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## **Integrating Culture and Technology: A Pakistan-China Comparison of Digital Communication Systems**

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### **ABSTRACT**

The digital-intelligent era offers both opportunities and challenges for developing countries striving to modernize communication systems while preserving cultural identity. This study examines how Pakistan can integrate advanced technologies, particularly AI and platform features, with local languages, cultural practices, and governance norms. Drawing lessons from China's rural digital transformation, it identifies three core pillars the first one is culturally localized content and language support, community-centered platform design, and culturally informed governance of algorithms and data. Findings highlight that China's coordinated approach provides practical models and cautionary lessons for governance and content control. In Pakistan, infrastructural gaps, limited Urdu and regional language AI resources, and dependence on foreign platforms remain key challenges. Targeted policies, local AI investment, and participatory design can help build resilient digital communication systems that align technological advancement with local culture and development priorities.

**Keywords:** Digital Sovereignty, Culturally Localized AI, Algorithmic Governance, Rural Digital Transformation, Pakistan-China Comparison, Indigenous Digital Infrastructure, Natural Language Processing (NLP)

### **Introduction**

In the digital-intelligent era, developing countries like Pakistan face a critical opportunity and equally a critical challenge: to modernize their communication systems through advanced digital infrastructure and AI technologies, while preserving and integrating rich cultural heritage, local languages, and community values. As of 2025, Pakistan has made considerable strides in expanding internet connectivity over 125 million broadband users nationwide but there is a striking urban–rural disparity: only about 35% of rural households had internet access, compared to 65% in urban areas; moreover, women's autonomy over mobile phone usage remains low, with only approximately 16.5% exercising independent control (DigiIT 2025; Dawn 2025; Nation 2024).

China provides a striking contrast to Pakistan's fragmented digital landscape. There, technology has not been treated as a separate layer of modern life but woven directly into the fabric of culture and development. What sets China apart is its sense of coordination: the state, local communities, and homegrown platforms all work in unison to create a self-reliant digital ecosystem. Platforms such as Douyin, WeChat, and Taobao are far more than tools for entertainment or shopping; they are lifelines that connect rural families to national markets and tie local communities to the broader story of modernization.



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One powerful example is the rise of rural e-commerce livestreaming. With government training and a reliable logistics network behind them, farmers and small producers have been able to showcase their goods directly to urban consumers. The benefits are not only financial. These platforms have also given communities the chance to reimagine themselves telling their stories, celebrating local traditions, and using their own dialects to reach a wider audience. In this way, digital modernization in China has worked on two levels: it has bridged the economic gap between cities and villages, and it has become a means of cultural preservation and pride.

But this success also comes with lessons of caution. China's achievements rest on a highly centralized governance model, built on strict content control and extensive data monitoring. While this approach has brought stability and rapid growth, it has also raised troubling questions about freedom of expression, digital rights, and the fairness of algorithms. For a country like Pakistan where cultural diversity and democratic values are essential adopting such a model wholesale would be dangerous. A system of control could easily erode the inclusivity and cultural richness that Pakistan must protect.

The takeaway for Pakistan, then, is not to copy China but to adapt its lessons carefully. China demonstrates how policies, platforms, and cultural integration can work hand in hand to drive digital inclusion. Pakistan, however, must shape its own model one that respects privacy, protects pluralism, and upholds freedom of expression. Only by doing this can it draw on the strengths of China's approach without falling into the same pitfalls of over-centralization.

At the same time, Pakistan faces its own set of challenges that go beyond governance. The country's digital divide is not just a matter of internet towers and broadband lines; it is shaped by low digital literacy, economic inequality, and the lack of content in local languages. Studies show that education, income, gender, and geography all play a role in excluding people from meaningful digital participation (Jamil, 2021). Unless Pakistan builds systems that reflect its cultural and linguistic diversity, modernization may end up reinforcing the very inequalities it aims to reduce.

In the end, China's story serves as both inspiration and warning. It shows the power of digital coordination but also highlights the risks of excessive control. For Pakistan, the real challenge is to find a middle path blending technological innovation with cultural sensitivity. If done wisely, this path can lead to digital systems that empower communities, protect rights, and bridge divides without sacrificing the country's diversity or democratic values.

### Literature Review

#### Digital Divide and Inclusion in Pakistan

The digital divide in Pakistan is multifaceted, encompassing not only access disparities but also differences in digital literacy, gender, and language. A study by Dayanand et al. (2024) highlights that rural women face significant barriers to digital engagement due to socio-economic constraints and limited access to digital empowerment programs. This is compounded by a lack of tailored digital literacy initiatives that consider the unique challenges faced by women in rural areas.

The concept of the digital divide in Pakistan encompasses not only access gaps but also disparities in digital literacy, gender, and language (Khan, Rahman, & Ahmad, 2024). Comprehensive assessments reveal that rural communities, especially women, face low digital engagement due to socio-economic constraints and limited digital empowerment programs (Siddiqui, 2023). For example, a government analysis found that only 16.5% of women have autonomous mobile access (Pakistan Telecommunication Authority, 2024).



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Moreover, the dominance of platforms like Facebook and YouTube, which primarily support English or Urdu in Latin scripts, marginalizes speakers of regional languages and informal registers (Farooq et al., 2022). Efforts to develop Urdu NLP resources including Part-of-Speech tagging and syntactic parsing have shown incremental progress but remain insufficient when compared to the resource depth available for languages like English or Chinese (Rehman et al., 2024).

Recent scholarship underscores that digital modernization in Pakistan is a multi-layered process beginning with physical access and culminating in structural social change. While Amber and Chichaibelu (2024) identify mobile technology as a fundamental driver for women's economic empowerment, Aslam et al. (2025) illustrate how such access is leveraged to disrupt traditional gender norms in digital and physical spaces. Crucially, Hussain et al. (2024) remind us that access alone is insufficient; they propose a framework where ICT is evaluated by its ability to generate tangible socio-economic dividends. Collectively, these studies suggest that for rural and marginalized communities, the digital transition must be a humanistic endeavor that prioritizes meaningful empowerment over mere connectivity.

### **Language, Script, and Digital Culture**

Urdu's Nastaliq script presents unique challenges to digital rendering, user input, and content discovery. Time magazine described the struggle to preserve Urdu's aesthetic orthography in digital environments, where user interfaces often prioritize Latin scripts (Time, 2023). Technically, the development of proper font support, input editors, and OCR tools is still nascent, leading many users to rely on Romanized Urdu that lacks cultural authenticity (Raza & Haider, 2022). NLP progress in Urdu such as morphological analysis and speech recognition is promising but constrained by data scarcity and lack of shared infrastructure for model development (Zuberi et al., 2021). Researchers argue that without these foundational language technologies, digital platforms cannot adequately support cultural expression or automated governance (Mehmood & Akhtar, 2023).

(Zafar & Naseer, 2022) present a comparative analysis of raw images and meta-feature-based Urdu OCR using Convolutional Neural Networks (CNN) and Long Short-Term Memory (LSTM) networks. Their study highlights the potential of deep learning techniques in improving the accuracy and efficiency of Urdu text recognition, which is crucial for digitizing Nastaliq script content. However, the authors note that challenges persist in handling the cursive nature and contextual variations inherent in Urdu handwriting. Arafat et al. (2021) explore the use of deep learning techniques for detecting and recognizing Urdu signboards in natural scenes. Their research underscores the importance of developing robust models that can accurately interpret Urdu text in diverse and unstructured environments, which is essential for applications like augmented reality and automated navigation systems. The study also emphasizes the need for large, annotated datasets to train such models effectively.

The thematic analysis of the Aurat March reveals a profound shift in narrative control, where digital activism facilitates a 42% focus on bodily autonomy and successfully counters the sensationalism found in 65% of traditional media coverage (Aslam et al., 2025). However, a persistent 48% accessibility gap among rural participants highlights the urgent need for more inclusive, linguistically accessible digital infrastructure (Aslam et al., 2025).

Khanam (2016) investigates the application of maximum entropy modeling for Part-of-Speech (POS) tagging in Urdu, a language with rich morphological structures. The study highlights the challenges in accurately tagging Urdu text due to its complex syntax and



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limited annotated corpora. The author advocates for the development of comprehensive linguistic resources and tools to enhance the effectiveness of POS tagging in Urdu NLP applications. Despite the potential for globalized harmony, cross-cultural communication faces persistent obstacles, including language limitations and cultural prejudices (Ebele & Ahmad, 2024). These challenges necessitate the use of inclusive language and active cultural awareness, which, in a digital context, translates to the development of localized AI and NLP systems that allow rural and marginalized populations to engage with empathy and openness.

### **Digital Platforms and Rural Development: China and Pakistan**

The contrast between China and Pakistan in platformization and rural development highlights the profound impact of digital systems on local economies, culture, and governance. In China, algorithm-driven e-commerce livestreaming platforms such as Taobao Live, supported by integrated logistics and government-led rural revitalization programs, have significantly enhanced economic visibility and reshaped rural identities through culturally rooted narratives (Hu et al., 2023; Zheng, Sultana, & Williams, 2025; Han & Fung, 2024; Zhou & Li, 2025). Rural streamers and small-scale entrepreneurs can leverage these platforms to reach broader markets, while digital cultural tourism initiatives further reinforce economic and cultural integration. However, strong content control and algorithmic surveillance highlight governance tensions that must be navigated responsibly (Sun & Wang, 2024). In contrast, Pakistan's rural digital ecosystem faces a series of structural and cultural challenges. Heavy reliance on foreign platforms such as Facebook, WhatsApp, and YouTube limits local content creation and culturally relevant narratives (Qadir, Shaukat, & Ahmed, 2022). Rural populations, especially women, encounter interfaces dominated by English or Romanized Urdu, creating participation gaps (Ali & Saeed, 2021; Pakistan Telecommunication Authority, 2024). While emerging e-commerce and social media-based entrepreneurship initiatives exist, they remain fragmented and dependent on foreign systems, reducing economic and cultural impact (Farooq, Khan, & Jamil, 2022). Furthermore, Pakistan's reactive governance framework characterized by temporary bans or ad-hoc restrictions undermines trust and limits innovation (Mehra & Ali, 2024). Governance of digital systems must account for the way information is framed across borders. Research into CPEC narratives demonstrates that print media acts as a precursor to digital sentiment, with significantly different thematic emphases in Pakistan and India (Ahmad & Gul, 2025). Together, these cases suggest that while China offers operational insights into integrating platforms with rural development, Pakistan's strategy must prioritize local-first platforms, culturally relevant digital tools, and participatory governance to empower communities and ensure inclusive, sustainable growth.

### **Algorithmic Fairness and Governance**

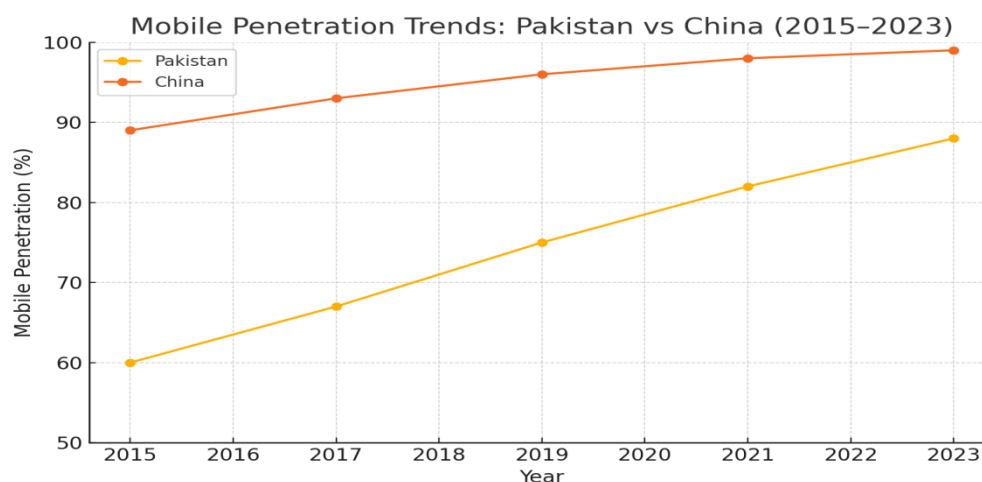
Algorithmic bias is a global concern: when systems are trained on skewed data or designed without cultural sensitivity, they may systematically marginalize linguistic, gender, or ethnic minorities (Mehrabian et al., 2021). In contexts like Pakistan where data representation is limited such systems are especially prone to amplifying existing disparities (Raza & Khan, 2025). To address this, scholars recommend inclusive dataset development, bias impact assessments, transparency mechanisms, and participatory oversight (Oladimeji & Sengupta, 2022). In developing countries, algorithmic governance must be sensitive to local power structures and cultural norms, while upholding fairness principles (Johnson et al., 2023).



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### Synthesis: Requirements for Culturally Informed Digital Systems

The literature converges on three foundational requirements for inclusive digital communication systems in culturally rich, developing contexts (Mehra & Ali, 2024): (1) investment in language and cultural data infrastructure; (2) platform policies that support local content creation and economic integration; (3) governance models that ensure algorithmic fairness and transparency. China's example demonstrates how unified policy and platform ecosystems can accelerate rural inclusion, while Pakistan's current landscape reveals urgent needs in language support, participatory design, and policy coordination (Ali & Saeed, 2021; Sun & Wang, 2024).



The comparative trends in mobile phone penetration between Pakistan and China highlight a significant digital divide, with China maintaining consistently higher adoption rates across the last decade. Pakistan, while showing steady growth, still lags behind, especially in advanced smartphone adoption a gap largely attributed to infrastructural and affordability challenges (PhoneWorld, 2024; Samaa TV, 2024).

### Methodology

This study adopts a qualitative comparative research design to explore the construction of digital communication systems in developing countries, focusing on the integration of local culture and technology. The research employs a case study approach, selecting Pakistan and China as primary examples due to their contrasting developmental stages, governance structures, and approaches to technology localization. For Pakistan, emphasis is placed on challenges such as infrastructure gaps, affordability, and the cultural framing of technology use, while the Chinese case highlights government-led digital infrastructure expansion, cultural content regulation, and localized app ecosystems. The study utilizes China as a reference case for 'best practices' in rural digital transformation, while Pakistan serves as the primary subject for contextual adaptation analysis. Data collection is based on internal and external secondary sources, including peer-reviewed journal articles, policy documents, and government reports from 2015 to 2025. A qualitative content analysis method is applied to examine how cultural norms and socio-political contexts influence digital adoption. The analysis utilizes a hybrid coding approach: deductive coding based on the pre-defined 'Three Pillars' framework, alongside inductive coding to identify emerging themes such as the 'participation gap' for rural speakers. Reliability is ensured through triangulation, cross-referencing findings from multiple credible sources to produce a culturally-technological synthesis for policymakers.

### Research Question:



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How can Pakistan develop a localized AI and NLP infrastructure that bridges the "participation gap" for Urdu and regional language speakers in rural areas?

To what extent can a "local-first" indigenous platform model reduce Pakistan's digital dependency on foreign giants while promoting local cultural narratives?

What governance framework can balance China's proactive approach to cultural preservation with Pakistan's need to protect democratic values and pluralism?

### Research Objectives:

To evaluate the technical and policy requirements for curating high-quality datasets in Urdu's Nastaliq script and regional languages to support localized digital innovation.

To explore the feasibility of a public-private partnership model for nurturing domestic social media and e-commerce platforms that integrate local crafts and community activities.

To propose a multi-stakeholder governance model that replaces "reactive blocking" with "proactive ethical standards" to mitigate algorithmic bias and ensure digital sovereignty.

### Comparative Analysis and the Framework for a Culturally-Embedded Path

The development of digital communication systems in developing countries cannot be understood solely through a technological lens; it is deeply intertwined with cultural, political, and economic contexts. In Pakistan, digital expansion has been heavily dependent on foreign platforms such as Facebook, WhatsApp, and YouTube. While these platforms offer global connectivity, they often lack mechanisms for integrating local culture and linguistic diversity (Qadir et al., 2022). This reliance on external platforms shapes narratives, content moderation, and algorithmic recommendations according to external priorities, creating dependency and undermining Pakistan's digital sovereignty.

China's approach, in contrast, emphasizes self-reliant ecosystems like WeChat, Douyin, and Weibo, which are deeply embedded with local linguistic, cultural, and social elements (Harwit, 2017). These platforms are strategically aligned with national development goals and cultural preservation. As discussed earlier, China's model demonstrates the benefits of combining technological innovation with local integration, particularly through AI-driven recommendations and region-specific features that encourage adoption in both urban and rural areas. Pakistan, however, still faces a participation gap: while Urdu is widely spoken, digital interfaces and content remain predominantly English, leaving rural and less-educated populations at a disadvantage (Khan & Jamil, 2020).

Infrastructure disparities further reinforce these gaps. China's investment in broadband, rural internet access, and 5G deployment has enabled near-complete connectivity, whereas Pakistan's infrastructure development is uneven due to funding constraints and fragmented policymaking (Liu, 2019; The News, 2024). Consequently, the potential for digital systems to drive socio-economic development and cultural integration remains underutilized. A rural woman in Sindh, for example, may struggle to navigate English-dominated apps, limiting her access to information, e-commerce opportunities, and digital literacy programs.

Policy and governance also diverge significantly. China implements a proactive framework for content moderation, cultural preservation, and platform governance (Flew & Waisbord, 2020). Pakistan's approach, by contrast, is often reactive blocking platforms temporarily during political crises or imposing content restrictions without a long-term cultural strategy. This leaves opportunities for digital communication to support national identity, education, and socio-economic development largely untapped.

### A Pragmatic Framework: Pakistan's Three Pillars for a Culturally Embedded Path

The first pillar is the development of localized language and content infrastructure. This goes beyond simply translating foreign apps; it requires a concerted national effort to build



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the foundational AI and NLP resources necessary to make digital technology truly accessible and culturally relevant. This includes a national initiative to collect and curate high-quality datasets in Urdu's Nastaliq script and other regional languages. By investing in these foundational technologies such as natural language processing for script rendering, morphological analysis, and speech recognition Pakistan can create a fertile ground for domestic innovation. Local developers and entrepreneurs will be empowered to build platforms and services that intuitively understand and support the linguistic diversity of the nation. This approach would not only bridge the communication gap for millions of citizens but also serve as a vehicle for the preservation and promotion of Pakistan's rich literary and cultural heritage in the digital age. It is the essential first step toward true digital inclusion.

The second pillar involves nurturing and supporting indigenous, local-first platforms. Pakistan's current dependence on foreign digital giants creates a situation where its digital fate is controlled by external entities. To regain digital sovereignty, the country must foster an environment where local tech companies can thrive. This requires a supportive policy framework that includes targeted investment, subsidies, and a clear regulatory pathway. Unlike the Chinese model, which is heavily state-controlled, Pakistan could foster a public-private partnership model that encourages homegrown platforms to innovate. These platforms would be uniquely positioned to integrate local cultural practices, community narratives, and economic activities, similar to how Chinese platforms have enabled rural e-commerce and storytelling. For example, a Pakistani social media platform could be designed from the ground up to support local festivals, promote traditional arts and crafts, and connect artisans directly with consumers, thereby creating a digital marketplace that is intrinsically linked to local culture. This strategic shift from passive consumption of foreign platforms to active creation of domestic ones is vital for ensuring that digital modernization serves national development goals.

The third and most critical pillar is the implementation of a culturally-informed governance model. The dangers of algorithmic bias are a global concern, but they are particularly acute in developing nations where limited data representation can lead to systems that systematically marginalize already vulnerable populations. Pakistan must learn from the global conversation on digital governance and establish a proactive, not reactive, framework. This framework should be built on principles of algorithmic transparency, fairness, and accountability. Unlike China's centralized governance, which prioritizes state control, Pakistan's model must be sensitive to its pluralistic society and uphold individual rights. This could involve creating multi-stakeholder governance bodies with representatives from civil society, academia, and local communities to oversee platform policies and algorithmic design. This participatory approach would ensure that digital systems are not just technologically efficient but are also socially just and culturally respectful. By embedding governance with local norms and values, Pakistan can create a digital ecosystem that is not only secure and stable but also ethical and equitable.

### Discussion

The findings of this study highlight that building digital communication systems in Pakistan is not just a matter of installing technology it is a deeply cultural, political, and developmental endeavor. Technology alone cannot create inclusion or empowerment; it must be integrated thoughtfully with language, identity, and governance. Comparing Pakistan with China offers important lessons, but it also reinforces the need for strategies tailored to local realities.

One of the clearest insights is the central role of language. In Pakistan, the dominance of



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English in digital interfaces creates both symbolic and practical barriers, particularly for rural populations and less-educated users (Raza & Haider, 2022; Farooq et al., 2022). Imagine a small shop owner in a village in Sindh trying to use an online marketplace or a rural teacher attempting to deliver digital lessons in Urdu without proper support for local languages and scripts, their participation remains limited. China's platforms succeeded by embedding Mandarin and regional dialects into every layer of their systems, from content curation to recommendation algorithms. For Pakistan, investing in natural language processing tools for Urdu and other regional languages—covering speech recognition, morphological analysis, and culturally aligned content would transform language from a technical requirement into a cultural right, ensuring meaningful digital participation for all citizens.

Platform dependency emerges as another critical issue. China's success with WeChat, Douyin, and Taobao shows how indigenous platforms can foster both economic growth and cultural representation. Pakistan, however, remains heavily reliant on foreign platforms, where algorithms, content flows, and monetization models are determined externally (Khan, 2025). This dependency constrains Pakistan's digital sovereignty, leaving local narratives vulnerable and economic opportunities tied to global tech giants. Encouraging local-first platforms is therefore not just about national pride it is essential for ensuring that cultural stories, entrepreneurial potential, and economic benefits remain rooted in Pakistan. For example, a homegrown social media platform could showcase traditional crafts, host local festivals, or connect rural artisans directly with buyers, turning digital spaces into vehicles for both culture and livelihoods. The findings regarding CPEC narratives (Ahmad & Gul, 2025) demonstrate that when a country relies on external or regional information flows, its national development goals are often reframed through a lens of 'geopolitical threat.' This empirical evidence supports the need for Pakistan's Second Pillar (Indigenous Platforms), which would allow the state to foster an information environment that prioritizes local socio-economic benefits over external political framing. As evidenced by recent research on multicultural environments, the lack of localized communication platforms and multilingual resources creates significant barriers to cultural exchange and inclusion (Ahmad & Ahamed, 2024).

Governance adds another layer of complexity. China's centralized system ensures alignment of digital platforms with national objectives but raises questions about censorship and surveillance (Sun & Wang, 2024). Pakistan faces a different challenge: how to protect cultural values while maintaining democratic freedoms. Currently, the reactive approach of banning apps during political crises or applying ad-hoc restrictions undermines public trust and long-term development. What Pakistan needs is a culturally informed governance framework—one that promotes transparency, accountability, and fairness while safeguarding pluralism and privacy. Such a framework could empower communities, protect vulnerable groups from algorithmic bias, and create digital systems that are ethical, equitable, and socially responsive.

From a theoretical standpoint, this study contributes to debates on digital modernization in the Global South. Much scholarship frames modernization as a technical or economic issue, but this research emphasizes that it must also be culturally embedded (Mehra & Ali, 2024). Without cultural sensitivity, digital systems designed elsewhere risk excluding local populations, alienating communities, and undermining development outcomes. By bridging technology studies with communication and development scholarship, the study provides a framework to understand how digital systems can reflect local identity, foster inclusion, and support sustainable growth.

The practical implications are equally clear. Policymakers should focus on enabling



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environments where local innovators can build culturally relevant platforms, supported by investment in language AI and rural connectivity. Civil society actors can advocate for policies that account for gender, class, and linguistic diversity, ensuring no one is left behind. Researchers and educators are encouraged to explore the lived experiences of rural users, women, and marginalized communities, whose voices are often absent from conventional data sources.

In sum, Pakistan's digital future hinges not only on adopting advanced technologies but also on the values, narratives, and cultural practices embedded within them. Lessons from China offer useful reference points, yet Pakistan must carve its own path one that is participatory, pluralistic, and rooted in the lived realities of its people. By centering local languages, supporting indigenous platforms, and fostering inclusive governance, Pakistan can turn its digital systems into engines of empowerment, cultural preservation, and equitable development.

### **Conclusion and Limitations**

Pakistan stands at a critical juncture in its digital journey. The decisions made today will shape whether the country remains a passive consumer of global digital platforms largely dominated by foreign companies or whether it creates an alternative, culturally grounded model of digital communication. This study argues that pursuing the latter path is not only feasible but essential if Pakistan aims to build a system that is inclusive, resilient, and sustainable, reflecting both its cultural diversity and development priorities.

Comparative insights from China illustrate the transformative potential of a coordinated approach, where indigenous platforms, robust infrastructure, and supportive policies work in tandem to drive socioeconomic development. Yet, Pakistan's context is fundamentally different. Its pluralistic society, linguistic diversity, and heightened sensitivity to issues of privacy and governance mean that any model must be adapted thoughtfully. Lessons from China can inform strategy, but they cannot be transplanted wholesale; Pakistan must design a system that respects local norms, addresses societal inequalities, and engages citizens meaningfully.

Three interrelated areas emerge as central to this endeavor. First, language and cultural infrastructure: ensuring that digital platforms fully support Urdu and regional languages is not merely a technical requirement, but a question of social justice. Millions of Pakistanis, especially in rural areas, are excluded from meaningful digital participation when interfaces, applications, and online content remain dominated by English. Consider a rural woman in Sindh or a small entrepreneur in Baluchistan without interfaces in languages they understand, access to online education, e-commerce, or digital governance remains out of reach.

Second, local-first platforms and innovation ecosystems: Pakistan must cultivate homegrown digital spaces that reflect its own cultural narratives, economic priorities, and social needs. Indigenous platforms could showcase traditional crafts, promote local festivals, and connect rural producers directly with urban markets, turning digital technology into a vehicle for economic empowerment and cultural preservation. Supporting such innovation requires both policy incentives and investment, creating an environment where local entrepreneurs can thrive alongside global platforms.

Third, culturally informed governance: fair, transparent, and participatory regulatory frameworks are essential. Policies must ensure that algorithms, data practices, and platform operations are socially responsible and aligned with community values, rather than dictated solely by external corporate interests or reactive political decisions. Involving civil society,



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academia, and local stakeholders in governance processes would help ensure that digital systems are ethical, equitable, and inclusive, preventing algorithmic discrimination and protecting privacy.

At the same time, this study acknowledges its limitations. The findings rely primarily on secondary data, which constrains the representation of real-life experiences, particularly those of rural communities, women, and local entrepreneurs. Future research must move beyond theory to capture on-the-ground realities through interviews, participatory studies, and field surveys. Engaging directly with policymakers, technologists, and marginalized groups will provide the nuanced insights needed to refine and implement the proposed framework effectively.

Finally, the digital landscape is dynamic and constantly evolving. Technology, regulatory debates, and cultural practices are all in flux, requiring continuous monitoring, adaptive policy responses, and a readiness to learn from both successes and setbacks. Approached with foresight and sensitivity, Pakistan's digital modernization can become more than a technological upgrade it can be a transformative project of cultural preservation, social inclusion, and economic empowerment. By embedding local values into digital systems, Pakistan has the potential to emerge as a model for other developing nations, demonstrating how technology can bridge divides, promote equity, and enhance dignity across society.

### Recommendations for Future Research

While this study establishes a theoretical and comparative framework for a culturally-embedded digital path in Pakistan, future research should transition toward empirical, field-based investigations to capture the lived experiences of diverse user groups. Specifically, longitudinal studies and ethnographic fieldwork are needed to explore how rural populations, women, and marginalized communities navigate the "participation gap" in real-time. Future scholarship should also focus on the technical performance of emerging Urdu-based NLP models and their specific impact on local e-commerce adoption. Additionally, as the global conversation on AI ethics evolves, further research is required to examine how decentralized governance models can practically operate within Pakistan's pluralistic society to protect data sovereignty without compromising individual freedoms.

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