Digital Innovation Through Cross-Border Cooperation Between Nepal and India

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1. Introduction

Digital innovation has become a cornerstone of economic transformation, inclusive growth, and regional integration. For countries like Nepal and India, strategic cooperation on digital infrastructure and emerging technologies presents a timely and transformative opportunity. While both nations have longstanding diplomatic and cultural ties, digital alignment remains at a nascent stage. India's success in developing and scaling public digital infrastructure (PDI) such as Aadhaar, Unified Payments Interface (UPI), and DigiLocker demonstrates the potential of state-led innovation (Government of India, 2023). These platforms have enabled financial inclusion, identity verification, and paperless service delivery at scale—creating an ecosystem that Nepal can learn from, adapt, and localize through bilateral collaboration.

Nepal, on its part, initially launched the Digital Nepal Framework (DNF) in 2019 to accelerate digital development across 8 sectors and 80 initiatives (MoCIT, 2019). However, despite early momentum, DNF faced significant implementation challenges due to fragmented institutional coordination, limited interoperability, and skill mismatches (ADB, 2024; IIDS, 2024). In response, the government has initiated DNF 2.0, which incorporates the FASTFramework—a new approach emphasizing foundational digital infrastructure, Access, Skills, and Transformation (MoCIT, 2025). Additionally, the earlier e-Governance Commission (EGC) has been replaced by the E-Governance Board, which is now leading the development of a comprehensive Digital Blueprint as part of the scoping process for sectoral digital transformation (OPMCM, 2025).

Parallel to these structural reforms, key legislation such as the Information Technology Bill, Artificial Intelligence (AI) Policy, and the Data Protection Act are currently under drafting. These policies aim to modernize Nepal's digital legal architecture and safeguard data governance, privacy, and responsible AI use. The government has signaled renewed commitment through fiscal priorities: the 2082/83 B.S. national budget highlights foundational DPI components such as the National ID system and the Nagarik App, recognizing them as core digital enablers for inclusive governance and service delivery (MoF, 2025). Emerging areas like AI and data analytics have also been prioritized, underscoring Nepal's intent to align with global technological trends and build a resilient digital future.

From an infrastructure standpoint, Nepal has made progress in broadband expansion, with fiber connectivity in 74 of 77 districts and mobile broadband access to over 89% of the population (NTA, 2025). Yet, disparities persist —particularly in last-mile access and digital literacy across provinces and wealth quintiles (CBS, 2023). Furthermore, digital infrastructure like secure data centers, cloud services, and reliable ID-based verification systems remains underdeveloped compared to regional standards.

Nepal's IT sector, while still emerging, shows promise. With approximately 100,000 ICT professionals across public and private sectors

including freelancers—it contributes to digital service delivery, outsourcing, and innovation (IIDS, 2024). However, this workforce faces significant skill mismatches, particularly in rapidly evolving areas like artificial intelligence (AI), data science, and cybersecurity (World Bank, 2022). Gender gaps persist: of the 2,145 public-sector tech employees, only 446 are women (ADB, 2023). Around 17,000 graduates enter the labor market each year, but many come from non-ICT backgrounds and rely on informal learning, raising concerns about job readiness (Sharma, 2024).

India and Nepal have made progress in strengthening financial connectivity through cross-border digital payments—a cornerstone of their evolving bilateral digital partnership. Following the June 2023 MoU enabling digital transactions for travelers and remittance users, the February 2024 agreement between the Reserve Bank of India and Nepal Rastra Bank laid the groundwork for integrating India's UPI and Nepal's NPI systems to support low-cost, real-time remittances. In a major step forward, March 2024 saw QR-based payments activated for inbound Indian tourists in Nepal, allowing users of apps like PhonePe and BHIM to scan and pay at Nepali merchants via platforms like Khalti and eSewa. However, reciprocal QR payment capabilities for Nepali users in India remain pending, with implementation delayed due to unresolved technical and regulatory issues. Once operationalized, this two-way digital payment system will not only streamline transactions for travelers and entrepreneurs but also deepen regional financial integration and digital inclusion across both countries

India-Nepal cooperation on digital innovation can bridge these gaps through knowledge transfer, south-south collaboration, and regulatory harmonization. India's India Stack ecosystem—based on open standards, APIs, and modular architecture—can offer technical blueprints and mentoring for building Nepal's Digital Public Infrastructure (DPI), including National ID integration, payment gateways, and data exchange layers (Government of India, 2023). Beyond infrastructure, joint centers for AI research, cybersecurity training, and startup incubation could enable co-development of digital public goods and promote entrepreneurship across borders.

Such cooperation also holds relevance beyond bilateral interests. As members of the BBIN (Bangladesh, Bhutan, India, Nepal) sub-region, Nepal and India can co-create scalable models of digital governance and economic participation that could be replicated in other South Asian countries. Digital alignment also facilitates cross-border trade in digital services, data interoperability, and regional security frameworks.In essence, Nepal is at a pivotal moment. While political, social, and economic transitions pose ongoing challenges, the convergence of its emerging digital ambitions and India's mature digital ecosystem creates a unique window for impactful cooperation. By investing in shared digital infrastructure, harmonizing policy frameworks, and promoting talent exchange, both countries can unlock new frontiers of innovation, equity, and resilience in the digital era.

2. Opportunities for Collaboration

1. Digital Trade and Cross-Border Data Flows

Digital trade—encompassing software services, cloud platforms, e-commerce, and data-driven solutions—is becoming a vital engine of economic diversification. While Nepal's digital service exports reached an estimated USD 515 million in 2022, they remain modest in comparison to India's USD 193 billion (IIDS, 2023;World Bank, 2024). However, this gap underscores a significant opportunity for bilateral cooperation to create enabling conditions for growth, particularly for Nepal's small and medium digital enterprises.

A core constraint lies in the lack of regulatory harmonization. India's Digital Personal Data Protection Act (DPDPA, 2023) allows conditional cross-border data transfers through government approvals, contracts, or adequacy-based frameworks (Government of India, 2023). Nepal, by contrast, currently lacks a dedicated data protection law—creating uncertainty for digital businesses operating across borders. Addressing this gap through legal alignment and mutual data governance principles would be foundational for trust and interoperability.

Platforms such as the National Payments Corporation of India's UPI and QR code frameworks offer scalable models for digital payments integration. Extending these to cross-border users—especially targeting SMEs and rural entrepreneurs—could accelerate financial inclusion and bilateral trade. Additionally, agreements to recognize digital signatures, rationalize cross-border taxation, and enable invoicing in digital services would reduce transaction costs and unlock new markets for Nepali firms.

2. Knowledge Transfer and Human Capital Development

Human capital remains a cornerstone of digital transformation. India has made substantial progress in developing digital skills pipelines through initiatives like Skill India, Digital India, and NASSCOM's FutureSkills Prime platform, which combine government funding, private partnerships, and digital delivery at scale (UNESCAP, 2023). In contrast, Nepal continues to face structural mismatches between education outputs and labor market needs. Employers regularly cite a lack of hands-on experience, exposure to global tools, and practical soft skills among ICT graduates (ADB, 2023; IIDS, 2024).

A bilateral knowledge partnership could provide much-needed momentum. Joint strategies may include the mutual recognition of digital certifications, open-access learning platforms, cross-border apprenticeships, and institutional faculty exchange. Establishing joint digital skills academies in border towns such as Lumbini–Lucknow would serve both countries by fostering shared innovation hubs and improving employability for export-ready talent.

Moreover, Nepal's global digital diaspora—particularly those working in India and Southeast Asia—represents an underutilized asset. Targeted re-engagement mechanisms,

including remote teaching, mentorship, and startup investment facilitation, could catalyze the domestic tech ecosystem. Embedding 21st-century competencies—such as critical thinking, communication, and adaptability—into core tech curricula is equally important to ensure a competitive digital workforce.

3. Artificial Intelligence and Emerging Technologies

Artificial intelligence (AI) offers transformative potential across public service delivery, economic productivity, and digital innovation. India's National AI Strategy emphasizes inclusive development and sectoral AI applications in agriculture, education, and health. It is also investing in AI compute infrastructure and foundational models under the Digital India initiative (Government of India, 2023). Nepal, still in early stages of AI adoption, stands to benefit immensely from regional knowledge transfer and joint experimentation.

Collaboration could focus on building ethical and interoperable AI frameworks, creating shared datasets in local languages, and co-developing AI testing sandboxes—particularly for disaster risk management, crop monitoring, and remote diagnostics. A compelling case exists to align AI innovation zones across the region: while India is developing Lucknow as an AI city, Nepal could position Lumbini as a complementary AI and digital innovation corridor. Such initiatives would not only generate skilled employment but also enhance bilateral research and commercialization pipelines.

Partnerships in emerging technologies could extend to areas such as blockchain for remittances, digital twins for urban planning, and IoT in climate-sensitive sectors like agriculture and hydropower.

4. Digital Health and Cross-Border Data Integration

Digital health offers a critical avenue for cooperation within the BBINS sub-region. India is already the primary destination for medical tourism from Nepal and neighboring countries, with BBINS accounting for over 70% of India's medical tourist arrivals in 2021 (UNESCAP, 2023). However, the potential of digital health integration remains underutilized. Fragmented referral systems, lack of data sharing, and regulatory siloes limit the efficiency and continuity of care.

Nepal and India can jointly advance cross-border healthcare through secure and consent-based health data exchange frameworks. Integration with India's Ayushman Bharat Digital Mission (ABDM) and its Unified Health Interface (UHI) could allow Nepali patients to digitally access health services, reducing reliance on informal referrals. Telehealth platforms, remote diagnostics, and health professional certification recognition can further improve access and quality, particularly in underserved border regions.

Nevertheless, health data is classified as sensitive personal information in India's and other countries' privacy frameworks. Any collaboration must prioritize data security, user consent, and interoperability. Harmonizing health information exchange standards, possibly modeled after global practices like HIPAA, will be essential to build trust and enable adoption.

5. Climate Resilience and Environmental Data Sharing

The BBINS sub-region is highly vulnerable to climate risks, with Nepal, India, and Bhutan projected to face GDP losses ranging from 10% to 18% by 2100 due to environmental shocks (World Bank, 2024). Climate resilience will depend on the ability to monitor, forecast, and act—using reliable, real-time data shared across borders.
Existing platforms such as the SAARC Disaster Management Centre and ICIMOD's Regional Database System have laid early foundations. However, integration remains limited due to incompatible data collection methods, lack of harmonized standards, and regulatory bottlenecks.

Nepal and India could lead the region by establishing climate data corridors, focusing on:

- Joint early warning systems for floods, landslides, and glacial lake outburst events.
- Standardized environmental datasets and open-access platforms.
- Cross-border research on climate-smart agriculture, water sharing, and ecosystem resilience.
- Integrated monitoring for climate-induced migration and urban stress.

Shared investment in regional analytics infrastructure, cloud platforms, and AI-enabled modeling tools will support better decision-making and crisis response.

Given South Asia's interconnected natural systems—rivers, weather patterns, and ecological zones—such collaboration is not only strategic but necessary for shared sustainability.

4. Conclusion

As Nepal and India chart their digital futures, the way forward lies in institutionalizing sustained collaboration anchored in shared values, mutual respect, and regional ambition. The two countries should prioritize building joint platforms for policy dialogue, co-creation of digital solutions, and coordinated implementation of key initiatives in areas such as digital public infrastructure, AI, cybersecurity, and digital skilling. Strengthening interoperability—of systems, standards, and strategies—will be critical to unlocking efficiencies and fostering innovation at scale. Leveraging regional frameworks such as BBIN and drawing on global best practices can help contextualize solutions while maintaining national priorities. Most importantly, placing people at the center—through inclusive digital access, cross-border talent mobility, and citizen-focused services—will ensure that this partnership delivers tangible benefits on both sides of the border. A deliberate, phased, and mutually accountable approach can transform the India–Nepal digital relationship into a model of regional cooperation for the digital age.

5. Recommendation

As Nepal and India navigate the next phase of their digital transformation journeys, there is

a compelling need to move from aspiration to action. While both countries have made pace in building digital public infrastructure and exploring frontier technologies, their bilateral engagement in this space remains largely untapped. Recognizing the complementarities between India's mature digital ecosystem and Nepal's emerging digital ambition, this set of recommendations proposes practical, innovative, and contextually grounded pathways to strengthen cooperation. These actions are designed to accelerate progress on shared priorities—ranging from cross-border data flows and digital trade to AI, startup ecosystems, and climate resilience—while fostering inclusive growth, regional stability, and technological co-development. The recommendations emphasize policy coherence, institutional collaboration, and scalable models.

Recommendation Area	Key Actions
1. Bilateral Digital Cooperation Framework	• Sign a formal India–Nepal digital cooperation agreement • Establish a joint coordination mechanism for DPI and emerging technologies • Leverage BBIN platform for sub-regional digital initiatives
2. Legal and Regulatory Alignment	• Support the drafting and enactment of Nepal's Policies such as Data Protection Act, AI, Cybersecurity in line with global cmpliance as GDPR • Enable mutual recognition of digital signatures, e-KYC, and invoicing standards • Pilot cross-border regulatory sandboxes for fintech, e-health, and e-commerce
3. Joint Human Capital Development	• Establish joint Digital Skills Academies in border cities like Lumbini–Lucknow • Launch cross-border faculty exchanges and apprenticeships • Promote digital talent mobility with return pathways for diaspora professionals
4. Shared Innovation and Startup Ecosystem	• Create bilateral startup bridges and co-incubation programs • Integrate Nepali SMEs into India's ONDC platform • Develop the Lumbini–Lucknow AI Corridor as a flagship cross-border tech zone
5. Cross-Border Health and Climate Data Sharing	• Establish interoperable cross-border health data protocols aligned with ABDM • Build joint early warning systems using real-time climate and disaster data • Leverage India's AI use cases for agriculture, telehealth, and resilience in Nepal • Promote adoption of open climate data standards and joint platforms
6. Civil Society Knowledge Partnerships	• Launch a Nepal–India Digital Diaspora Network for mentorship and knowledge exchange • Support co-funded research labs and collaborative digital governance pilots
7. Learning Mechanisms	• Launch a Nepal–India Digital Diaspora Network for mentorship and knowledge exchange • Support co-funded research labs and collaborative digital governance pilots

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