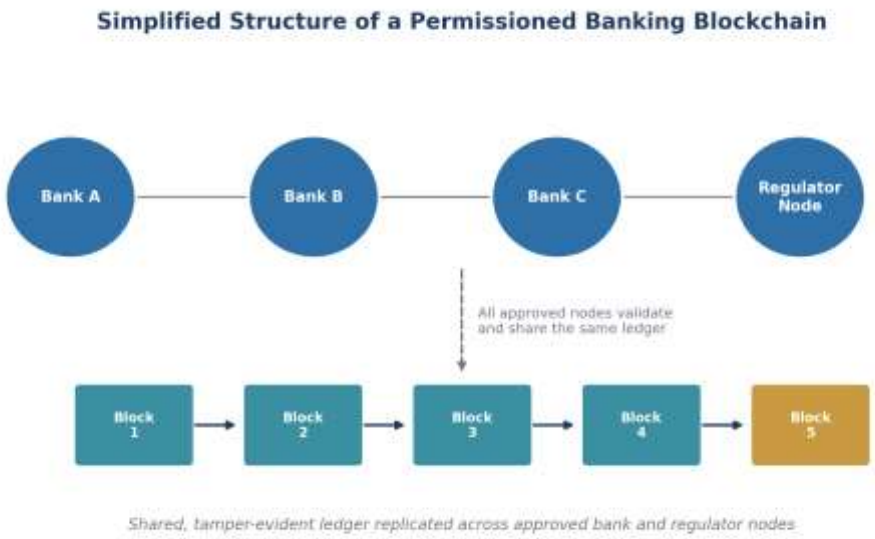

Figure 1. A simplified permissioned blockchain: approved bank and regulator nodes jointly validate and share an append-only ledger of blocks.

Blockchain networks are commonly classified along two dimensions—access and validation rights. Permissionless (public) blockchains allow anyone to join, validate transactions and add new blocks; their openness supports transparency but raises concerns about scalability and regulatory compliance that make them a poor fit for most banking use cases. Permissioned (private or consortium) blockchains, by contrast, restrict participation to vetted, known entities, allowing banks to retain the control, privacy and auditability that regulatory frameworks require while still benefiting from a shared, tamper-evident ledger. For this reason, the literature is consistent in observing that Indian banks—like most banking institutions globally—have gravitated toward permissioned and consortium architectures rather than public blockchains.

2.1 Core Banking Use Cases

Use Case	Description	Illustrative Adopters
Trade finance	Digitising letters of credit and shipping documentation to cut processing time and paper-based fraud.	SBI, ICICI, HDFC
Cross-border remittances	Faster, cheaper settlement between correspondent banks using a shared ledger.	Axis Bank, Yes Bank
KYC / AML data sharing	Consortium-based sharing of verified customer identity data among member banks.	SBI-led 10-bank consortium

Use Case	Description	Illustrative Adopters
Vendor / supply-chain financing	Tracking invoices and payables across a multi-party supply chain.	ICICI Bank, Kotak Mahindra
Asset registries	Recording loan collateral or asset ownership on a tamper-evident ledger.	Pilot stage across several banks
Smart contracts	Self-executing agreements that trigger payments or actions once conditions are met.	Experimental / proof-of-concept

Each of these use cases addresses a recurring inefficiency in the traditional banking model: the need to reconcile records held independently by multiple counterparties, each of whom must separately verify the same underlying facts.

3. Blockchain Adoption in the Indian Banking Sector

India's Ministry of Electronics and Information Technology has designated blockchain as a priority research area with applications spanning governance, banking, finance and cybersecurity. Several public and private banks have piloted blockchain-based solutions for vendor financing, trade-finance documentation, and cross-border remittances, and SBI's 2017 blockchain consortium with other commercial banks remains a landmark case of shared KYC and anti-money-laundering information exchange.



Figure 2. Timeline of key blockchain milestones in Indian banking, from SBI's 2017 consortium to recent employee-awareness research.

Nevertheless, several strands of the literature converge on the observation that blockchain adoption in Indian banking is still experimental and has not progressed much beyond the pilot stage. Barriers repeatedly cited include regulatory uncertainty around cryptocurrency-adjacent technologies, the difficulty of integrating blockchain with legacy core-banking systems, a shortage of in-house technical know-how, and organisational resistance to change among staff accustomed to conventional processes.

Because employees are the ones who must operationalise any new banking technology, several Indian studies have shifted the focus of enquiry away from purely technical feasibility and toward the awareness, perceptions and behavioural

intentions of bank staff and bank management themselves. This employee-centred literature, reviewed in Section 5, complements bank-level and ecosystem-level studies that examine adoption as an organisational or inter-organisational decision.

4. Theoretical Perspectives on Technology Adoption

Three theoretical frameworks recur across the reviewed literature and together provide the conceptual scaffolding for the factors discussed in Section 6.

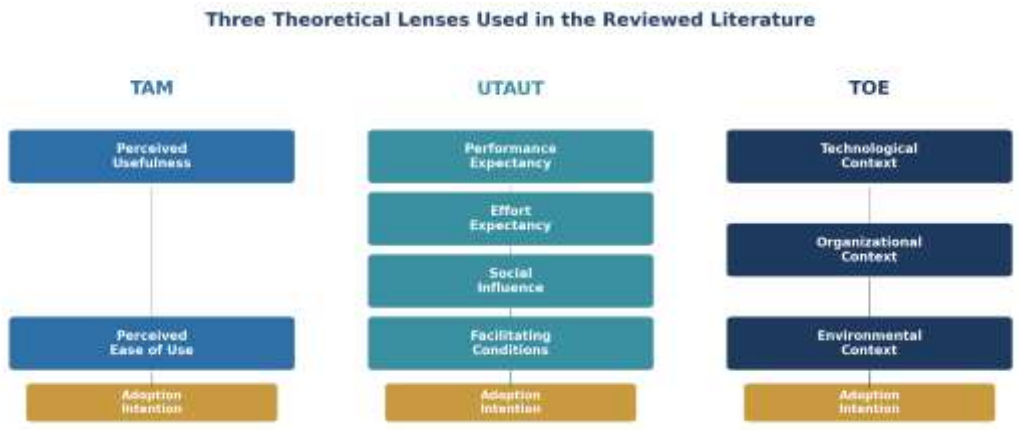

Figure 3. Core constructs of the three theoretical models most frequently applied to blockchain-adoption research in banking.

4.1 The Technology Acceptance Model (TAM)

Davis's Technology Acceptance Model proposes that an individual's intention to use a new technology is shaped primarily by two beliefs: perceived usefulness—the degree to which a person believes the technology will improve their job performance—and perceived ease of use. TAM remains the most widely applied lens in the blockchain-adoption literature because of its parsimony, and several studies reviewed here extend it with additional constructs—trust, cost, risk, security and strategic value—that are considered particularly relevant to financial services.

4.2 The Unified Theory of Acceptance and Use of Technology (UTAUT)

UTAUT synthesises several earlier technology-acceptance theories into four core predictors of behavioural intention: performance expectancy, effort expectancy, social influence and facilitating conditions, moderated by variables such as experience and voluntariness of use. Because blockchain is typically an inter-organisational rather than a purely individual technology, several banking-sector studies extend the base UTAUT model with contextual constructs such as initial trust, perceived risk and government regulation, reflecting the fact that a banker's willingness to use blockchain depends not only on personal utility but also on institutional and regulatory conditions outside their control.

4.3 The Technology–Organization–Environment (TOE) Framework

Where TAM and UTAUT operate largely at the level of the individual user, the TOE framework explains adoption as an organisational decision shaped by three contexts: the technological context (the characteristics of the innovation itself, such as relative advantage, compatibility, complexity, trialability and observability), the organizational context (internal readiness, firm size, top-management support and organisational age) and the environmental context (industry structure, competitive pressure, regulatory conditions and the wider business ecosystem in which the firm operates). Because blockchain delivers most of its value only when multiple counterparties adopt it jointly, TOE-based studies argue that environmental and ecosystem-level factors deserve at least as much attention as an individual bank's internal technological or organisational readiness.

Key Insight

TAM and UTAUT explain why an individual employee or banker forms a positive attitude toward blockchain; TOE explains why that positive attitude does not always translate into organisational adoption, because inter-organisational and regulatory conditions outside the individual's control must also align.

5. Review of Empirical Studies

This section reviews five major studies in depth: an Indian employee-awareness survey, an Indian UTAUT-based banker-intention survey, a European TOE-based ecosystem study, an Indian banking-sector implementation paper, and a special-issue synthesis of additional blockchain-in-banking research. A comparative summary appears in Table 2 at the end of this section.

5.1 Employee Awareness and Perception in Indian Banks

A 2025 study of 200 employees across public and private Indian banks (including PNB, SBI, Canara Bank, Bank of Baroda, Union Bank, HDFC, ICICI, Kotak Mahindra, Axis Bank and IndusInd Bank) examined awareness of blockchain and the factors shaping attitudes toward its adoption, extending TAM with perceived trust, cost, strategic value, risk and security. Chi-square tests found that awareness of blockchain varied significantly by age, gender, education, designation, work experience and type of bank, with younger, more educated employees and staff at private-sector banks reporting greater familiarity with the technology.

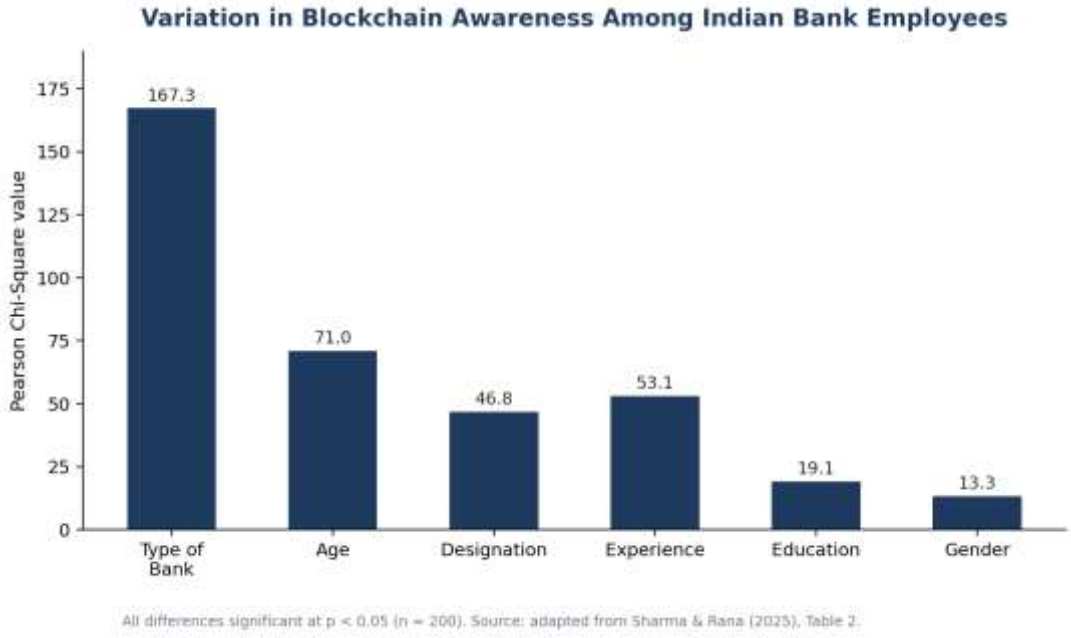

Figure 4. Blockchain awareness among Indian bank employees varies significantly across demographic and professional variables.

Regression analysis found that perceived ease of use, trust, cost and strategic value were significant positive predictors of employee attitude toward blockchain, whereas perceived usefulness, perceived risk and perceived security showed no significant effect. Attitude, in turn, was found to strongly and positively predict behavioural intention to adopt blockchain. The authors interpret this pattern as evidence that, at the current early stage of blockchain's diffusion in Indian banking, employees are guided more by how easy, trustworthy, strategically valuable and cost-effective the technology appears than by more abstract notions of its usefulness or by technical risk and security considerations, which may not yet be salient to staff who lack hands-on experience with the technology.

5.2 Extended UTAUT Studies of Banker Intention

A study of the Indian banking and FinTech sector extended the UTAUT model with initial trust, government regulation and perceived risk to explain bankers' intention to use blockchain technology, based on 381 usable responses from middle- and senior-level bank employees. Using partial least squares structural equation modelling, the study found that facilitating conditions and performance expectancy directly and positively predicted usage intention, and that both constructs also built initial trust, which itself was a strong direct predictor of usage intention and fully mediated the effects of facilitating conditions and performance expectancy on adoption intention.

Government regulation was found to positively moderate the trust–intention and performance-expectancy–intention relationships, while perceived risk negatively moderated performance expectancy's effect on usage intention. Notably, perceived risk did not significantly moderate the relationships involving facilitating conditions or trust, which the author interprets as evidence that once bankers are proficient with blockchain-enabled systems and trust has been established, residual risk perceptions become less influential in shaping usage intention. The study underscores that trust-building, adequate facilitating conditions (infrastructure, training, support) and regulatory clarity are central levers for accelerating blockchain adoption among Indian bank employees.

5.3 Ecosystem-Level and TOE-Based Adoption Studies

Moving beyond the individual employee, a European survey of 350 organisations across Germany, Austria and Switzerland—developed on TOE foundations—tested fourteen hypothesised drivers of organisational blockchain adoption spanning technological, organizational and environmental contexts. A binary logistic regression identified six significant predictors: relative advantage and observability (technological); organizational age, which negatively predicted adoption—younger firms were more likely to adopt (organizational); and external stakeholder pressure, regulatory uncertainty and the scope of the business ecosystem (environmental).

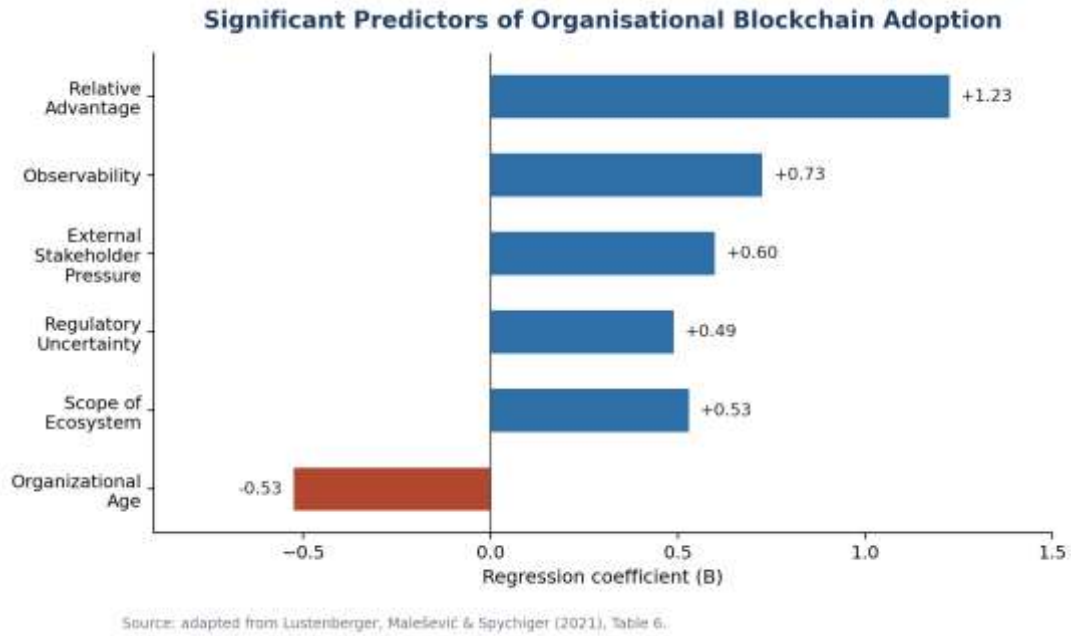

Figure 5. Significant technological, organizational and environmental predictors of organisational blockchain adoption.

Contrary to expectation, both regulatory uncertainty and ecosystem scope were positively associated with adoption, a finding the authors explain by noting that organisations without any blockchain project tend not to perceive regulation as a barrier at all, while those already exploring blockchain become more sensitive to regulatory ambiguity as their projects mature, and that blockchain's network effects mean it delivers little value in small, already-trusted ecosystems but becomes attractive precisely where many, less mutually familiar participants need to establish shared trust at scale. Building on these

findings, the authors propose the concept of 'ecosystem readiness'—characterised by a large ecosystem scope, stakeholders not yet collaborating in a regulated, trustful environment, and a powerful lead organisation willing to demonstrate benefits, exert pressure on other participants and push for regulatory certainty—as the single most important condition for blockchain adoption to take hold. This ecosystem-level perspective is directly relevant to Indian banking, where SBI's role in initiating a multi-bank blockchain consortium exemplifies exactly this kind of lead-adopter dynamic.

A related descriptive finding from the same survey (Figure 6) illustrates why adoption studies so often describe blockchain as 'experimental': across 346 surveyed organisations, the single most common status was no blockchain project at all, and production deployments remained a minority outcome even among organisations that had started a project.

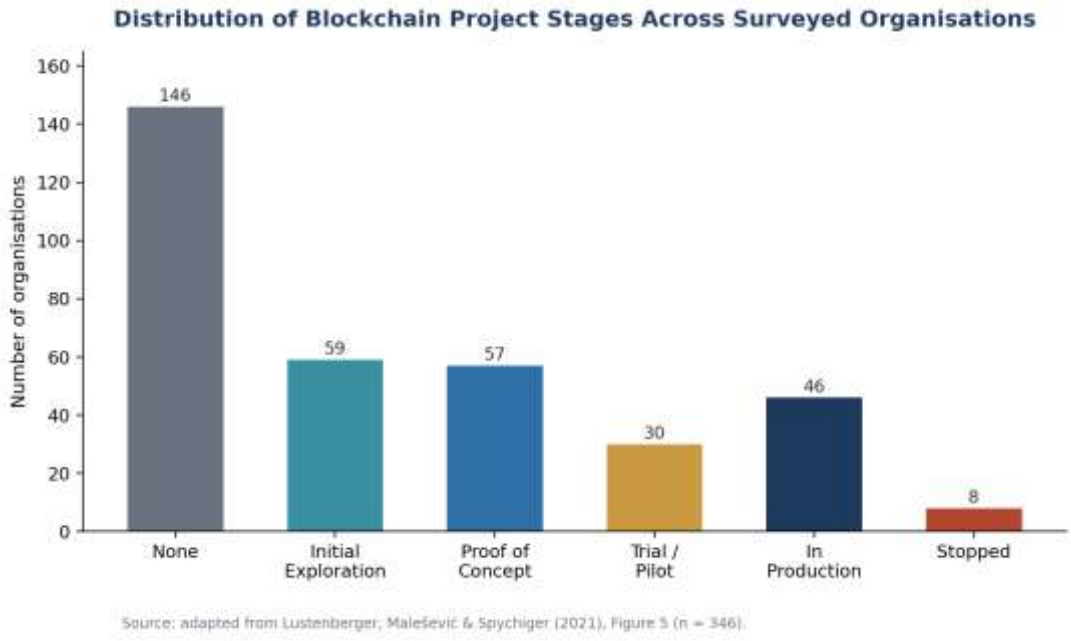

Figure 6. Most surveyed organisations report no blockchain project, and full production deployment remains the exception rather than the norm — a pattern broadly consistent with the pilot-stage status of blockchain in Indian banking.

5.4 Indian Banking Sector-Specific Perspectives

A widely cited paper examining the Indian banking sector specifically frames blockchain implementation as a story of significant potential constrained by practical challenges: regulatory ambiguity around cryptocurrency-linked technology, the cost and complexity of integrating blockchain with legacy core-banking infrastructure, a shortage of in-house technical expertise, and the need for industry-wide collaboration given that blockchain's benefits accrue mainly when multiple counterparties adopt a shared standard. This paper's central argument—that blockchain's value proposition for Indian banks is inseparable from the willingness of the broader banking ecosystem to move together—anticipates the ecosystem-readiness argument developed in Section 5.3 and reinforces the view that adoption cannot be understood purely as a series of independent, bank-by-bank technology decisions.

A 2024 special issue of the International Journal of Quality and Reliability Management further situates the Indian findings within a broader international literature. Among the papers summarised in that issue, one study using a fuzzy-AHP and TOE-integrated approach found organisational factors to be the most significant drivers of blockchain adoption in banking, ahead of environmental and technological criteria, while identifying scalability, standardisation and complexity as persistent implementation challenges and insufficient government regulation as a factor that specifically hampers progress in the banking sector. A related Indian study using PLS-SEM and artificial neural network approaches to examine cryptocurrency and blockchain acceptance found that social influence was the strongest driver of behavioural intention, followed by design, hedonic motivation and security, with performance and effort expectancy playing a comparatively minor role—a pattern that, together with the employee-awareness findings summarised above, suggests that social and experiential factors may

matter more for blockchain-adjacent financial technologies in India than the utilitarian, performance-based factors emphasised in classical technology-acceptance theory.

5.5 Comparative Summary of Reviewed Studies

Study	Setting / Sample	Framework	Key Significant Predictors
Employee awareness study (2025)	200 employees, Indian public & private banks	Extended TAM	Ease of use, trust, cost, strategic value → attitude → intention
Extended UTAUT banker study	381 responses, Indian banking & FinTech firms	Extended UTAUT (PLS-SEM)	Facilitating conditions, performance expectancy, initial trust (mediator)
Ecosystem readiness study	350 organisations, DACH region (Europe)	Extended TOE	Relative advantage, observability, stakeholder pressure, regulatory uncertainty, ecosystem scope, org. age
Indian banking sector paper	Conceptual / qualitative, India-specific	TOE-informed discussion	Regulatory ambiguity, legacy integration, talent shortage, collaboration need
IJQRM special issue synthesis	Multiple studies, international + India	Fuzzy-AHP / TOE, PLS-SEM & ANN	Organisational factors (AHP study); social influence, design, hedonic motivation (India crypto study)

6. Synthesis: Factors Affecting Blockchain Adoption in Indian Banking

Taken together, the reviewed studies point to a consistent four-way classification of adoption determinants, broadly aligned with the TOE framework but extended to include the individual-level constructs highlighted by TAM- and UTAUT-based research on Indian bank employees. Figure 7 summarises this layered structure.



Figure 7. Consolidated conceptual framework of factors affecting blockchain adoption in Indian banking.

6.1 Technological Factors

- Perceived ease of use and relative advantage: consistently reported as significant positive predictors of favourable attitudes and adoption intention across the Indian and international studies reviewed.
- Perceived usefulness: reported as insignificant in the Indian employee-awareness study, suggesting that, unlike in many classical TAM applications, usefulness alone does not yet translate into positive attitudes among bank staff who have limited hands-on exposure to blockchain.
- Trust, cost and strategic value: significant positive predictors of employee attitude in the Indian study, and trust additionally functions as a key mediating variable between performance/facilitating-condition beliefs and usage intention in the UTAUT-based banker study.
- Perceived risk and security: generally insignificant or, where significant, negatively associated with adoption intention only under specific moderating conditions (e.g., in interaction with performance expectancy), implying that risk and security concerns are less decisive than trust and ease of use at this stage of adoption.
- Observability: a significant positive predictor of organisational adoption in the TOE-based ecosystem study, reflecting the difficulty organisations face in estimating blockchain's costs and benefits without visible external reference cases.

6.2 Organizational Factors

- Top-management support and organizational readiness (financial and technical resources, internal IT competence) are widely cited as important enablers in qualitative and case-based studies of blockchain adoption, although the quantitative TOE-based survey did not find statistically significant effects for these constructs, suggesting their influence may operate more strongly in the earliest, pre-pilot stages of adoption than in explaining variance in adoption status once projects are already under way.
- Organizational age: younger organisations were significantly more likely to adopt blockchain in the TOE-based study, consistent with the argument that younger firms use emerging technology to differentiate themselves and carry a smaller legacy-system burden.

- Designation, work experience, education and gender: significant sources of variation in blockchain awareness among Indian bank employees, indicating that internal capacity-building and training programmes may need to be differentiated across employee segments rather than applied uniformly.

6.3 Environmental and Ecosystem Factors

- Regulatory clarity and government regulation: found to positively moderate the trust–intention relationship in the UTAUT-based banker study, while its absence is repeatedly cited as a constraint on further blockchain development once pilot projects have begun.
- External stakeholder pressure: a significant positive predictor of organisational adoption, consistent with the reasoning that blockchain's network-based value proposition often requires a dominant customer, regulator or consortium leader to compel other participants to join.
- Scope of the business ecosystem: found to positively affect adoption once a sufficiently large number of participants is involved, since blockchain delivers limited benefit in small, already-trusted networks where centralised alternatives remain cheaper and simpler.
- Ecosystem readiness and lead-adopter dynamics: the presence of a powerful organisation willing to demonstrate benefits, exert pressure on other ecosystem participants and pursue regulatory certainty—exemplified in the Indian context by SBI's multi-bank blockchain consortium—emerges as a decisive higher-order condition that shapes many of the other environmental factors.

6.4 Individual and Employee-Level Factors

- Awareness and understanding: varies significantly with demographic and professional characteristics and is repeatedly identified as a foundational prerequisite—without basic awareness, downstream attitude and intention constructs cannot meaningfully form.
- Attitude toward blockchain: functions as the most proximate and consistently significant predictor of behavioural intention to adopt across the studies reviewed.
- Initial trust: central to both the employee-attitude findings and the UTAUT-based banker study, where it mediates the effects of performance expectancy and facilitating conditions on usage intention.
- Social influence: identified as the strongest predictor of behavioural intention in at least one Indian cryptocurrency/blockchain acceptance study, suggesting peer and organisational norms may carry particular weight in the Indian banking context.

7. Illustrative Case: The SBI-Led Blockchain Consortium

The State Bank of India's 2017 initiative to form a ten-member commercial-bank blockchain consortium for sharing KYC, anti-money-laundering and counter-terrorist-financing information offers a concrete illustration of the ecosystem-readiness dynamics discussed in Section 5.3. Several features of the initiative align closely with the attributes the literature associates with successful blockchain adoption:

- Lead organisation: SBI, as India's largest public-sector bank, possessed the scale, regulatory standing and reputational credibility to convene multiple competing banks around a shared ledger.
- Ecosystem scope: a ten-bank consortium provided the network size needed for blockchain's shared-ledger benefits (reduced duplication of KYC effort, faster verification) to materially outweigh the coordination costs of participation.
- Observable benefits: by demonstrating a working consortium model, SBI provided other banks and regulators with an observable reference case, addressing the 'observability' factor identified as significant in the TOE-based literature.

- Regulatory engagement: the consortium's compliance focus (KYC/AML/CTF) meant its objectives were closely aligned with, rather than in tension with, existing regulatory priorities, partially mitigating the regulatory-uncertainty barrier that affects more speculative blockchain use cases.

At the same time, the consortium illustrates the limits of ecosystem readiness in the absence of full regulatory certainty: broader production-scale use of blockchain for trade finance, cross-border payments and asset registries across the Indian banking sector has continued to develop only gradually, consistent with the pilot-stage status reported across the literature reviewed in Section 5.

8. Challenges and Barriers

- Regulatory ambiguity surrounding cryptocurrency-adjacent technology, which creates uncertainty for banks seeking to invest in blockchain infrastructure.
- Integration difficulty with legacy core-banking systems built on centralised architectures.
- Shortage of in-house technical expertise and blockchain-specific talent within Indian banks.
- Organisational resistance to change, particularly among staff accustomed to conventional, centralised banking processes.
- Coordination costs inherent in any inter-organisational technology: blockchain's benefits depend on the participation of multiple, often competing, banks and counterparties.
- Limited observable, production-scale success stories within the Indian market, making it difficult for individual banks to benchmark expected costs and benefits.

9. SWOT Analysis

Drawing on the factors identified across Sections 5 through 8, the following SWOT analysis summarises the internal and external conditions shaping blockchain adoption in Indian banking.



Figure 8. SWOT analysis of blockchain adoption in Indian banking, synthesised from the reviewed literature.

The SWOT analysis reinforces a theme that runs throughout this review: the strengths and opportunities facing Indian banks are substantial and increasingly well documented, but they are counter-balanced by weaknesses and threats that are predominantly ecosystem-level and regulatory in nature rather than attitudinal. Indian bank employees appear broadly receptive to blockchain; the binding constraints lie elsewhere.

10. Implications for Practice and Policy

For bank management, the review suggests that awareness-building and training programmes should be differentiated by employee segment (age, designation, experience and bank type all significantly shape existing awareness levels), and that communication about blockchain initiatives should emphasise ease of use, trust-building measures, cost implications and strategic value rather than abstract usefulness claims, since the latter has not been shown to move employee attitudes in the Indian context studied. Facilitating conditions—adequate technical infrastructure, support systems and training—along with performance-expectancy messaging, appear to be effective levers for building the initial trust that mediates adoption intention among bankers.

For regulators and industry bodies such as the Reserve Bank of India, the review's ecosystem-readiness perspective implies that regulatory clarity functions less as a simple green light and more as a moderator that strengthens the effect of other positive drivers (trust, performance expectancy) on adoption intention. Coordinated, consortium-style initiatives—of the kind SBI has already led—appear to be a particularly effective mechanism for overcoming the collaboration paradox identified in the ecosystem literature, in which blockchain's trust-building value is most needed precisely where inter-organisational collaboration does not yet exist, but that same absence of pre-existing collaboration makes coordinated adoption harder to achieve without a dominant lead organisation willing to bear early coordination costs.

10.1 A Phased Roadmap for Indian Banks



Figure 9. A phased roadmap for accelerating blockchain adoption across Indian banks, derived from the factors identified in this review.

Phase	Time Horizon	Priority Actions	Primary Owner
Phase 1: Foundation	0–12 months	Segment-specific awareness and training; trust-building pilots; internal facilitating-condition audits	HR & Learning, IT
Phase 2: Consolidation	1–2 years	Expand consortium-based KYC/AML sharing; formalise IT infrastructure and support systems	Bank consortia, IT leadership
Phase 3: Scale-up	2–4 years	Push for regulatory certainty; scale trade-finance and remittance use cases to full production	RBI/regulators, bank leadership

11. Limitations and Directions for Future Research

Several limitations of the existing literature point toward productive avenues for future research. First, most Indian studies to date rely on cross-sectional survey data collected from a limited number of banks and cities, which constrains the generalisability of findings across India's highly heterogeneous banking landscape (public sector banks, private banks, regional rural banks and cooperative banks differ substantially in technological readiness and regulatory treatment). Longitudinal research tracking the same banks and employees as blockchain projects mature from pilot to production would help clarify whether the risk and security concerns currently found to be insignificant remain so as deployment scales.

Second, few studies directly compare adoption dynamics across different banking sub-sectors or across retail, commercial and cooperative banking models within India. Third, given the central role that ecosystem-level and regulatory factors appear to play, future work could usefully apply case-study or comparative methods to examine specific Indian blockchain consortia (such as the SBI-led initiative) in depth, testing whether the 'ecosystem readiness' attributes identified in the European TOE-based study—ecosystem scope, absence of pre-existing trust, and a powerful lead organisation—hold in the Indian regulatory and competitive context.

- Extend cross-sectional employee surveys into longitudinal panels tracking attitude change as pilot projects mature.
- Compare adoption dynamics across public-sector, private, regional-rural and cooperative banks within India.
- Conduct in-depth case studies of Indian blockchain consortia to test the ecosystem-readiness framework directly.
- Examine whether social-influence effects found in cryptocurrency-adoption research generalise to core banking blockchain applications.
- Investigate the specific role of RBI regulatory signalling as a moderator of bank-level adoption decisions.

12. Conclusion

Blockchain technology continues to be viewed by Indian banks as a strategically important, if still largely experimental, innovation. The literature reviewed here shows that adoption is best understood not as a single decision but as the outcome of conditions operating at four interacting levels: individual employee awareness, attitude and trust; technological characteristics such as ease of use and relative advantage; organizational readiness and leadership support; and, critically, environmental and ecosystem-level conditions including regulatory clarity, external stakeholder pressure and the presence of a credible lead adopter capable of coordinating action across a sufficiently large network of participants.

For Indian banking specifically, where employee attitudes toward blockchain already appear broadly favourable and where several major banks have accumulated pilot-stage experience, the evidence suggests that further progress toward production-scale adoption depends less on convincing individual banks or bankers of the technology's usefulness and more on resolving the ecosystem-level coordination and regulatory-certainty challenges that determine whether blockchain's

network benefits can actually be realised. The phased roadmap and SWOT analysis presented in this paper offer a starting point for bank managers, technology leaders and regulators seeking to translate this diagnosis into coordinated action.

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