

ADOPTION OF MODERN TECHNOLOGY IN HUMAN RESOURCE MANAGEMENT PRACTICES IN PUBLIC SECTOR BANKS OF BIHAR

Seema Sharma

Research Scholar,
P.G. Department of Commerce, Jai Prakash University, Chapra

(Dr.) Abdul Rahim Safi

Supervisor, Prof., P.G Department of Commerce, Jai Prakash University, Chapra

ABSTRACT

Public Sector Banks (PSBs) in Bihar operate at a scale that makes digitally enabled human resource management (HRM) not merely an efficiency choice but an operational necessity. This study examines how modern technology, primarily HRIS/HRMS platforms, e-recruitment pipelines, learning management systems, digital performance management, and tech-enabled grievance redressal, has been adopted across key HRM practices in PSBs serving Bihar. Using a secondary-data design, the study triangulates (i) Bihar's banking network intensity (branches, ATMs, and BC/CSP outlets) with (ii) publicly available institutional disclosures and policy reforms shaping technology adoption in PSBs. Empirically, the Bihar banking system recorded 8,136 branches (all banks) as of 30-06-2024, of which PSBs accounted for 4,045 branches (49.7%), indicating the continued workforce intensity and governance footprint of PSBs in the state. District-level analysis shows high spatial concentration in Patna and major economic districts, while the ATM and BC/CSP data indicate a strong shift toward digitally mediated service delivery requiring parallel HR digitization, digital skilling, and IT-risk controls. The study proposes an adoption framework grounded in technology acceptance and IS-success theory, and it develops measurable indicators for HR technology effectiveness relevant to Bihar's PSB context.

Keywords: Public sector banks, Bihar, HRIS, e-HRM, HRMS, digital HR transformation, training and development, performance appraisal, grievance handling, banking correspondents

1. INTRODUCTION

The digitization of Indian banking has progressed from customer-facing channels to core operational functions, including human resource management, where HR technology has become a key lever for productivity, compliance, and workforce capability development. In PSBs, the "HR problem" is structurally different from that in smaller or digitally native firms: large employee bases, extensive branch footprints, geographically dispersed postings, and strong compliance requirements produce high transaction volumes in recruitment, training, appraisal, transfers, and employee services. Bihar represents a particularly important context because PSBs continue to carry a substantial share of the state's formal banking infrastructure, meaning that HR technology adoption in PSBs materially influences service delivery capacity and organizational resilience.

State-level evidence supports the scale argument. As of 30-06-2024, Bihar had 8,136 branches across the banking system, while PSBs alone accounted for 4,045 branches, i.e., 49.7% of total branches, underscoring the centrality of PSBs for staffing, governance, and operational continuity in the state [1]. The distribution is spatially uneven, with Patna hosting the largest concentration of branches, consistent with the administrative and commercial centrality of the capital region [2]. Digital service infrastructure is also extensive: Bihar recorded 7,269 ATMs (district totals aggregated) as of 31-03-2025, further intensifying the need for secure IT operations and digitally competent frontline and support workforces [3]. In parallel, the banking correspondent (BC/CSP) channel has grown into a major last-mile delivery architecture; the cumulative BC/CSP dataset for Bihar (as of 31-03-2024) reports large outlet counts and transaction activity, reinforcing the conclusion that operational delivery is increasingly hybrid, physical plus digital, and HR systems must support this hybridization [4].

At the policy level, PSB modernization has been shaped by reform programs and institutional directives emphasizing process digitization, governance controls, and capability building. The Department of Financial Services (DFS) frames modernization priorities through its annual reporting and governance initiatives for the banking system [5]. In addition, IT governance and cyber-risk controls have become explicit supervisory concerns; RBI's Master Direction on IT Governance, Risk, Controls and Assurance Practices formalizes governance expectations that directly affect HR technology environments because HR systems are part of the broader enterprise application and control landscape [6]. Within banks, digital HR is commonly operationalized through integrated HR platforms (HRMS/HRIS), self-service portals, digital learning ecosystems, and workflow systems that enable recruitment, training, appraisal, and grievance handling at scale; SBI's annual report disclosures explicitly highlight integrating IT across functions to improve employee experience and productivity [7].

Against this backdrop, the present study asks: how and to what extent are modern technologies being adopted in major HRM practices in PSBs operating in Bihar, what operational outcomes are most relevant, and what constraints are most salient in a state with large rural and semi-urban banking footprints?

2. REVIEW OF LITERATURE AND THEORETICAL ANCHORS

The adoption of HR technologies is typically examined under the umbrella of electronic HRM (e-HRM) and HRIS research, where HR processes are digitized through integrated platforms enabling employee self-service, workflow automation, analytics, and compliance reporting. Conceptually, HR technology adoption intersects two mature research streams: technology acceptance and information systems success.

Technology acceptance research, especially the Technology Acceptance Model (TAM), argues that adoption intentions and usage are driven by perceived usefulness and perceived ease of use, with downstream effects on realized use [8]. Extensions such as TAM2 add social influence and cognitive instrumental processes, making them relevant for PSBs where mandatory systems and hierarchical workflows are common [9]. The Unified Theory of Acceptance and Use of Technology (UTAUT) further integrates performance expectancy, effort expectancy, social influence, and facilitating conditions, constructs that fit well with

PSBs' operational realities (e.g., training support, infrastructure availability, and policy mandates) [10]. A complementary lens is the IS Success Model, which evaluates systems by information quality, system quality, service quality, use, user satisfaction, and net benefits; this perspective is particularly useful for HRMS deployments because "success" must be measured in operational outcomes such as cycle-time reduction, compliance improvement, and error reduction rather than adoption alone [11].

In banking-specific contexts, empirical studies in South Asia and India have increasingly examined e-HRM's influence on job satisfaction, service climate, and perceived HR effectiveness, suggesting that digitised HR processes can improve process transparency and HR responsiveness when accompanied by change management and capability building [12]. Banking-sector studies also stress that e-HRM benefits are contingent on user readiness, training effectiveness, and the alignment of HR workflows with regulatory and audit requirements [13]. These findings matter in Bihar because the operational network implies high volumes of HR transactions at the district and branch levels, which can magnify both the benefits of automation (standardization, speed, and traceability) and the risks (process rigidity, system downtime, cyber vulnerabilities, and exclusion of low-digital-skill employee segments).

Another strand emphasizes the governance and risk dimension. As banks digitize, IT governance, cybersecurity, and assurance controls become key determinants of operational trust and continuity. RBI's IT governance directions formalize board-level governance, risk frameworks, and periodic review expectations across regulated entities [6]. For HR systems, this implies that adoption must be accompanied by strong access controls, audit trails, segregation of duties, and robust vendor and change-management governance, especially because HR data are sensitive and HR workflows influence compensation, postings, and disciplinary processes.

The literature therefore supports an integrated approach: evaluating HR technology adoption in PSBs should simultaneously consider user acceptance, institutional enabling conditions, and measurable operational net benefits under appropriate governance controls.

3. CONTEXT: BANKING FOOTPRINT IN BIHAR AND IMPLICATIONS FOR HR DIGITIZATION

Bihar's banking delivery architecture is characterised by a dense branch network, a large ATM footprint, and a substantial BC/CSP channel, each of which increases the need for systematic workforce management, standardised HR service delivery, and continuous capability development.

3.1 Branch Network and PSB Dominance

Table 1 shows PSB branch counts in Bihar (rural, semi-urban, and urban) as of 30-06-2024. The concentration of branches in PSBs indicates that HR digitization in these banks will have outsized effects on workforce capability, internal efficiency, and customer-facing delivery standards. The PSB branch footprint also implies significant volumes in transfers/postings, onboarding, performance cycles, and grievance cases, areas where workflow automation and self-service reduce administrative overhead and improve traceability [1].

Table 1. Branch network of major PSBs in Bihar (as on 30-06-2024) (Source: SLBC Bihar) [1]

Bank	Rural	Semi-Urban	Urban	Total
State Bank of India	379	384	263	1026
Punjab National Bank	380	194	132	706
Central Bank of India	198	138	92	428
Bank of India	138	133	78	349
Canara Bank	119	89	109	317
Bank of Baroda	97	99	107	303
Indian Bank	119	87	95	301
UCO Bank	113	77	51	241
Union Bank of India	64	70	99	233
Bank of Maharashtra	31	0	31	62
Indian Overseas Bank	13	18	29	60
Punjab & Sind Bank	2	2	15	19

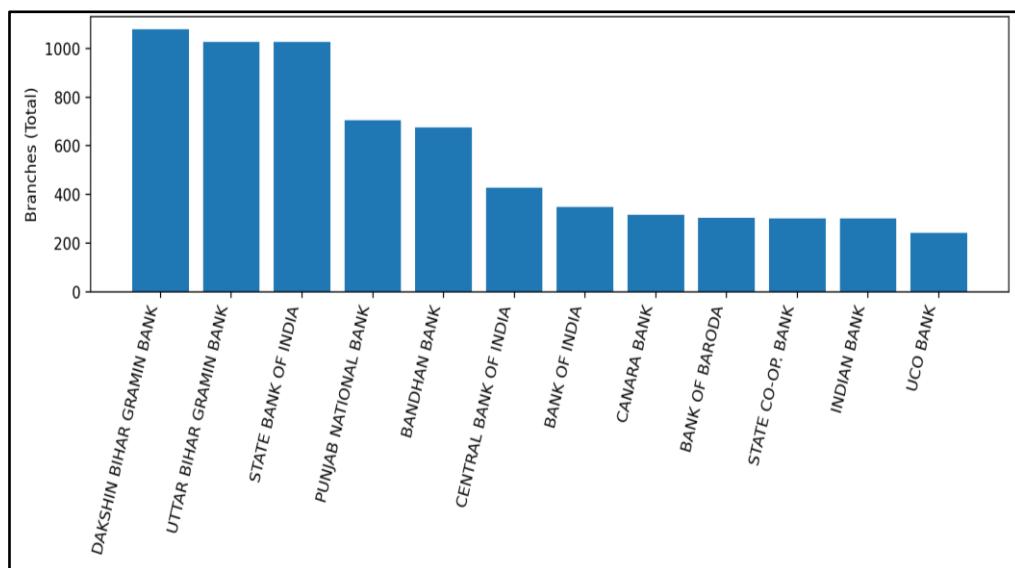


Figure 1. Top banks by branch count in Bihar (as on 30-06-2024) (Source: SLBC Bihar) [1]

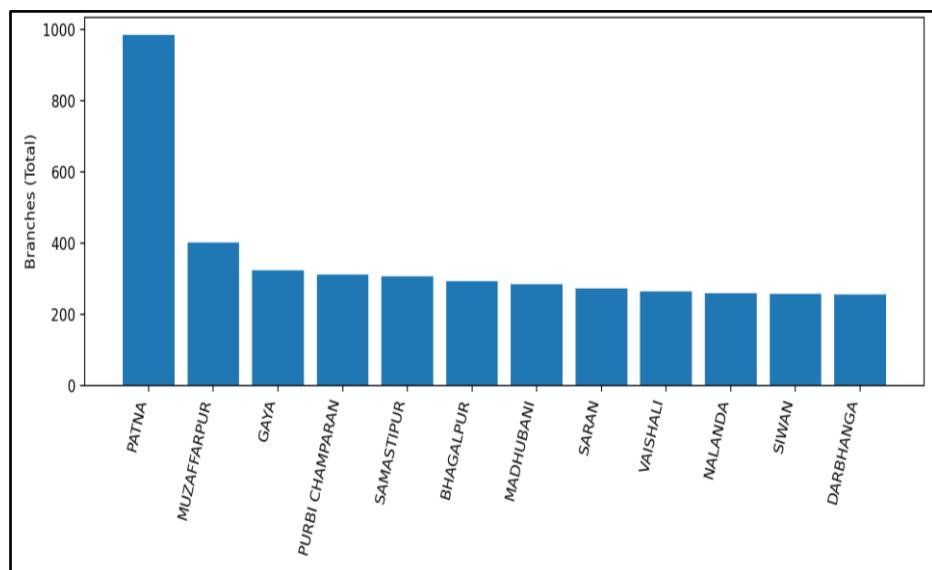
3.2 District Concentration and Workforce Administration Load

District-level branch distribution matters because HR administration is often organized via regional offices, circles, and administrative units aligned with district clusters. Table 2 shows the top districts by total branches, with Patna far ahead, indicating concentration of

workforce, supervisory layers, and support functions in the capital district. This spatial pattern implies that HRMS workflows must support both high-density urban administration (where process volumes are high) and low-density rural districts (where connectivity and user support can constrain adoption) [2].

Table 2. Top districts by branch count in Bihar (as on 30-06-2024)
(Source: SLBC Bihar) [2]

District	Total branches
Patna	985
Muzaffarpur	402
Gaya	323
Purbi Champaran	312
Samastipur	306
Bhagalpur	293
Madhubani	285
Saran	273
Vaishali	264
Nalanda	259



*Figure 2. Top districts by branch count in Bihar (as on 30-06-2024) (Source: SLBC Bihar)
[2]*

3.3 ATM and BC/CSP Channels and the Digitization Imperative

ATM density and BC/CSP expansion reshape job roles and skill requirements. With 7,269 ATMs aggregated across districts (as of 31-03-2025), banks face continuous operational needs in cash management coordination, vendor oversight, and incident handling, functions that rely on digitally tracked processes and data-driven control mechanisms [3]. The BC/CSP channel further amplifies this: Bihar's BC/CSP reporting as of 31-03-2024 indicates very large outlet footprints across multiple banks and substantial transaction values, implying that frontline delivery is increasingly mediated by agent networks and digital devices rather than only staffed branches [4]. This operational structure demands HR systems that can manage training certification, conduct and compliance controls, and standardised grievance workflows across a distributed ecosystem.

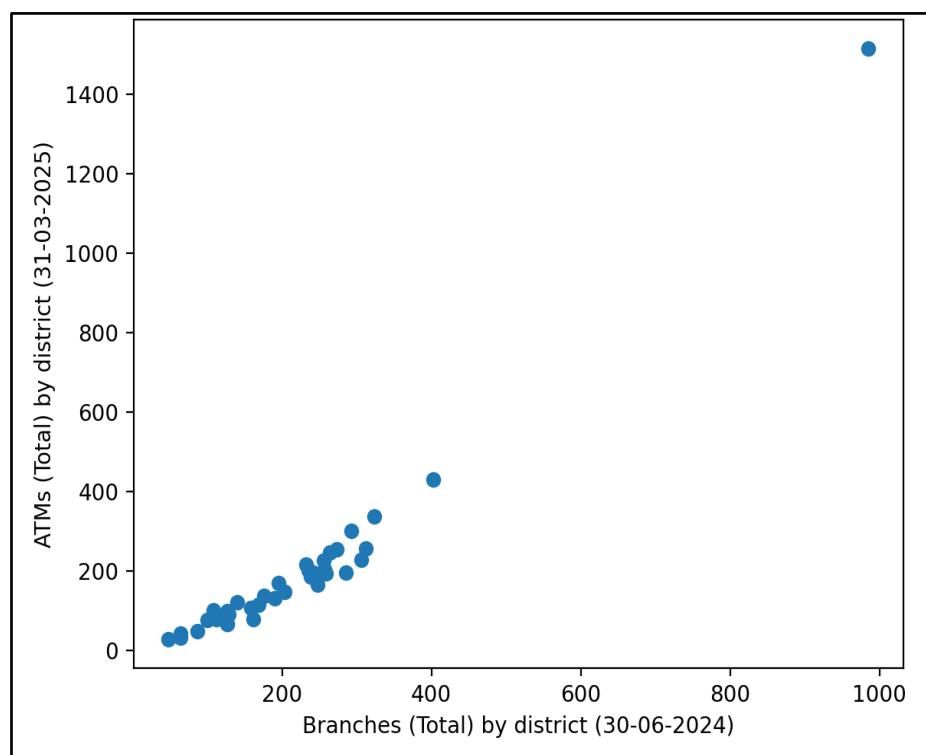


Figure 3. Relationship between district branch counts (30-06-2024) and ATM counts (31-03-2025) (Sources: SLBC Bihar) [2], [3]

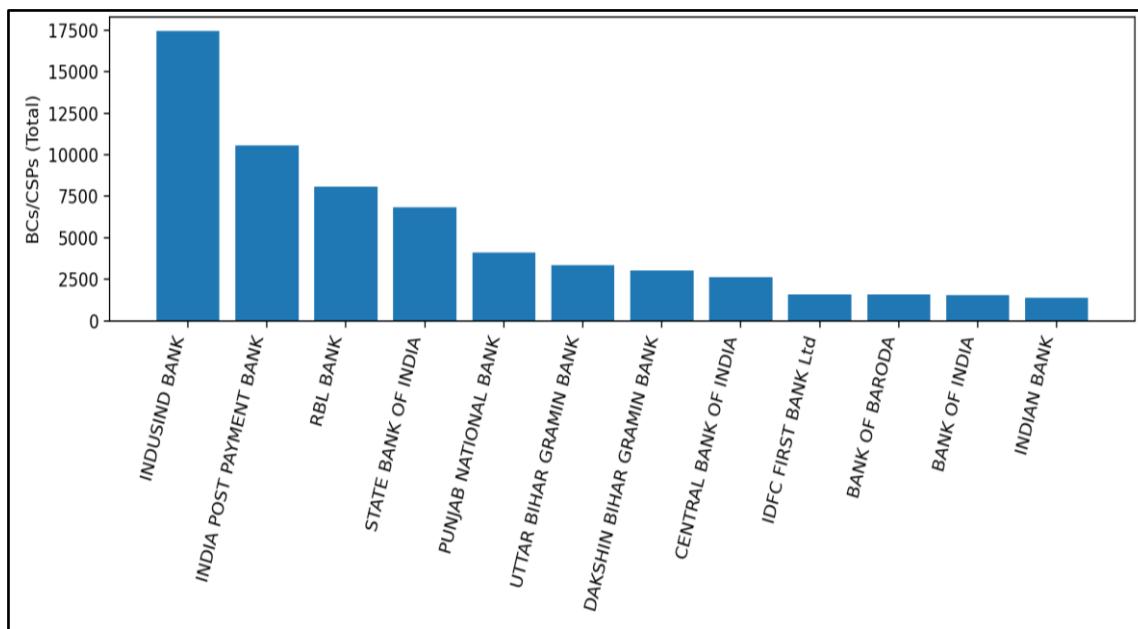


Figure 4. Top banks by BC/CSP outlets in Bihar (as on 31-03-2024) (Source: SLBC Bihar)
[4]

4. CONCEPTUAL FRAMEWORK: HOW HR TECHNOLOGY TRANSFORMS PSB HRM IN BIHAR

In PSBs, “modern technology adoption” in HRM can be analytically framed as the digitization of HR processes via integrated platforms, supported by data standards and control frameworks. The pathway from adoption to outcomes is mediated by acceptance, capability, and governance.

First, HRMS/HRIS platforms create standardization and traceability by turning HR processes into digitally auditable workflows. Recruitment can be digitized through e-recruitment portals, online examinations, and document verification pipelines, reducing manual errors and improving cycle time. Training and development increasingly operate through learning management systems (LMS), digital classrooms, and blended training, enabling continuous upskilling for large workforces. Performance appraisal can be managed through digital goal-setting, structured reviews, and role-based dashboards that reduce discretionary opacity and improve documentation quality. Grievance handling benefits from ticketing systems, escalation matrices, and time-bound resolution tracking, which are crucial for large organizations where grievance volume can be high.

Second, user acceptance and enabling conditions are decisive. TAM predicts that employees will use systems if they perceive clear utility (e.g., faster leave approvals, transparent postings, simplified training enrollment) and low effort (intuitive interfaces, stable connectivity, responsive support) [8]. UTAUT adds the role of facilitating conditions and social influence, which map well to PSBs where adoption is often mandated and reinforced through administrative instructions and training programs [10]. Third, net benefits must be assessed using IS success logic: system quality, information quality, and service quality drive

use and satisfaction, producing net benefits such as efficiency and compliance improvements [11].

So, governance and IT risk controls are not optional in banking. RBI's IT governance directions require structured risk management and assurance practices, shaping how HR systems are designed, operated, and audited, especially because HR data confidentiality and integrity are fundamental for institutional trust [6]. Thus, adoption is best viewed as a socio-technical change program rather than a software installation.

5. RESEARCH DESIGN AND METHODOLOGY

This study uses a secondary-data and document-analysis design suitable for examining sector-wide adoption patterns in the absence of uniform, bank-wise HR technology metrics at the state level. The empirical backbone is Bihar banking network data from SLBC Bihar, which provides standardized reporting on branch networks (bank-wise and district-wise), ATM networks (district-wise), and BC/CSP channel indicators. These datasets are used to quantify the operational scale of banking delivery in Bihar and to infer HR administration intensity by network density and distribution [1]–[4].

To connect operational scale with HR technology adoption, the study uses structured content analysis of publicly available disclosures and policy documents, focusing on (i) bank-level statements on HR digitization and employee systems, (ii) sector-level governance and reform priorities from DFS, and (iii) supervisory IT governance expectations from RBI. SBI's annual report disclosures, for example, explicitly discuss integrating IT across functions for a seamless employee experience, serving as a concrete example of HR digitization in a leading PSB [7]. A cross-bank perspective is supported through additional institutional disclosures such as Bank of Baroda's HR transformation narrative [14]. At the policy layer, DFS annual reporting provides the reform context for PSBs, while RBI's IT governance master direction formalizes the risk-control environment within which HR systems operate [5], [6].

Analytically, the study reports descriptive statistics from SLBC datasets and develops interpretations grounded in the adoption framework above. Where appropriate, relationships between district branch counts and ATM counts are plotted to visualize how physical and digital delivery infrastructure coexist, shaping HR skilling and control needs [2], [3]. The purpose is not to claim that ATMs “cause” HR digitization but to demonstrate the operational environment that makes digital HR capabilities strategically necessary.

6. FINDINGS AND EMPIRICAL RESULTS

6.1 Scale and Composition of Banking Delivery Infrastructure

The Bihar banking system recorded 8,136 branches as of 30-06-2024, and PSBs accounted for 4,045 branches, indicating that PSBs remain central to staffing and branch-level governance in the state [1]. This footprint is not evenly distributed: Patna alone accounts for 985 branches, while other high-density districts include Muzaffarpur (402) and Gaya (323) [2]. From an HR management perspective, this implies that HR transaction volumes, leave, transfers, training nominations, appraisal workflows, and grievances, will be concentrated in high-density districts, while digital enablement is crucial to deliver consistent HR services in dispersed rural districts.

The ATM dataset shows 7,269 ATMs across Bihar districts as on 31-03-2025, with Patna again leading at 1,514 ATMs, followed by Muzaffarpur (431) and Gaya (337) [3]. This infrastructure profile suggests that banking service delivery is already heavily dependent on technology-mediated channels, which increases the need for HR digitization in at least three ways: first, employee roles require higher digital competence; second, operational incidents and vendor coordination increasingly use IT-enabled workflows; and third, governance and cybersecurity controls become essential to sustain trust and continuity.

The BC/CSP dataset reinforces the last-mile argument. The cumulative BC/CSP reporting indicates large outlet numbers across multiple banks and substantial transaction volumes, illustrating that a significant portion of “banking work” is executed through digitally enabled agent ecosystems rather than exclusively through staffed branches [4]. This reality expands the scope of HR capability and compliance management: training content must be scalable, certification must be trackable, and grievance and dispute processes must be standardized across a wider delivery chain.

6.3 Evidence of HR Digitization in PSBs: Institutional Disclosure Signals

Bank-level disclosures indicate that PSBs are explicitly pursuing digital HR as part of broader modernization. SBI’s annual report narrative emphasizes integrating IT across functions to provide employees with a seamless experience and enhance productivity, aligning with the HRMS/LMS/self-service model of HR digitization [7]. Similarly, Bank of Baroda describes an HR transformation framing (albeit at a higher level), reflecting that PSBs recognize HR modernization as an organizational capability rather than a back-office utility [14]. At the system level, DFS annual reporting frames policy and governance oversight for banking operations and reforms, providing the institutional environment under which PSBs execute modernization initiatives [5].

A critical constraint is risk governance. RBI’s IT governance directions formalize risk controls and assurance practices, which imply that HR technology adoption must be accompanied by robust controls, access governance, auditability, vendor risk management, and periodic reviews, because HR systems process sensitive personal data and influence compensation and postings [6]. The implication is that “successful adoption” is jointly determined by usability and governance maturity.

7. DISCUSSION: HRM PRACTICE-WISE ADOPTION IN BIHAR’S PSBS

In recruitment and selection, modern technology typically appears as centralized e-recruitment portals, online examinations, digital document verification, and workflow-based onboarding. For PSBs serving Bihar, the adoption logic is strong because recruitment is periodic but large-scale, geographically diverse, and compliance-sensitive. Digital recruitment reduces processing delays and improves auditability, but it also creates new constraints: identity verification integrity, platform fairness, and grievance handling for candidate disputes. From a TAM/UTAUT lens, acceptance depends on whether HR and line managers perceive recruitment platforms as reducing workload and improving quality (performance expectancy/usefulness) while being stable and easy to operate (effort expectancy/ease of use) [8], [10].

In training and development, digital learning ecosystems are the clearest and most scalable HR technology intervention. LMS platforms, digital content libraries, certification tracking, and blended delivery reduce training costs and expand reach, which is highly relevant in Bihar, where rural postings and travel constraints can limit centralized training. Institutional capability-building efforts in the banking sector are reinforced by professional bodies that emphasize structured training and professional development programs for bankers [15]. However, training digitization is only effective when completion tracking, assessment integrity, and learning transfer to workplace performance are managed; otherwise, digital learning becomes a compliance activity rather than capability building. IS success theory becomes important here because net benefits require system quality (availability, speed), information quality (relevant content), and service quality (support and facilitation), not merely “usage” [11].

In performance appraisal, modern technology manifests through goal-setting modules, performance dashboards, structured appraisal workflows, and evidence repositories that reduce ambiguity and improve documentation quality. In PSBs, appraisal digitisation must balance standardisation with role diversity and unionised contexts, and it must remain transparent enough to reduce perceived unfairness. Acceptance is strongly influenced by social influence and facilitating conditions because appraisal is often mandatory and shaped by managerial practices [10]. Where appraisal systems are perceived as opaque or overly bureaucratic, digital systems may amplify dissatisfaction; hence, governance and change management are as important as the platform.

In grievance handling, technology adoption typically appears as ticketing platforms, online complaint submission, escalation matrices, and time-bound resolution tracking. For PSBs operating large networks in Bihar, digitised grievance systems can reduce discretionary delays and improve management oversight. Yet grievance digitisation requires trust in confidentiality and fairness; therefore, IT governance controls and audit trails become central to system legitimacy [6]. In addition, cyber risks and fraud incidents in digital banking ecosystems highlight the broader need for strong security culture and controls, which indirectly shapes the adoption environment for internal systems as well [16].

8. MANAGERIAL AND POLICY IMPLICATIONS FOR BIHAR

The Bihar evidence indicates that PSBs operate at a scale where HR technology must be designed for distributed service delivery. A practical implication is that HR digitization programs should be evaluated against district and channel realities: districts with high branch and ATM densities will generate high HR transaction volumes and require workflow efficiency, while low-density rural districts require stronger enabling conditions such as connectivity support, digital literacy interventions, and local HR service facilitation.

At the bank level, HR technology portfolios should converge on an integrated HRMS architecture with strong self-service, a robust LMS, and workflow-based grievance and appraisal modules, accompanied by analytics that can identify training gaps and process bottlenecks. The emphasis should be on measurable outcomes: reduction in HR cycle times, improved completion rates of critical training, and grievance closure within defined service levels. At the policy level, DFS and supervisory expectations on governance and risk

reinforce that HR systems must be embedded in enterprise IT control frameworks rather than treated as “administrative software” [5], [6].

In Bihar specifically, the BC/CSP expansion suggests that HR capability frameworks must extend beyond branch staff to include agent-ecosystem governance, digital conduct norms, and consistent learning interventions; otherwise, service delivery modernization will outpace workforce capability maturation [4].

9. LIMITATIONS AND FUTURE RESEARCH DIRECTIONS

A key limitation is the availability of standardized, bank-wise HR technology metrics at the state level. Public disclosures rarely provide Bihar-specific HR adoption statistics, making it difficult to quantify adoption intensity directly for each PSB in Bihar. This study therefore uses operational scale and institutional disclosure signals as the empirical bridge. Future research should implement a primary survey across PSB employees in Bihar to measure HR technology acceptance and effectiveness using validated TAM/UTAUT and IS success scales and then relate these measures to HR outcomes such as perceived HR responsiveness, training effectiveness, and appraisal fairness [8], [10], [11]. A second direction would be to conduct district-level comparative case studies (e.g., Patna vs. a low-density rural district) to understand how infrastructure constraints shape HRMS usage quality and outcomes.

10. CONCLUSION

Modern technology adoption in HRM is increasingly integral to PSB operations in Bihar because the state's banking delivery architecture is large, dispersed, and progressively technology-mediated. Empirical evidence shows a substantial physical footprint, 8,136 branches total and 4,045 PSB branches as of 30-06-2024, combined with a large digital-service infrastructure of 7,269 ATMs as of 31-03-2025, and expansive BC/CSP outlet activity as of 31-03-2024 [1]–[4]. This operating environment creates persistent HR challenges, scale, dispersion, and compliance, which modern HRMS/LMS/workflow systems are designed to address. Institutional disclosures confirm that leading PSBs emphasize IT integration for employee experience and productivity, while governance directives underline that adoption must be coupled with strong IT risk controls [6], [7].

The central conclusion is that “adoption” should be evaluated as a capability system: HR technology is effective in Bihar's PSBs when it improves measurable HR service delivery outcomes, strengthens workforce digital capability, and remains robust under governance and cybersecurity constraints.

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