Received: January 24, 2025

Revised: February 19, 2025 & March 25, 2025

Published: May 29, 2025

Journal of Politics and International Studies
Vol. 11, No. 1, January–June 2025, pp.65–86

Role of World Bank in Land Digitalization in Pakistan: An Analysis

Muhammad Faizan Salik
M.Phil Scholar, Department of International Relations, Government College University Faisalabad, Punjab- Pakistan
Corresponding: saliksoft@gmail.com

Dr. Ghulam Mustafa
Associate Professor, Department of International Relations, Government College University Faisalabad, Punjab-Pakistan

Dr. Anwar Ali
Assistant Professor, Department of Political Science, Department of International Relations, Government College University Faisalabad, Punjab-Pakistan

Abstract

This article critically examines the strategic interventions of the World Bank aimed at transforming Pakistan's land administration system in digital format. Based on the template of the colonial-era Patwari system, Pakistan's land administration was previously plagued by inefficiency, corruption, and social exclusion. The World Bank's effort, through initiatives such as the Punjab Land Records Management and Information System (PLRMIS) among others, aimed to introduce a new paradigm of transparent, efficient, and citizen-friendly land administration. The research examines the Bank's diverse assistance--in terms of financial investment, technical help, legal reform, and institutional capacity building--and its contribution to improving service delivery, cutting transaction times, and empowering poor and vulnerable groups. Institutional accountability and transparency have been promoted with the help of biometric systems, GIS mapping, and workflow reengineering. Despite persistent challenges like digital divides and opposition by vested groups, the reforms provide a model of inclusive and sustainable development. The findings underscore how digital rule can enhance state capacity and social equity in post-colonial environments.

Key Words: World Bank, Pakistan, Digital Governance, Land Reform, Patwari System, Transparency, Inclusion, State Capacity, E-Governance, Sustainable Development.

1. Introduction

Land administration systems form part of the governance infrastructure with direct implications on property rights, social justice, public trust, and national trajectories of development. In most developing countries, insecure tenure and weak record-keeping continue to be the cause of both economic inefficiency and social tension. Pakistan is an example, where land administration has been entangled in a centuries-

long legacy of colonial institution design, viz. the Patwari system—a paper-based, centrally focused system that has long facilitated corruption, falsification of records, and clientelism. In spite of the significance of land to Pakistan's rural economy and rural lives, land record management remained mostly outdated and inaccessible, disproportionately prejudicing small farmers, women, and marginal groups that had no means and institutional facilities to register their rights on land.

The Patwari system, introduced with British colonial rule, conferred local revenue officials with widespread administrative and discretion powers. The officials held handwritten land registers under little supervision and accountability. The system, with time, developed opaque government institutions that favored document forgery, delay in transactions, and institutionalization of rent-seeking behavior. Disputes over land—most due to conflicting, duplicate, or fake documents—were a primary source of litigation, social unrest, and violence, especially in rural regions. These structural issues carried on into the post-colonial period, seriously hindering the capacity of the state to transform its ruling machinery or to provide easy access to land.

Rising to the challenge of reform, the Government of Pakistan, with the help of technical and financial assistance from the World Bank, initiated an all-encompassing program for the digitization of land records at the dawn of the 2000s. The reforms were not only dictated by the need to render administration more efficient but also by larger development objectives such as poverty alleviation, economic modernization, and alignment with international agendas such as the Sustainable Development Goals (SDGs). The World Bank recognized secure tenure of land, open land markets, and accountable institutions as catalysts for economic growth and social inclusion. By bridging the gap between paper-based and digital land records, the World Bank aimed to foster citizen-centered, equitable, and resilient governance.

The flagship reform scheme—the Punjab Land Records Management and Information System (PLRMIS)—was an experimental program to test the feasibility and effectiveness of electronic land administration. The scheme brought in technological innovations like biometric verification, Geographic Information Systems (GIS), and uniformly formatted digital databases to replace the imperfect and sporadically recorded manual records. The success in this model was replicated in other provinces as well, such as Sindh and Khyber Pakhtunkhwa, to set the stage for a national movement towards digital land administration. Apart from technical innovation, these reforms also entailed legal reform, institutional reform, capacity-building programmes, and outreach programmes for ensuring sustainability as well as inclusiveness.

Despite considerable strides, roll-out of digital land administration has also encountered considerable challenges. Opposition by vested interest groups, notably well-established Patwaris and local elites who had benefited from their role in the absence of transparency of the old regime, has been a constant stumbling block. Secondly, concerns about digital literacy, especially in rural and under-developed areas, have constrained the applicability and utility of new systems. Cybersecurity problems and the need for constant infrastructure maintenance also point towards the complexity of reforms. Yet, the transition towards digitization is an innovative leap in the administrative strength of the state and its ability to provide services in a transparent and equitable way.

This article analyzes the World Bank's complex role in redesigning Pakistan's land administration system. It outlines the background history that made reforms imperative, the planning and implementation of e-governance programs, and their larger socio-political and economic consequences. Using an in-depth analysis of

policy interventions, technical support, and capacity development, the paper analyzes how the role of the World Bank has affected not only land administration but also the broader policy environment for e-governance, accountability, and sustainable development in Pakistan.

Research Question

How has the World Bank's support impacted transparency, efficiency, and inclusivity in Pakistan's digital land administration reforms?

2. Literature Review

The article *"Towards Intelligent Land Administration Systems: Opportunities and Challenges in AI Integration"* (2025) by Valentina L. Duran, Michael Z. Hobson, and Felix W. Adebayo examines the new role of artificial intelligence (AI) in enabling land administration functions such as tenure, valuation, land use management, and conflict resolution. Through systematic review of global practice over the last decade, the research identifies integration of AI technology such as machine learning, natural language processing, and predictive analytics into cadastral processes. The authors substantiate that AI models enhance the accuracy of decision-making dramatically, identify anomalies in land deals, and rationalize bureaucratic processes. Cases from Sub-Saharan Africa and South Asia offer how AI technology enhances the resolution of land conflict as well as automates tenure verification processes. The research concludes that, while AI can be revolutionary, data quality issues, ethical deployment, and digital infrastructure need to be resolved for public trust and equitable access to be realized. The research adds to wider debate on digital governance by highlighting the ground-up role of technology as well as inclusive land reform. (Duran, Hobson, & Adebayo, 2025).

The study *"Digitalization of Land Records and Public Perception: A Case Study of Faisalabad, Pakistan"* (2025) by Sehrish Ali, Danish Rauf, and Tauseef Jamil researched the attitudes of computerized land services by citizens with regard to the Punjab Land Records Authority (PLRA). Taking a quantitative strategy, authors interviewed 500 residents of District Faisalabad to identify attitudes towards transparency, ease, satisfaction with the service, and fairness of computerized land records. The results indicate that most users found digital services transparent and convenient compared to the conventional Patwari system. Nevertheless, digital literacy among lower-educated and older respondents was a significant barrier to access parity. The paper emphasizes that sensitization campaigns among citizens and training programs at local levels should be encouraged in order to trigger inclusive digital change. This study aligns with existing research on e-governance in the Global South to conclude that technical innovations must be accompanied by socio-cultural adjustment policies to be truly effective (Ali, Rauf, & Jamil, 2025).

The World Bank's *"Implementation Status and Results Report for the Punjab Urban Land Systems Enhancement Project"* (2025) gives an overview of achievements made in digitization of land systems for the urban areas of Punjab, Pakistan. The report enumerates notable achievements such as effective digitization of more than 18 million parcels and the integration of cadastral mapping features into urban planning. It records enhanced service delivery, transparency of transactions on land, and enhanced inter-agency coordination, especially between the Punjab Land Records Authority and municipal governments. Interestingly, the report mentions GIS and biometric authentication to better strengthen record integrity and prevent impersonation. Yet, the document also points out areas of challenge like legacy data that is outdated, insufficient staff training, and cybersecurity weaknesses. The findings of the report affirm the expanding scholarly consensus that digital land

systems can greatly improve institutional performance when supported by legal change and stakeholder participation. This book is a critical guide to policymakers and practitioners interested in scalable e-governance reforms (World Bank, 2025).

The article *"Assessing Urban Land Governance in Pakistan: A FELA-Based Framework Analysis"* (2025) by Mahnoor Sheikh, Asad Iqbal, and Paul M. Dorner implements the UN Framework for Effective Land Administration (FELA) to assess urban cadastral institutions in Pakistani cities of Lahore, Karachi, and Peshawar. In institutional evaluation and interviewing the stakeholders, the authors analyze the functioning of urban land administration on legal, technical, organizational, and social fronts. The research discovers remarkable progress in digital mapping, centralized data management, and online service delivery, especially in Punjab. However, discrepancies still exist with respect to inter-agency interoperability, tenure security of informal settlers, and enforceability of electronic records in law. A convergent strategy involving legal harmonization, more investments in digital infrastructure, and inclusive policy practices is critical to address urban disparities. This paper contributes to improving the understanding of how global governance standards such as FELA can be localized to facilitate effective, transparent, and citizen-centric land systems (Sheikh, Iqbal, & Dorner, 2025).

3. Research Methodology

This study employs a qualitative study design to examine the role of the World Bank in reorganizing land governance in Pakistan through technology reforms. Observing an interpretivist epistemological approach, the study seeks to unpack the impact international development actors exert on national policy-making processes and institutional change. Qualitative studies are notably especially well-suited to disentangle complex socio-political processes, institutional change, and development interventions in context-dependent environments

Research Design

The case study design has been used, with Pakistan as the primary unit of observation. Punjab, Sindh, and Khyber Pakhtunkhwa have been used as sub-cases because these provinces have actively engaged in digital land reform programs. This provides the opportunity for an intensive study of reform impacts, variation in implementation, and overall governance effects of World Bank-supported operations. Case study research is best suited to policy research with complexity in the real world and changing institutional settings (Yin, 2018).

Data Collection

The research is based wholly on secondary data, which are drawn from a wide variety of original and pertinent documents. These include:

- World Bank reports and records (e.g., Project Appraisal Documents, Implementation Status Reports, and Completion Reports)
- Government policy reports and official statements of provincial land agencies (e.g., Punjab Land Records Authority, Sindh Board of Revenue)
- Academic, peer-reviewed journal articles and academic reports
- International organization, development think tank, and non-governmental organization reports
- Press releases and news publications about land governance reform

These reports were chosen for their relevance to the most universal land administration, e-governance, institutional change, and development aid themes.

Data Analysis

The documents that were retrieved were theme-content analyzed. Key themes like "transparency," "efficiency," "institutional resistance," "digital inclusion," and "capacity building" were invoked and hand-coded to follow up on patterns and variations between provincial and institutional contexts. Special care was also taken to see how reform narratives changed over time and mirrored shifts in priorities and orientation.

Theoretical Framework

This study is theoretically based on Institutional Theory, with the New Institutionalism school of thought emphasizing how formal institutions (rules, laws, procedure) and informal habits (power relations, customs) influence policy outputs. The World Bank's influence is analyzed in terms of institutional pressures—coercive (funding terms, policy norms), normative (best practices, technical assistance), and mimetic (copying good performers such as Punjab's LRMIS). These pressures partly explain the adoption and difficulties of implementing digital land administration in various provinces.

Concurrently, E-Governance Theory offers a conceptual framework for understanding how digital technology can reshape state-citizen relations through increased openness to governance, limiting discretion, and enhanced access to public services. The theory also identifies digital divides and the threat of marginalization of excluded citizens, proposing a critical critique of technology-oriented reform.

4. Discussion

Pakistan's land management has been plagued with deep-seated inefficiencies, corruption, and socio-economic inequalities under the colonial Patwari system. The manual record system and arbitrariness of the Patwari system allowed intermediaries to employ their authority for personal gain at the expense of time-consuming land transactions and large-scale tampering of records. The traditional hand-held land administration techniques introduced a culture of concealment which had an unfavourable effect on the small landowners and the marginalized communities, hindering the equitable access to secure land titles. For these system-level issues, the Government of Pakistan started a ground-breaking endeavor to computerize land records a reform process strongly supported by the World Bank. The Bank's involvement in Pakistan's reform of governance land was motivated by the conviction that secure, transparent, and accessible land records are fundamental to constructing economic development, social equity, and citizen trust in institutions (Sharoon, Mustafa, & Shahrukh, 2024). In particular, the World Bank promoted e-governance as a way to avoid the typical issues of inefficiency and corruption but also to stimulate more dynamic and fair land markets. In Punjab, for example, Computerized Land Records Management and Information System (CRMIS), a World Bank-assisted project, initiated the radical decrease in transaction time from several months to hours, with evidence demonstrating robust evidence of how digital interventions could transform things. Outside Punjab, the World Bank's technical, financial, and strategic support has acted as a catalyst to digital governance reform in the other provinces, tying these efforts to Pakistan's Vision 2025 and wider Sustainable Development Goals (SDGs) for land tenure security and inclusive development. Given such a context, the World Bank's role in Pakistan's land administration reform in a multi-dimensional sense indicates its concern for delivering transparency, accountability, and effectiveness in public administration as an antecedent to sustainable land administration in the country.

4.1. Historical Context and Policy Imperatives

Land administration in Pakistan has for a very long time been the pivot of the nation's political economy, embodying an extremely compound mix of colonial history, social stratifications, and evolving state ability. The origination of land administration in the country lies in the colonial era of the British when the Patwari system was formalized as the leading tool for keeping land records and exacting revenue (Joshi, 2021). This system granted immense authority to local revenue officials Patwaris who kept land title records by hand, exercising often personal discretion over proprietors. Although the Patwari system was an aid to colonial administrative purposes, it also established deep power conduits that continue long after independence, injecting a culture of secrecy and patronage into Pakistan's land ruling institutions.

The inherent vulnerabilities of the Patwari system vulnerability to document forgery, secrecy, and bureaucratic lag increasingly manifested as Pakistan's population and economy developed over the years of independence. For example, Khan, Shahid, and Idrees (2023) describe that land conflicts in Pakistan were more likely to be triggered by fake documents and contentious claims, leading to long drawn-out legal cases and economic insecurity. These struggles were most harming to smallholders and marginal groups, who would often lack the political or economic leverage to contest entrenched elites and manage complicated bureaucratic avenues (Singh, Singh, & Dhanda, 2021). Therefore, insecure tenure was a significant barrier to investment, rural livelihoods, and pro-equitable development outcomes across the nation.

By the early 2000s, Pakistan's policymakers came to understand that curing these structural inefficiencies in land management was not only key to economic modernization but also to social stability and poverty reduction. The Government of Pakistan's Vision 2025, a national development strategy, specifically listed safe and transparent land administration as one of the requirements for inclusive development, rural poverty eradication, and attracting domestic and foreign investment (Farooq, Feroze, Cheng, & Feroze, 2024). Alike, global development frameworks like the United Nations Sustainable Development Goals (SDGs), in particular SDG 1.4 and SDG 16, emphasized the role of secure land rights and strong institutions in advancing overall development goals.

In this policy context, the World Bank became an important ally in Pakistan's attempt to revamp the land management system. The Bank's intervention was based on accumulating global evidence demonstrating that open land administration was associated with increased state capacity, reduced corruption, and faster economic growth (Foa, 2022). For its 2021 report, the World Bank maintained that secure land rights form a basis for sustainable development since, besides easing investment in land-based sectors housing, agriculture, and infrastructure, for instance they also form an important source of collateral against credit and financial inclusion. In Pakistan, where agriculture forms a large sector of the economy, these interlinkages were especially relevant.

The World Bank's early intervention in land reforms in Pakistan prioritized diagnostic studies and policy recommendations. Technical missions in the early 2000s highlighted the necessity to shift from paper-based record-keeping to integrated computerized systems that would help maintain accuracy, accessibility, and security (Farotimi, Adegoke, & Akeroro, 2023). The policy suggestions of the Bank for establishing a unified land record management system to overcome the inefficiency and fragmentation of the Patwari system. Followed by these suggestions, Pakistan's provincial governments chiefly Punjab, Sindh, and Khyber

Pakhtunkhwa started implementing pilot schemes for the digitalization of land records and open land transaction processes adoption.

Punjab, the most populated and agricultural province of Pakistan, was selected to serve as the pilot for first reforms. Punjab Computerization Land Records Management and Information System (CLRMIS) was designed to be a pilot which would showcase the efficacy and value of digital land administration. With heavy financial and technical assistance from the World Bank, CLRMIS sought to establish a centralized electronic database that would replace land records in physical form, eliminate discretion on the part of Patwaris, and increase the efficiency of land transactions. Biometric validation and simplified procedures for service delivery and curtailed opportunities for corruption were also part of the system.

The Punjab experience with CLRMIS provided worthwhile lessons that guided more extensive national and provincial policy efforts. Most crucial was the innovative potential of electronic land administration to lower the time for transactions and increase transparency. In keeping with evidence from PLRA (2025), the transaction time in verifying and mutating land records decreased from several months to under one day in most instances, meaning significant gains in efficiency. Additionally, landowners especially small farmers and excluded communities were provided with unprecedented access to safe records, which led them to have more faith in the impartiality of state institutions (Vercillo, 2022).

However, the Punjab experience also revealed entrenched challenges that highlighted the necessity of a strategic policy response. Vested interest obstruction especially by Patwaris and middlemen who risked losing rents from hand-maintenance of the record was found to be a critical constraint to reform. Lack of digital literacy in rural areas also reduced spontaneous access to digital systems, compromising social justice and inclusiveness. Cybersecurity concerns like the vulnerability of data breaches and the capability of hacking into digital records similarly highlighted the necessity of giving priority to proper data security mechanisms.

To tackle these challenges, the World Bank and the Government of Pakistan underscored the necessity for an integrated policy environment comprising stakeholders' engagement, technical investments, capacity building, and legal reforms. Legal reforms were required for enshrining digital land records in the overall legal system to ensure their enforceability in courts and transactions. Land Revenue Act and amendments to ancillary legislation backed by World Bank technical support established the legal framework for electronic governance (Rüzgar, 2024). They also established the use of electronic signatures and digital verification, thus bringing Pakistan's land governance in line with international best practice.

Technical investment, however, was directed towards the development of secure and inter-operable digital platforms that would be capable of handling the number and complexity of land transactions at the provincial level. World Bank investment enabled the creation of data centers, secure servers, and reliable internet connections for Arazi Record Centers and provincial land offices. The investments were particularly important in rural provinces, where shortages in infrastructure had historically constrained access to land services.

Capacity building was the other central pillar of the policy. Because effective digital transformation depended on frontline officials' skills and mindsets, the World Bank supported enormous training of revenue officials, district administrators, and

facilitators at the community level. Training was not merely a matter of technical skills ntering data and managing records electronically but also transforming mindsets and instilling confidence in the new system. Simultaneous community outreach programs were established to bridge the digital gap by educating landowners, particularly women and other vulnerable populations, of their rights and digital platform navigation.

Stakeholder participation was also at the heart of the policy drivers that guided digital land reforms in Pakistan. The World Bank facilitated provincial governments in establishing spaces for engagement among government ministries, civil society groups, and community members. These dialogue sessions assisted in the identification of context-relevant issues such as gender imbalances in access to land and cultural resistance to change and allowed for adaptive policy reaction (Buabeng & Amo-Darko, 2025). In Sindh, for instance, consultations with stakeholders highlighted the specific challenges facing coastal residents in accessing land records and led to focused interventions designed to meet these needs.

Prominently, World Bank intervention in land reform in Pakistan, especially in Punjab, was not an isolated effort. In Sindh, the Sindh Land Record Management Information System (SLRMIS) project of the Board of Revenue, supported by the World Bank, aimed to emulate the success in Punjab's LRMIS by placing land records on a computerized platform with GIS-based mapping tools. Khyber Pakhtunkhwa also initiated the same reforms, using World Bank policy guidance to build a vision for digital land management that reconciled technological innovation with the needs of local government.

At the national level, World Bank policy guidance prompted broader discussions of the promise digital government holds for building state capacity and inclusive development. This domestic debate raised the connections between secure tenure and other development objectives, such as rural livelihoods, food security, and gender empowerment (Schling & Pazos, 2024). Resisting these more inclusive policy calls against land digitization allowed the World Bank to help ensure that land governance reforms were not considered technical interventions by themselves but rather an integral part of Pakistan's future development plan.

4.2. Technical Assistance and Capacity Building

Perhaps the most significant element of the World Bank intervention into Pakistan's land reform has been its provision of vast technical aid and strategic advice in system design. Its understanding that digital transformation implied not just substitution of paper records by digital records, but also process reengineering and workflow reengineering inside institutions at its core, the World Bank's technical support has played a key role in building the platforms for efficient, secure, and citizen-centric digital land administration systems in the country.

The World Bank's technical support was extensive, from system design to digitization strategy of data, introduction of newer technologies, and creation of standard operating procedures for provincial revenue management (Mpofu, 2022). The integrated strategy made the electronic systems not only technologically highly efficient but also in proportion to the realities of local administration and governance entities.

4.2.1. System Architecture and Data Standardization

Among the most significant pillars of World Bank technical support was the development of a standard electronic land record system architecture. Pakistan's pre-reform context had land records as highly fragmented as they were, kept in handwritten registers at the village and tehsil levels, and in non-standard data format.

Not only was it slowing down fast transactions, but it also facilitated easy manipulation of records by powerful go-betweens.

In response, the World Bank collaborated with provincial governments, led by Punjab, to establish a harmonized data framework, one that would gather disparate manual records into one electronic database. This meant:

- Creating a digital land database with unique identifiers for each tract of land (Rodima-Taylor, Digitalizing land administration: The geographies and temporalities of infrastructural promise, 2021).
- Building relational data models that would be able to bring together spatial data (maps and cadastral boundaries) and textual records (ownership, tenancy, and history of transactions).
- Harmonizing data fields for consistency across records and elimination of uncertainties in land ownership claims.

The standardization of the data played a major role in establishing the credibility and enforceability of the records in electronic form. In Punjab's CLRMIS, for instance, each parcel of land was assigned a unique Parcel Identification Number (PIN), a practice that served to efficiently settle conflicts resulting from concurrent, overlapping claims of ownership (Ullah & Hussain, 2023).

4.2.2. Integration of Biometric and GIS Technologies

Aside from data standardization, the World Bank promoted the use of high-technology tools like biometric identification and Geographic Information Systems (GIS) for enhancing the integrity and integrity of electronic land records. In Punjab, biometric identification of landowners at the Arazi Record Centers (ARCs) aimed at eradicating identity forgery and mitigating the influence of middlemen who earlier impersonated owners while selling and buying land (Ahmad M. , 2024).

In the same vein, GIS mapping software was integrated into computerized land systems to display the boundaries of land and make records reconcile between the spatial and the textual. Another World Bank-financed initiative, the Sindh Land Record Management Information System (SLRMIS), also took great leaps towards reconciling GIS mapping with land ownership records so that it became possible to maintain transparent and more accurate records (World Bank, 2023). These GIS functionalities not only enhanced land records but also facilitated effective analysis in urban planning, disaster response, and resource allocation.

4.2.3. Workflow Re-engineering and Process Simplification

A critical element of World Bank technical assistance was re-engineering administrative procedures to align them with digital governance principles. Under the pre-reform system, property transactions entailed moving through a labyrinth of government offices, which also had their own procedural deviations and vulnerability to corruption (Urchick, 2023). Having an understanding that computerization of documentation alone without workflow modification would still ensure inefficiency, the World Bank assisted province governments to re-design these procedures.

For instance, in Punjab's LRMIS, old serial office visits for validation and correction of land records were substituted with a single window transaction in ARCs where transparency was facilitated by computerization and time for processing was brought down from weeks to hours. SOPs and process maps were designed to de-

mystify roles and responsibilities, minimize human judgment, and establish transparent accountability templates.

4.2.4. Piloting, Testing, and Iterative Design

World Bank technical support also gave a step-by-step, iterative approach to developing digital systems a high priority. Pilot projects were established in target districts to pilot new digital processes, identify operation challenges, and integrate lessons learned into a large-scale rollout (Fruchtman, et al., 2021). Pilot testing in Punjab identified data quality and accept gaps, so specific work was done to clean up legacy records and reduce interfaces.

This iterative design also identified socio-political aspects of reform. Pilot testing in Sindh, for example, found specific challenges that the coastal population was facing in terms of informal tenures and land use conflicts over common land, leading the World Bank to suggest context-specific system design modifications (World Bank Completion Reports, 2024).

4.2.5. Capacity Building for Technical Sustainability

In order to render technical solutions more sustainable, the World Bank undertook significant investments in developing provincial-level technical capacity. This involved:

- Training provincial land record authority staff to execute data entry, verification, and system maintenance (Biraro, Zevenbergen, & Alemie, 2021).
- Creating troubleshooting manuals and user manuals to assist with uninterrupted system functioning.
- Initiating peer-learning workshops through which officials from different provinces could exchange best practices as well as challenges.

Such capacity building was intended to minimize the dependence on foreign consultants and create a bank of national experts that would be capable of sustaining and enhancing digital land record systems.

4.2.6. Cybersecurity and Data Protection

As computers came to define land administration, the World Bank focused on the imposition of strong cybersecurity measures for safeguarding against unauthorized access and data breaches. The Bank's technical specialists collaborated with provincial governments to develop encryption techniques for data, secure server technologies, and multi-layered authentication models in order to secure digital records (Malempati, 2024).

Moreover, data protection policies were incorporated into the system design to cater to mounting global standards as well as establish public trust in digital land administration security (World Bank, 2019). This was especially crucial considering hacking and data tampering problems that had emerged in developing such digital governance in other parts of the world.

4.2.7. Provincial Adaptation and National Integration

While Punjab's LRMIS was the flagship project, provincial adaptation and national integration were World Bank technical support. In Sindh, for instance, World Bank ensured local land tenure institutions and historical revenue custom were included in system design (Home, 2021). In Khyber Pakhtunkhwa, technical support aimed at overcoming geographical challenges to digitizing land records in hilly areas as well as integrating the system with other provincial databases.

At the federal level, the World Bank advocated for interoperability standards that would allow provincial systems to speak with national-level databases such as the National Database and Registration Authority (NADRA) and Federal Board of Revenue property tax records removing the barrier towards an integrated and holistic land governance.

4.3. Capacity Building and Human Resource Development

Pakistan's digital land administration reform successes have not largely been contingent upon the limits of technological progress or law change; it has significantly been based on the construction of human assets to sustain and maintain new digital infrastructures. Aware of this, the World Bank placed major emphasis on capacity development and training of human resources as a fundamental component of its intervention strategy. This section examines the World Bank's efforts in this direction, its scope, challenges, and value addition through transformation.

4.3.1. Capacity Development's Role in Digital Reforms

Reforms in land governance entail a revolutionary shift in bureaucratic culture and attitudes. The shift from paper to digital land records in Pakistan unsettled entrenched power relations, especially the prerogatives so far wielded by Patwaris and revenue officials (Rahman T. , 2022). This disruption, while important to transparency and effectiveness, bore resistance from the workers with the habitual discretionary power provided by the traditional system. Capacity building proved to be an important intervention to this resistance, to improve the technical proficiency and organizational confidence of the workers to function in the new digital environment.

Further, effective roll-out of digital governance reforms needed not only technical capacity but also a change in organizational culture. For Pollitt and Bouckaert (2011), digital government reforms fundamentally transform bureaucratic routines and forms, calling for an overall institutional change plan (Manda, 2022). World Bank-financed capacity-building projects in Pakistan faced such complexities.

4.3.2. World Bank-Supported Capacity Building Scope and Nature

World Bank capacity development in Pakistan was multilateral, its various programs being designed for the various stakeholder groups of the land governance. They were:

- **Training Programs for Revenue Officials**

Workshops for the training of tehsildars, Patwaris, and district land officials were conducted. These included training in data entry, electronic verification processes, and biometric identification processes. The training in the Punjab CLRMIS project, which included sessions that covered as much the technical procedure to update the land records as the ethical requirements of the management of open data and accountability.

- **On-the-Job Learning and Peer Mentoring**

As a supplement to traditional workshops, the World Bank supported the creation of peer mentoring programs across revenue agencies. This involved mapping digital champions and early adopters staff who were the first to use digital systems and using their expertise to train other staff members. The nonformal learning approaches proved particularly useful to counter resistance from older staff members who were unwilling to use new digital tools (Pihlainen, Korjonen-Kuusipuro, & Kärnä, 2021).

- **Community Outreach and Digital Literacy Campaigns**

Realizing that successful digital management demands the active engagement of citizens, the World Bank encouraged community outreach initiatives such as the "Internet Dost" scheme in Punjab. These initiatives provided general digital literacy and access to the CLRMIS portals to rural landowners, especially smallholders and marginal groups. Such outreach created confidence among the initial users of the new digital platforms, who were wary of their credibility.

- **Manual and Standard Operating Procedure Development**

In a bid to standardize service provision and training, the World Bank partnered with government entities at the provincial level in establishing detailed manuals and SOPs (Huang, Zhao, Cao, Lyu, & Tang, 2024). The manuals acted as guidelines for workers within Arazi Record Centers and contained clear steps to follow for digital land transactions to avoid confusion and come up with standard practice within districts.

4.3.3. Breaking Resistance and Cultural Barriers

One of the biggest challenges mentioned from among the World Bank's capacity-building initiatives was resistance to change by staff, in particular, by Patwaris. As documented by Rahman (2023), Patwaris enjoyed extensive discretionary power traditionally, often serving as gatekeepers within the land record system. The advent of computerized records took away their traditional power and financial interest, resulting in hesitation and sporadic open resistance.

The World Bank's capacity-building approach acknowledged these socio-cultural dynamics. Training programs emphasized digital governance as benefiting not just citizens, but also the staff themselves, such as reduced workload, simplified procedures, and improved job security for an administration computerized (Sira & Kuzior, 2025). Workshops introduced role-playing and peer-to-peer discussions to break down fear and build buy-in among staff.

4.3.4. Building Technical Competencies and Institutional Resilience

Aside from combating resistance, World Bank programs aimed to teach technical competencies required in the upkeep of advanced computer systems. Training modules involved:

- Data Entry and Verification: It trained workers in proper data entry procedures in order to prevent potential errors that might ruin the integrity of computerized records (Sharma, Shingatgeri, & Pal , 2021).
- Troubleshooting and Maintenance: On-field implementation in diagnosing and fixing common technical problems, maintaining system stability, and minimizing external consultants.
- GIS and Biometric Systems: Advanced training in operating GIS-based land mapping and biometric authentication software to provide secure and accurate land administration (World Bank, 2021).

These programs sought to establish a group of technologically capable professionals in the revenue offices, who could adjust themselves to the new techno demands and protect system integrity in the longer perspective.

4.3.5. Capacity Building with Digital Literacy among Marginalized Groups

The World Bank also noted that the digital divide may end up marginalizing groups and depriving them of the full benefits of land governance reforms. In this regard,

capacity-building programs reached community-level initiatives with an emphasis on:

- Women's Land Record Accessibility: Women's special training workshops and outreach initiatives, given the historical difficulties these women experienced in obtaining access to their land rights (Fernandez-Gimenez, Oteros-Rozas, & Ravera, 2021).
- Assistance to Small Farmers and Indigenous Peoples: Computer literacy interventions based on the internet with respect to the special difficulties these groups encountered in dealing with digital systems (Ali, 2024).

These efforts transcend cross-national best practices for inclusive digital governance, maintaining the principle that digital reforms must be accessible and equitable in order to be truly transformative.

4.3.6. National and Provincial Collaboration

World Bank capacity development activities were conducted at the national level rather than being provincial-specific and took the form of inter-provincial knowledge sharing and coordination. Interprovincial workshop took place and peer-exchange visits enabled revenue officials from Punjab, Khyber Pakhtunkhwa, and Sindh to exchange lessons learned, standardize training procedures, and tailor strategies to meet their respective settings.

Such national coordination was essential towards propelling a shared vision for digital land administration in Pakistan. It also facilitated the creation of national interoperability guidelines so that, in the future, provincial systems could be plugged into a unified national land administration system.

4.4. Financial Support and Operational Expansion

One of the basic pillars of the World Bank's contribution to the land governance reforms in Pakistan has been its commitment to providing strong financial support, which supported the expansion of operations and made digital land administration sustainable. This financial support was supplemented by the Bank's technical assistance as well as policy advice, which made the transformation of land records management comprehensive and spread across several provinces. This sub-theme discusses the extent of the financial support provided by the World Bank, its operational effect, and its general implications for sustainable land administration in Pakistan.

4.4.1. Extent and Composition of Financial Support

World Bank funding for Pakistan's digital land administration reforms has been considerable and multi-phased. In Punjab alone, Computerization Land Records Management and Information System (CLRMIS) received funding from the Punjab Land Records Management and Transparency Project, which received more than $45 million in funding (Ahsan M. , Hussain, Lemmen, Zevenbergen, & Atif, 2025). That funding provided financing for the key phases of system design, pilot deployment, infrastructure expansion, and capacity-building activities.

Likewise, in Sindh, the Bank supported the Sindh Land Record Management Information System (SLRMIS), supporting digitization in one of Pakistan's most socio-economically diverse provinces. The arrangements for financing took to take on a phased disbursement approach, where initial funding was invested in feasibility and pilot initiatives, and then larger disbursements at a subsequent stage for full implementation and scaling up (Kapologwe, et al., 2024).

4.4.2. Infrastructure Development and Operational Expansion

Infrastructure development is also one of the core areas where the World Bank financial assistance had a revolutionary effect. Before the reforms, the majority of the provincial land record offices were being run in below-standard buildings with no hardware, software, and internet access, which was the basic level for e-governance (Ali, 2024). The World Bank financing facilitated:

- **Installation of Arazi Record Centers (ARCs)**

Punjab's financial assistance enabled the state to set up ARCs in each tehsil, where land owners enjoyed computerized information from a single window, fresh documents, and settled disputes (Ullah & Hussain, 2023). ARCs were provided with biometric identity facilities, high-speed internet connection, and trained personnel, providing uniform and secured services in the province.

- **Hardware and Software Procurement**

The Bank's funding paid for the acquisition of servers, biometric scanners, secure data storage systems, and GIS-based mapping software. These platforms were at the center of digital land governance systems in Punjab, Sindh, and other places.

- **Resilient Internet Connectivity**

In rural and peri-urban regions where internet connectivity was previously an exception, World Bank funding enabled reliance on trustworthy connectivity, thereby ensuring that computerized land administration systems possessed the ability to function effectively even in distant regions (Ali, 2024).

4.4.3. Funding Data Digitization and Record Verification

In addition to physical infrastructure, the financial strength of the World Bank formed the foundation of the colossal endeavor in digitizing paper records decades in age. These included:

- Financing data scanning and paper land records data entry.
- Field verification and ground-truthing of records to confirm accuracy.
- Financing data cleaning and standardization, minimizing inconsistencies and maximizing the reliability of digital databases (World Bank Completion Reports, 2024).

The investment significantly minimized the risk of tampering with records and maximizing the legal enforceability of digital records, thus making citizens more confident in the new system.

4.4.4. Digital Literacy and Community Engagement Programs

Financial support offered to community-led projects that promoted bridging the digital divide and inclusivity in land management by the World Bank included programs like "Internet Dost" supported to educate rural land owners, women, and marginalized groups on the use of digital land platforms. The activities included:

- Digital literacy training workshops on the village level, localized to language and cultural context (Parks, Srinivasan, & Aragon, 2024).
- Awareness campaigns on the advantages of digital land records and how to get access to them.
- Cell phone-based outreach programs that underwent computer literacy training to far-flung villages.

These outreach programs were instrumental in making the advantages of digital governance not only reach urban elites but also touch marginalized sections of society that were hitherto left out of formal land governance regimes.

4.4.5. Sustainability and Financial Planning

World Bank financial assistance was not only in the form of one-time investments but also long-term sustainability. This included:

- **Cost-Recovery Mechanisms**

In Punjab, for instance, nominal charges for electronic services in ARCs were introduced as a measure to raise revenues for system maintenance and enhancement. Technical assistance in designing cost-recovery systems was given by the World Bank in attempting to make them not burdensome on poor people while generating a sustainable revenue stream (Iychettira, 2021).

- **Integration with Broader Public Financial Management Systems**

The Bank prompted provinces to incorporate digital land administration systems within wider public financial management systems. Harmonization allowed system upgrading costs and staff training costs to be absorbed into regular government budgets, minimizing long-term dependence on foreign funding.

4.4.6. Broader Operations Effects

Expansion of operations led by World Bank financing has had widespread effects:

- Expansion of Service Delivery Reach: With ARCs and digital infrastructure rolled out to rural geographies, millions of citizens enjoy access to safe, transparent land records (Rodima-Taylor, Digitalizing land administration: The geographies and temporalities of infrastructural promise, 2021).
- Reduction of Transaction Times: Financial investment on digital platforms has cut the time taken to conduct transactions from several months to a few days or even hours, enhancing economic efficiency.
- Boost to Investment and Economic Development: Secure land records have enabled farm and urban investment with greater confidence for landowners and investors (World Bank, 2021).

4.4.7. Lesson and Challenges

While these gains were being secured, the World Bank financing support also brought vital lessons concerning sustainable operational growth:

- Maintenance of Infrastructure: Maintaining the infrastructure (e.g., hardware and internet) in some remote areas continues to be a problem, necessitating ongoing financial investment by the provincial governments (Ali, 2024).
- Equity of Access: Even though ARCs increased access to cover more, ARCs continue to deny marginalized groups like women and landless people full access to digital services, making the issue of targeted funding and policy interventions necessary.
- Cybersecurity: Greater digital infrastructure means greater exposure to data breaches and the need for ongoing investment in strong cybersecurity protection (Rajeh, 2022).

4.5. Enhancing Transparency, Efficiency, and Citizen Trust

Amongst the key goals of the World Bank intervention in Pakistan's land digitalization are higher transparency, enhanced administrative effectiveness, and citizens' faith in the government organizations. In the pre-existing system inherited from British colonial times, the Patwari system used to be marked by secret processes, document forgery, and restricted provision of correct information to common landowners (Rahman, 2023). Through enabling the digitization of land records, the World Bank has helped to change this environment to make land administration more transparent, efficient, and equitable.

4.5.1. Enhancing Transparency in Land Administration

One of the greatest contributions of the World Bank-funded land administration reforms is that they have enhanced transparency in land transactions and record-keeping. Under the old system, landowners were usually at the mercy of the Patwaris' discretionary orders because they had control over the land records and could manipulate documents to favour influential interests (Joshi, 2021). Electronic land records have broken this cycle by moving from paper-based, tampered-with documents to secure, tamper-evident electronic databases.

For instance, Punjab's Land Records Management and Information System (LRMIS) implemented using World Bank assistance established an integrated digital record to be viewed by officials and citizens at Arazi Record Centers (ARCs). It largely prevented document forgery and bribe incidents. According to Hussain (2025), the presence of verified digital records enabled citizens to double-check property and transaction information directly, thus enhancing an accountable governance system.

Secondly, transparency has been enhanced through the use of biometric verification processes in ARCs. Biometric data maintains that only genuine landowners are able to initiate transactions, thereby eliminating impersonation and fraud previously common in the old manual system (World Bank, 2019).

4.5.2. Minimizing Administrative Efficiency

World Bank support has also had the impact of revolutionizing administrative efficiency immensely. In the previous manual system, land transactions would take weeks or even months because landowners were handling a slow and complex bureaucracy (Ali, 2024). Digital systems have made it easier to execute these transactions, ensuring they are quicker and less de-burdened for administrators.

In Punjab, median transaction times in fard issuance-related transactions and mutation registration decreased from more than 45 days to hours in the majority of cases. This has been made possible through:

- Computerization of records, which eliminated the time spent searching out papers manually and verifying them (Liu, Shapira, & Yue, 2021).
- Computerized workflows, which became streamlined through standardization and curbed discretionary decision-making by officials.
- The establishment of ARCs as one-stop centers that reduce visits to different offices.

In Sindh also, changes have been witnessed at the district level where there are pilots of the Sindh Land Record Management Information System (SLRMIS). Errors caused by human agents have been reduced by automating processes, bridging gaps and leaving limited scope for deliberate record manipulation.

4.5.3. Building Citizen Confidence in Governance Agencies

Above all else, perhaps, is their effect on the trust of the people in public institutions. Public trust in state institutions had already been eroded by the charges of corruption and arbitrary discretion in land administration (Rahman, 2023). By making secure, accessible, and verifiable digital land records, World Bank interventions have gained the trust of landowners, especially from previously excluded groups.

Multi-perspective evidence attests that online platforms have reinforced fairness beliefs in land sales. For instance, media reports capture the cases of small farmers who, for the first time in history, are able to buy verified ownership certificates without bribe money and personal connections (Ali, 2024). Such procedures reinforced not only government legitimacy perceptions but also encouraged a sense of security and ownership for rural landowners.

Further, digital systems have led to fairer governance by removing information asymmetry. Patwaris manipulated landowners under the manual system without any information on their rights or technical skill sets to confront such manipulations (Ullah & Hussain, 2023). Land data has been brought to people's doors with direct access to authenticated records through digitization.

4.5.4. Marginalized Groups Empowerment

Yet another key area of World Bank focus on inclusivity has been to support work towards empowering marginalized groups such as women, small farmers, and ethnic minorities (Swaiss, 2024). These have traditionally been working under stringent constraints to gain access to land tenure, with little access to solid information and heavy reliance on intermediaries.

Digital land records have leveled the playing field by:

- Provision of concise, standard documentation to minimize discrimination and prejudice.
- Enabling quick, convenient access to land information, mainly through ARCs and mobile digital media.
- Facilitating women's right to inheritance through traceable electronic documentation, an issue where patriarchal practices have traditionally restricted women's land control.

These changes strengthen higher development goals, such as the Sustainable Development Goals (SDG 1.4), targeting secure land rights for all, and SDG 16, targeting accountable institutions.

4.5.5. Challenges to Transparency and Efficiency

Despite some progress, the World Bank's drive towards transparency and efficiency has also continued to face challenges:

- **Digital Divide**

Despite increased digital access, rural areas continue to experience disparities owing to poor internet infrastructure and poor digital literacy (James, 2021). This translates to unequal access to digital records, especially for elderly, less educated landowners.

- **Opposition from Traditional Power Holders**

Local elites and Patwaris in certain districts have been reluctant to reforms that challenge their authority, and it is challenging to attain complete transparency and accountability.

- **Cybersecurity Concerns**

With land information available online, issues of data protection and integrity also arose. Strong security systems, aided by World Bank technical support, play an important role in maintaining public trust.

4.6. National Implications and National Reach

World Bank efforts in Pakistan's land reform management have carried wide national implications, transforming the nation's overall government landscape. Started as provincial digitization initiatives, the Punjab Computerization Land Records Management and Information System (CLRMIS), they have also set the example for digital transformation of governance reforms across the country. The ability of the CLRMIS to shorten land transaction time and cut rent-seeking helped to showcase the revolutionizing potential of computerized systems, compelling the same in Sindh and Khyber Pakhtunkhwa.

One major corollary has been the institutionalization of legal frameworks. World Bank encouragement for digital record identification under the Land Revenue Act placed land administration on a level with global benchmarks (Gupta, Shah, & Mandal, 2020). Semi-autonomous organizations such as the Punjab Land Records Authority (PLRA) are now examples of open governance, and some lessons can be drawn from other provinces and ministries.

Aside from land administration, these reforms have triggered total debate regarding digital government in Pakistan. National institutions such as the National Database and Registration Authority (NADRA) are presently contemplating interoperability of land registers and population databases, thus the move towards more holistic e-governance (Zein & Twinomurinzi, 2023). World Bank-supported workshops have also helped cross-provincial cooperation, allowing provinces to draw on each other's experience and make governance practices streamlined accordingly.

Economic growth has also been an essential contribution to the nation. Secure and reliable digital land records have increased investors' confidence, decreasing the cost of transactions and facilitating investment in agriculture, housing, and infrastructure (Ali, 2024). Farmers and smallholders, who were once susceptible to record tampering, now have greater security, facilitating agricultural modernization and rural economic development (Hussain, 2025). These reforms have been aligned with national development priorities envisioned in Vision 2025, focusing on inclusive growth and poverty reduction via enhanced land tenure.

Notably, the World Bank's efforts have promoted social inclusion and empowerment. Socially marginalized groups most notably women and small farmers have had unprecedented access to secure land documents and mechanisms for resolving disputes. Initiatives such as "Internet Dost" have filled digital literacy gaps in remote areas, making digital land management accessible to everyone. The impacts are aligned with Sustainable Development Goals (SDG 1.4 and SDG 16), increasing Pakistan's international commitment towards inclusive development and responsible governance.

Apparently, despite, there are challenges. Chronic differences in internet access and digital literacy still hinder even participation, particularly in conflict and rural areas. Opposition from vested local elites and Patwaris also undermines the sustainability of reforms, which need constant stakeholder cooperation and adaptive governance. Moreover, as digital platforms become the center of governance, effective cybersecurity arrangements need to protect vital land information and ensure people's confidence (Syarief, 2022).

In spite of this, the general lesson of World Bank experience is evident: digital government, together with law reform, institutional development, and inclusiveness, has the capacity to overcome deeply rooted inefficiencies and injustices in the public sector. The success of Pakistan's digital land administration offers a useful template for more ambitious governance reforms in taxation, municipal services, and social protection. As Pakistan moves on in direction of transparent and equitable governance, these lessons will be all-important in forming inclusive policies and sustainable development.

5. Conclusion

The World Bank was instrumental in reforming the land administration system of Pakistan with its long-term assistance in digital government transformation. Taking a cue from the colonial-era Patwari system, land administration in Pakistan was plagued by inefficiency, corruption, and denial of secure land rights to marginal communities. With technical support, investment, policy advice, and capacity building interventions, the World Bank supported the creation of digital land record systems in Punjab, Sindh, and Khyber Pakhtunkhwa. The reforms led to a striking improvement in administrative transparency, low transaction times, and improved citizens' trust in institutions.

The main innovations, such as biometric verification, GIS mapping, and centralized digital storage, increased record security and accessibility. Nevertheless, there are challenges that still persist, including resistance from vested power brokers, rural digital illiteracy, and cybersecurity threats. For all these constraints, the reforms have made a solid basis for inclusive, transparent, and efficient land governance in Pakistan. The World Bank model shows how global development support, when coordinated with national priorities and reforming institutions, can deliver lasting results. For the future, sustained investment in digital infrastructure, legal integration, and balanced access would be the key factors to ensure the long-term success of Pakistan's land governance modernization.

Conflict of Interest

The authors showed no conflict of interest.

Funding

The authors did not mention any funding for this research.

References

[1] Ahmad, M. (2024). *Digital security and land ownership verification in Punjab*. Journal of E-Governance Studies, *12*(1), 45–60.

[2] Ahsan, M., Hussain, A., Lemmen, C., Zevenbergen, J., & Atif, A. (2025). *Reforming Land Records: The Case of Punjab's CLRMIS*. *Land Governance Review*, *6*(2), 33–52.

[3] Ali, S. (2024). *E-governance and rural inclusion: Challenges in Pakistan's digital transition*. *Governance and Society*, *19*(1), 78–91.

[4] Ali, S., Rauf, D., & Jamil, T. (2025). *Digitalization of land records and public perception: A case study of Faisalabad, Pakistan*. South Asian Governance Journal, *8*(2), 21–36.

[5] Biraro, M., Zevenbergen, J., & Alemie, B. K. (2021). *Building capacity for sustainable land administration systems*. International Journal of Land Use Policy, 95, 102–114.

[6] Buabeng, A. & Amo-Darko, S. (2025). *Community participation in digital governance: Lessons from Pakistan's land reform*. International Development Practice, *7*(1), 88–106.

[7] Duran, V. L., Hobson, M. Z., & Adebayo, F. W. (2025). *Towards intelligent land administration systems: Opportunities and challenges in AI integration*. International Journal of Geospatial Science, *29*(3), 101–124.

[8] Farooq, S., Feroze, M., Cheng, Z., & Feroze, A. (2024). *Vision 2025 and the strategic importance of land governance in Pakistan*. Asian Development Review, *41*(1), 11–29.

[9] Farotimi, J. A., Adegoke, O. A., & Akeroro, E. A. (2023). *From paper to platform: Lessons in land digitization*. Journal of Public Sector Reform, *17*(4), 62–78.

[10] Foa, R. (2022). *Institutional quality and the promise of land reform in emerging economies*. Journal of Governance Studies, *14*(2), 88–103.

[11] Fruchtman, J., Moyer, D., Singh, T., & Kapur, V. (2021). *Designing digital systems for the public good: An iterative approach*. Technology for Development, *13*(3), 144–165.

[12] Gupta, A., Shah, R., & Mandal, P. (2020). *Land Revenue Act reforms in South Asia: Legal modernization and digital adoption*. Legal Innovations Journal, *9*(2), 55–77.

[13] Home, R. (2021). *Customary land rights and formal systems: Integrating local tenure in digitized frameworks*. Land Use Policy, 102, 105239.

[14] Huang, Z., Zhao, Y., Cao, R., Lyu, Q., & Tang, H. (2024). *Standardizing land transactions through SOPs in public service centers*. Journal of Administrative Modernization, *12*(1), 59–74.

[15] Hussain, R. (2025). *Citizen trust and digital records: Evaluating the Punjab LRMIS experience*. Pakistan Journal of Public Administration, *18*(1), 23–41.

[16] Iychettira, K. (2021). *Cost recovery and affordability in digital public service delivery*. Finance & Development Perspectives, *6*(3), 33–50.

[17] James, N. (2021). *Digital divide and governance inclusion: A study of rural South Asia*. Development and Equity, *14*(4), 90–104.

[18] Joshi, A. (2021). *Colonial institutions and land governance legacy in South Asia*. Journal of Historical Institutionalism, *11*(2), 44–60.

[19] Kapologwe, N. A., Motsoaledi, J., Park, E. H., & Sumani, M. (2024). *Scaling public sector digitization: Financing reform projects in low-income countries*. Public Policy & Technology, *19*(2), 121–140.

[20] Khan, A., Shahid, A., & Idrees, M. (2023). *Land conflicts and document fraud in Pakistan: Root causes and legal reform pathways*. Legal Studies in the Global South, *7*(3), 66–84.

[21] Liu, C., Shapira, P., & Yue, Y. (2021). *Accelerating digital public services through workflow automation*. E-Government Review, *5*(2), 112–131.

[22] Malempati, R. (2024). *Cybersecurity risks in e-governance: Safeguarding land data*. Journal of Cyber Policy, *10*(1), 73–95.

[23] Manda, M. I. (2022). *Institutional adaptation in digital land reform: Lessons from Africa and South Asia*. Public Policy Futures, *12*(1), 65–80.

[24] Mpofu, A. (2022). *Creating smart land systems: The role of design thinking in public sector IT*. Journal of Smart Governance, *9*(1), 38–55.

[25] Parks, S., Srinivasan, K., & Aragon, M. (2024). *Bridging the digital literacy gap: Case studies from South Asia*. Journal of Digital Inclusion, *8*(2), 49–70.

[26] Pihlainen, K., Korjonen-Kuusipuro, K., & Kärnä, E. (2021). *Peer mentoring for digital transitions in the public sector*. Journal of Organizational Learning, *6*(3), 112–127.

[27] Rahman, T. (2022). *Resistance to administrative change: Patwari influence in Pakistan's land record system*. Journal of Political Economy in South Asia, *5*(2), 77–96.

[28] Rahman, T. (2023). *Digitizing power structures: Bureaucratic resistance in land governance*. Policy Reform Quarterly, *11*(1), 66–85.

[29] Rodima-Taylor, D. (2021). *Digitalizing land administration: The geographies and temporalities of infrastructural promise*. Land Use Policy, 103, 105313.

[30] Rüzgar, M. (2024). *Legal frameworks for e-signatures and digital land transactions in Pakistan*. Journal of Legal Informatics, *13*(1), 27–43.

[31] Schling, M., & Pazos, C. (2024). *Inclusive land governance and its intersections with food security and gender equity*. World Development Review, *34*(1), 19–34.

[32] Sharoon, M., Mustafa, U., & Shahrukh, H. (2024). *Transparency in land records: A case for digital public goods in Pakistan*. Governance and Policy Review, *6*(1), 89–104.

[33] Sheikh, M., Iqbal, A., & Dorner, P. M. (2025). *Assessing urban land governance in Pakistan: A FELA-based framework analysis*. International Journal of Urban Affairs, *17*(2), 71–93.

[34] Sharma, M., Shingatgeri, K., & Pal, A. (2021). *Training modules for e-governance implementation*. Journal of ICT in Governance, *4*(4), 29–47.

[35] Sira, M., & Kuzior, A. (2025). *Bureaucratic change management in digital reforms*. Global Public Administration Journal, *13*(2), 59–81.

[36] Singh, S., Singh, R., & Dhanda, A. (2021). *Disempowered by design: Marginalized communities and land rights in South Asia*. Asian Policy and Society, *9*(2), 35–49.

[37] Swaiss, A. (2024). *Digital governance and gendered access to land rights*. Development and Technology Studies, *11*(3), 50–67.

[38] Ullah, A., & Hussain, R. (2023). *Tracking the impact of ARCs on transparency and service efficiency in Pakistan*. Journal of South Asian Policy Reform, *10*(1), 88–107.

[39] Urchick, A. (2023). *Re-engineering land governance workflows in emerging democracies*. Journal of State Innovation, *6*(1), 40–59.

[40] World Bank. (2019). *Securing land tenure through digital systems: Global insights and lessons*. Washington, DC: World Bank Publications.

[41] World Bank. (2021). *Digital land governance and sustainable development: A policy guide for low-income countries*. Washington, DC: World Bank Publications.

[42] World Bank. (2023). *Sindh Land Record Management Information System: Midterm performance review*. Washington, DC: World Bank.

[43] World Bank. (2025). *Implementation status and results report: Punjab Urban Land Systems Enhancement Project*. Washington, DC: World Bank.