Social Inequality in the Era of the Digital Economy: A Development Sociology Perspective

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Abstract

The rapid expansion of the digital economy has transformed production systems, labor markets, consumption patterns, and public service delivery. While digitalization is frequently promoted as a driver of inclusion and economic growth, emerging evidence suggests that it also reproduces and restructures social inequality. This study aims to analyze how digital economy transformation generates new forms of stratification from a development sociology perspective and to assess its implications for sustainable and socially just development. The research employs a qualitative design based on a systematic literature review of peer-reviewed studies published between 2021 and 2025. Data were collected through document analysis and examined using thematic analysis and critical interpretative synthesis to identify structural mechanisms linking digital transformation and inequality. The findings indicate that digitalization initially intensifies income polarization due to pro-skill technological bias, regional innovation agglomeration, and concentrated platform ownership. The multidimensional digital divide covering access, capabilities, usage patterns, and governance emerges as a new layer of social stratification. However, under inclusive institutional frameworks, digital finance, entrepreneurship, and adaptive policies can mitigate inequality. The study concludes that achieving sustainable development in the digital era requires a shift from digital equality toward digital justice through redistributive governance and institutional strengthening
Keywords: Development sociology; Digital divide; Digital economy; Digital justice; Social inequality.

1. Introduction

The rapid expansion of the digital economy over the past two decades has fundamentally reshaped global economic structures, including those in developing countries. The proliferation of digital platforms, artificial intelligence, financial technology, and e-commerce has transformed the ways individuals work, conduct business, access public services, and participate in political processes. Normatively, digital transformation is frequently framed as an engine of inclusion, capable of lowering entry barriers, expanding access to information, and increasing efficiency in resource distribution. However, emerging evidence demonstrates that the benefits of digitalization are not automatically distributed evenly across social groups. Instead, digital transformation often reproduces and deepens pre-existing social inequalities through various forms of digital divide and what has been conceptualized as adverse digital incorporation (Oliinyk, 2025; Hackfort, 2021; Heeks, 2022).

This paradox constitutes the central research problem of the present study. While digitalization enhances productivity, innovation, and economic efficiency, its impact on

inequality is largely indirect and mediated by non-digital factors such as public policy, human capital, and institutional capacity (Rosário & Dias, 2022; Tian & Xiang, 2024). In the absence of strong redistributive mechanisms and inclusive governance, digital technologies tend to disproportionately benefit skilled workers and capital owners. Empirical findings indicate that individuals with higher levels of education and digital competencies capture the most significant economic gains, whereas low-skilled and low-wage workers face increasing marginalization (Oliinyk, 2025; Zheng & Walsham, 2021; Ragnedda et al., 2022). Consequently, traditional class structures are not dissolved in the digital era; rather, they are embedded within digital infrastructures, generating new forms of stratification based on access, skills, and control over technological resources.

In many contexts across the Global South, digital inclusion initiatives have produced ambivalent outcomes. Although connectivity has expanded, vulnerable populations frequently experience integration into digital markets under highly unequal conditions. The concept of adverse digital incorporation explains how marginalized groups may become digitally connected yet remain structurally disadvantaged, as economic value generated through their participation is disproportionately extracted by dominant actors such as global platforms and technology corporations (Hackfort, 2021; Heeks, 2022). Rather than empowering users, digital systems can reinforce asymmetrical power relations, intensify precarity, and create new dependencies within global value chains. This dynamic underscores the need to examine digital transformation not merely as a technological shift, but as a socio-economic process embedded within broader structures of power and development.

Contemporary scholarship conceptualizes the digital divide as a multidimensional phenomenon that extends beyond access to infrastructure. It encompasses disparities in device ownership and broadband availability, differences in digital skills and literacy, variations in patterns and quality of use, and ultimately unequal outcomes in terms of income, social mobility, health, and political participation (Lythreatis et al., 2021; Rosário & Dias, 2022; Baraka, 2024). Oliinyk (2025) emphasizes that these layers of inequality interact cumulatively, reinforcing structural disadvantages rather than operating independently. As a result, digital inequality should be understood as a complex system of stratification rather than a simple binary between connected and unconnected populations.

Empirical studies from diverse national contexts illustrate the structural determinants of digital inequality. Research in China and India demonstrates that urban–rural divides, income disparities, age differences, and migrant status significantly shape both access to digital technologies and the capacity to benefit from them (Qi & Ці, 2025; Laskar, 2023). These findings highlight the emergence of new social hierarchies based on digital competencies and infrastructural access. From a development sociology perspective, such hierarchies reflect enduring patterns of structural inequality rather than temporary transitional gaps. Digital transformation thus interacts with historical legacies of uneven development, reinforcing existing cleavages along geographic and socio-economic lines.

An intersectional lens further reveals how digital inequalities intersect with race, class, gender, disability, and legal status. Zheng and Walsham (2021) and Imran (2022) argue that individuals marginalized in offline contexts frequently experience compounded exclusion and exploitation in digital spaces. For instance, women, migrants, and informal workers with limited digital literacy are often concentrated in low-paid platform-based work characterized by algorithmic surveillance, limited social protection, and unstable income streams. These conditions demonstrate that the flexibility celebrated in platform economies may conceal new

forms of labor precarity and power asymmetry. Digital labor markets, therefore, represent not only economic innovation but also sites of contested social relations.

Infrastructure disparities remain a critical dimension of digital inequality. Limited broadband coverage in rural or low-income areas restricts opportunities for remote education, telework, digital entrepreneurship, and access to online public and health services (Sanders & Scanlon, 2021; Eruchalu et al., 2021; Baraka, 2024). The consequences extend beyond economic participation to fundamental aspects of citizenship and social rights. When digital access becomes a prerequisite for education, healthcare, and public administration, infrastructural gaps translate directly into broader social exclusion. This dynamic reinforces cumulative disadvantage and perpetuates cycles of poverty within digitally marginalized communities.

Regulatory and governance frameworks also shape the distribution of digital benefits and burdens. Weak data protection regimes, insufficient labor protections for platform workers, and limited oversight of algorithmic systems contribute to the concentration of economic and informational power within a small number of corporations (Hackfort, 2021; Heeks, 2022; Zheng & Walsham, 2021). From a development sociology standpoint, this concentration reflects asymmetrical power relations between global technology firms and local labor markets, as well as between capital and labor more broadly. Inequality in the digital era is therefore not solely about income distribution but also about control over data, algorithms, and digital infrastructures that mediate economic and social life.

The implications of digital inequality for sustainable development are substantial. Without explicit pro-equity policies, digital transformation tends to reproduce or intensify pre-existing inequalities (Oliinyk, 2025; Brenner & Hartl, 2021; Rosário & Dias, 2022). Digital divides undermine the three pillars of sustainability. Economically, limited digital access constrains labor market participation and entrepreneurial opportunities. Socially, it restricts civic engagement and access to essential services. Environmentally, unequal access to green and innovative technologies hampers the equitable transition toward sustainable development (Sá et al., 2021; Ragnedda et al., 2022; Baraka, 2024). In this sense, digital inequality poses systemic challenges to inclusive and just development trajectories.

At the same time, the literature recognizes that digitalization can support the achievement of the Sustainable Development Goals when embedded within inclusive institutional frameworks. Digital finance, green innovation, and technology-enabled public services have the potential to expand educational access, improve healthcare delivery, and promote more efficient resource use (Rosário & Dias, 2022; Tian & Xiang, 2024; Rafiq et al., 2025; Li et al., 2022). The direction of impact is therefore contingent upon governance arrangements, redistributive policies, and the capacity of institutions to ensure equitable benefit-sharing. Digital transformation is not inherently egalitarian or exclusionary; its outcomes depend on socio-political contexts and regulatory choices.

Despite the growing body of scholarship on digital inequality, several research gaps remain. First, many studies emphasize quantitative measurements of access gaps or skill differentials without sufficiently situating these findings within broader development sociology frameworks that interrogate power relations, institutional dynamics, and structural stratification. Second, analyses of adverse digital incorporation are often treated separately from sustainable development debates, resulting in fragmented understandings of how digital economies shape long-term development trajectories. Third, there remains limited integrative research that systematically connects multidimensional digital divides with structural

inequality and sustainable development outcomes, particularly from the perspective of developing societies.

This study addresses these gaps by integrating the multidimensional concept of the digital divide with a development sociology perspective to examine how digital transformation reproduces and restructures social inequality. Its novelty lies in shifting the analytical focus from digital equality, understood primarily as access provision, toward digital justice, which emphasizes power structures, value extraction, regulatory regimes, and the distribution of digital benefits (Oliinyk, 2025; Hackfort, 2021; Heeks, 2022; Imran, 2022). By combining structural analysis with sustainability considerations, the study offers a comprehensive framework for understanding digital inequality as a core challenge of contemporary development.

Accordingly, the objective of this research is to analyze how the transformation of the digital economy reproduces and reconfigures social inequality from a development sociology perspective, and to assess its implications for sustainable and socially just development. Through this approach, the study seeks to contribute both theoretically and policy-relevantly to the design of digital transformation strategies that are inclusive, equitable, and aligned with broader development goals.

2. Method, Data, and Analysis

This study employs a qualitative research design grounded in a development sociology approach to critically examine how the transformation of the digital economy reproduces and restructures social inequality. The research adopts a socio-structural analytical framework that integrates the multidimensional concept of the digital divide covering access, skills, usage patterns, outcomes, and regulatory dimensions with theories of power, institutional dynamics, and value extraction in digital capitalism. Data collection was conducted through a systematic literature review of peer-reviewed journal articles published between 2021 and 2025 that address digital inequality, adverse digital incorporation, platform labor, digital governance, and sustainable development. Academic databases were used to identify relevant sources using keywords such as "digital divide," "digital economy," "platform labor," "digital justice," and "development sociology." Inclusion criteria required that articles be indexed in reputable international journals and provide empirical or theoretical contributions related to structural inequality in the digital era. In addition to scholarly literature, selected policy reports and international development documents were examined to contextualize institutional and governance dimensions. Data were collected using document analysis techniques, with each source systematically coded according to thematic categories derived from the research objective.

Data analysis was conducted using qualitative thematic analysis combined with critical interpretative synthesis. First, the collected literature was organized into analytical dimensions corresponding to infrastructure access, digital literacy and capacity, patterns of use and socio-economic outcomes, and governance and regulatory structures. Second, cross-case comparisons were undertaken to identify recurring patterns of inequality reproduction across different national and regional contexts. Third, the analysis employed a development sociology lens to interpret how digital transformation interacts with existing class structures, institutional arrangements, and global power asymmetries. The process involved iterative coding, categorization, and abstraction to construct an integrative conceptual model linking digital transformation to structural inequality and sustainable development outcomes. To enhance analytical rigor, triangulation was applied by comparing empirical findings across multiple

studies and theoretical perspectives. Through this methodological design, the study aims to generate a comprehensive and critically grounded explanation of how digital economic transformation reshapes social stratification and development trajectories.
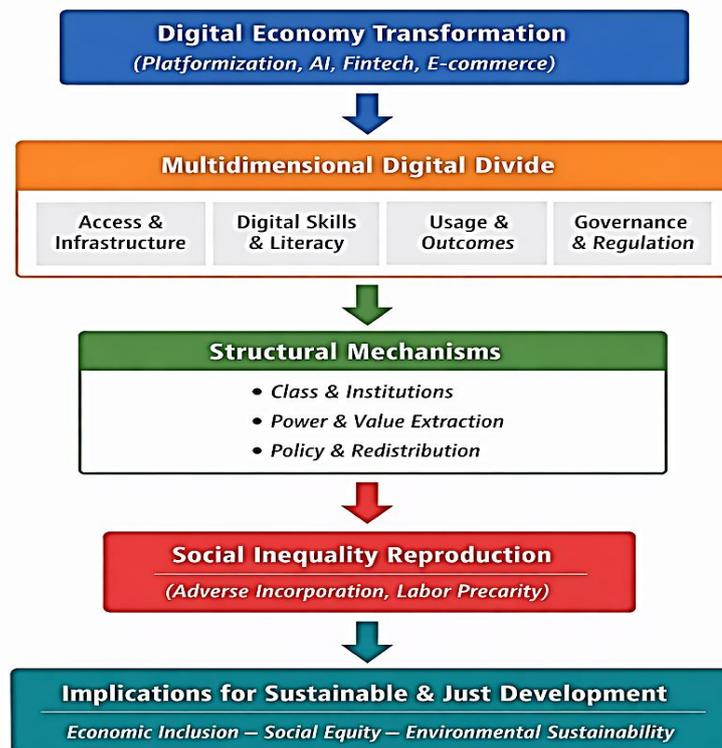

Figure 1. Diagram Conceptual Research

3. Results

Below is the synthesized findings derived from the thematic and critical interpretative analysis of the selected literature (2021–2025). The table summarizes how digital economy transformation interacts with the multidimensional digital divide, structural mechanisms, and inequality outcomes within a development sociology framework.

Table 1. Synthesis of Findings: Digital Economy Transformation and Social Inequality

Dimension of Analysis	Empirical Patterns Identified	Structural Mechanisms Involved	Inequality Outcomes	Key References
Access & Infrastructure	Unequal broadband distribution; limited device ownership in rural and low-income communities	Uneven regional development; weak public investment; market-driven infrastructure expansion	Restricted access to online education, remote work, e-health, and public services	Sanders & Scanlon (2021); Eruchalu et al. (2021); Baraka (2024)

Digital Skills & Literacy	Higher returns to advanced digital skills; low-skilled workers excluded from high-value digital sectors	Educational inequality; unequal human capital formation; institutional capacity gaps	Wage polarization; concentration of high-income jobs among educated groups	Oliinyk (2025); Lythreatis et al. (2021); Ragnedda et al. (2022)
Usage Patterns & Outcomes	Vulnerable groups concentrated in low-paid platform labor; algorithmic management and surveillance	Platform capitalism; asymmetrical value extraction; labor market deregulation	Labor precarity; adverse digital incorporation; limited upward mobility	Hackfort (2021); Heeks (2022); Zheng & Walsham (2021)
Governance & Regulation	Weak data protection and limited worker protection; dominance of global tech corporations	Regulatory gaps; power concentration; global–local asymmetries	Reinforcement of corporate control; digital power concentration; social exclusion	Hackfort (2021); Heeks (2022); Imran (2022)
Sustainable Development Implications	Digitalization supports SDGs only under inclusive governance; otherwise deepens inequality	Institutional quality; redistributive policy design; inclusive digital strategies	Divergent development trajectories: digital justice vs digital stratification	Rosário & Dias (2022); Tian & Xiang (2024); Rafiq et al. (2025)

The findings indicate that digital economy transformation does not operate as an inherently equalizing force; rather, its distributive effects are mediated by structural conditions embedded within broader development contexts. Across all dimensions, inequality emerges not merely from technological access gaps but from systemic interactions between infrastructure, human capital, regulatory regimes, and power relations. In particular, the evidence demonstrates that limited infrastructure and skills constrain participation in high-value digital sectors, while platform-based economic models tend to concentrate value and decision-making power in dominant corporate actors.

Furthermore, the analysis reveals that digital transformation can either support or undermine sustainable development goals depending on governance quality and redistributive mechanisms. Where institutional frameworks promote equitable access, fair labor protection, and inclusive digital policies, digitalization contributes to economic inclusion and social mobility. Conversely, where regulatory gaps persist, digital transformation reinforces class stratification, labor precarity, and value extraction. From a development sociology perspective, these findings confirm that digital inequality is structurally produced and politically mediated, requiring a shift from a narrow digital access agenda toward a broader digital justice framework.

4. Discussion

This study aims to analyze how the transformation of the digital economy reproduces and restructures social inequality from a development sociology perspective, as well as to assess its implications for sustainable and socially just development. Based on the methodological synthesis and the empirical patterns summarized in Table 1, the discussion demonstrates that digital transformation functions as a structurally mediated process whose distributive consequences depend on class configurations, territorial disparities, institutional quality, and governance arrangements.

First, the relationship between digital economy expansion and income inequality reveals a dynamic and non-linear pattern. Cross-country and cross-provincial studies indicate that at early stages of digital development, inequality tends to widen before potentially narrowing once digital maturity and institutional adaptation reach higher levels. This inverted U-shaped or U-shaped relationship suggests that digitalization initially benefits skilled workers and capital owners disproportionately, reinforcing income polarization (Li, 2025; Wu et al., 2024; Khyareh, 2025; Ruan et al., 2024). From a development sociology standpoint, this phenomenon reflects the structural bias of technology toward those who already possess economic, educational, and social capital. The pro-skill technological bias privileges highly educated labor and digitally literate entrepreneurs, while low-skilled workers face displacement or relegation to low-value segments of the digital economy (Oliinyk, 2025; Tian & Xiang, 2024).

The widening phase of inequality is driven by several structural mechanisms. Technological agglomeration in advanced urban regions concentrates innovation ecosystems, venture capital, and high-paying digital employment opportunities within already prosperous territories (Li, 2025; Wu et al., 2024). This spatial concentration intensifies regional disparities, as rural or peripheral areas struggle to compete in digital infrastructure and human capital formation. In addition, ownership of digital platforms and data infrastructures remains highly concentrated, leading to disproportionate accumulation of wealth among a limited number of corporate actors (Oliinyk, 2025). These patterns illustrate that digital transformation is embedded within broader capitalist dynamics, reinforcing class-based stratification rather than dissolving it.

However, the literature also identifies mechanisms through which digitalization may reduce inequality under specific institutional conditions. Inclusive digital finance, low-entry-cost digital entrepreneurship, and structural upgrading of industries can create new opportunities for marginalized groups if accompanied by supportive policies (Li, 2025; Khyareh, 2025; Xu, 2023). Tian and Xiang (2024) emphasize that when digital transformation is integrated with industrial restructuring and innovation policies, it can generate employment diversification and productivity gains across broader social strata. From a development sociology perspective, this suggests that the inequality-reducing potential of digitalization depends on redistributive governance, public investment, and institutional capacity rather than on technological diffusion alone.

Second, the digital divide constitutes a new layer of social stratification. Contemporary research conceptualizes digital inequality as multidimensional, encompassing access to infrastructure, digital literacy and capabilities, patterns of use, and differential socio-economic outcomes (Trofymenko et al., 2023; Oliinyk, 2025; Qi & Цi, 2025; Rydzewski, 2025; Laskar, 2023). The findings presented in this study confirm that disparities in broadband infrastructure and device ownership continue to reflect regional and class-based inequalities. Yorman (2025) and Trofymenko et al. (2023) show that unequal digital infrastructure development reinforces

territorial stratification, particularly between metropolitan centers and peripheral regions. In China and India, urban–rural divides significantly determine access to digital education, employment platforms, and public services, thereby entrenching social hierarchies (Qi & Цi, 2025; Laskar, 2023).

Digital capability represents a second critical dimension of stratification. Higher returns to advanced digital skills concentrate high-income digital occupations among well-educated groups, leaving less-educated populations confined to low-value activities (Oliinyk, 2025; Zhao & Wang, 2023). Rydzewski (2025) demonstrates that digital competence increasingly functions as a form of social capital, shaping life chances in labor markets and civic participation. This stratification process echoes classical sociological theories of human capital reproduction but in a technologically intensified form. Educational inequality thus translates directly into digital inequality, creating cumulative disadvantages that span generations. Sá et al. (2021) further note that disparities in digital skills limit participation in green innovation and sustainable economic activities, reinforcing environmental as well as economic divides.

Patterns and outcomes of digital use further illustrate how inequality is reproduced. While digital technologies can support Sustainable Development Goals in education, health, and environmental management, unequal access and usage limit these benefits for marginalized communities (Trofymenko et al., 2023; Rydzewski, 2025; Rafiq et al., 2025). Wang and Shen (2024) argue that digital public services tend to benefit middle- and upper-class populations who possess higher digital literacy, thereby inadvertently excluding those with limited competencies. This dynamic transforms digital participation into a gatekeeping mechanism for social mobility. Rather than functioning as universal equalizers, digital systems can institutionalize new barriers aligned with pre-existing socio-economic hierarchies.

At the global level, disparities in digital development indexes reveal profound inter-regional inequalities. Trofymenko et al. (2023) document significant gaps between high-income regions and low-income countries, particularly in Africa, where infrastructural deficits and institutional fragility constrain digital transformation. Oliinyk (2025) conceptualizes this phenomenon as adverse digital incorporation, wherein low-income countries become integrated into global digital value chains primarily as consumers or providers of low-value labor, while high-value segments remain concentrated in advanced economies. This global asymmetry underscores that digital inequality is not merely a national issue but a structural feature of the global political economy.

The temporal evolution of research from 2021 to 2025 reflects increasing recognition of digital inequality as a central development challenge. Early contributions emphasized infrastructure and platform governance (Hackfort, 2021; Sá et al., 2021), followed by expanded analyses of digital stratification and sustainable development linkages (Trofymenko et al., 2023; Laskar, 2023; Zhao & Wang, 2023). By 2024 and 2025, scholarship increasingly integrated digital economy dynamics with institutional quality and income distribution models (Wu et al., 2024; Tian & Xiang, 2024; Li, 2025; Rydzewski, 2025; Khyareh, 2025). This progression demonstrates a shift from access-oriented perspectives toward structural and justice-oriented frameworks.

Third, the implications of digital inequality for sustainable development and social justice are profound. Digital disparities undermine economic inclusion by restricting access to employment and markets, particularly for rural populations and low-skilled workers (Trofymenko et al., 2023; Rydzewski, 2025). Social inclusion is similarly affected, as limited digital access constrains civic engagement and access to rights-based services. Environmental sustainability is also implicated, since unequal access to green technologies and digital

innovations hinders equitable ecological transitions (Rafiq et al., 2025). These interconnected effects illustrate that digital inequality operates across all three pillars of sustainability.

Nonetheless, the literature suggests that digital transformation can enhance social sustainability when embedded within adaptive social policies. Yorman (2025) emphasizes the importance of equitable infrastructure distribution and affordable access. Rydzewski (2025) highlights digital literacy programs as mechanisms to democratize participation in high-value digital sectors. Rafiq et al. (2025) demonstrate that inclusive digital finance and gender empowerment policies can significantly reduce inequality while promoting sustainable development outcomes. These findings reinforce the argument that institutional quality and redistributive governance are decisive in shaping digital trajectories.

From a development sociology perspective, these results confirm that digital economy transformation is neither inherently emancipatory nor inherently exclusionary. Its impact depends on the interaction between technological systems and social structures. Class relations shape who controls data and capital; regional disparities determine infrastructural access; gender and age influence digital competencies; and institutional frameworks regulate value extraction and redistribution. Thus, digital inequality is structurally produced and politically mediated.

By integrating the multidimensional digital divide with development sociology theory, this study advances a digital justice framework. Rather than focusing solely on digital equality understood as access provision, digital justice emphasizes power redistribution, fair labor protection, equitable value allocation, and institutional accountability. The evidence indicates that without structural interventions, digital transformation risks reinforcing class stratification, territorial marginalization, and global asymmetries. Conversely, when accompanied by inclusive governance and adaptive policies, it can contribute to reducing inequality and enhancing social sustainability.

In conclusion, the findings answer the research objective by demonstrating that digital economy transformation reproduces and restructures social inequality through interconnected mechanisms of income polarization, infrastructural disparity, capability stratification, and regulatory asymmetry. These mechanisms operate within broader socio-economic structures and shape development trajectories. Addressing digital inequality therefore requires a shift from technology-centered strategies to structurally informed, justice-oriented development policies capable of ensuring that digital transformation advances inclusive and sustainable social progress.

5. Conclusion, Limitations, and Suggestions

Conclusion

This study concludes that the transformation of the digital economy reproduces and restructures social inequality through structurally mediated mechanisms embedded in class relations, territorial disparities, institutional quality, and governance arrangements. From a development sociology perspective, digitalization does not function as an inherently equalizing force; rather, it initially intensifies income polarization through pro-skill technological bias, regional innovation agglomeration, and concentrated platform ownership, while its inequality-reducing potential depends on inclusive digital finance, industrial upgrading, and adaptive public policies. The multidimensional digital divide encompassing infrastructure access, digital capabilities, patterns of use, and differential outcomes operates as a new layer of stratification that shapes access to employment, public services, and sustainable development opportunities. Furthermore, global asymmetries in digital development risk producing adverse digital

incorporation, particularly for low-income regions integrated into unequal digital value chains. Therefore, achieving sustainable and socially just development in the digital era requires a shift from access-oriented digital equality toward structurally grounded digital justice, emphasizing redistributive governance, institutional strengthening, labor protection, and equitable control over digital resources.

Limitation and suggestions

This study is limited by its reliance on secondary data and systematic literature synthesis, which, while allowing for broad theoretical integration across contexts, does not provide primary empirical evidence from specific local or national cases. The analysis is therefore constrained by the scope, methodologies, and regional focus of the reviewed studies, which may underrepresent certain developing regions or marginalized communities. Additionally, the rapidly evolving nature of digital technologies means that empirical patterns may shift faster than existing research can capture. Future research should incorporate mixed-method or field-based empirical approaches to examine how digital inequality operates within specific socio-institutional settings, particularly in low- and middle-income countries. Comparative cross-regional studies and longitudinal analyses are also recommended to better understand the non-linear relationship between digital development and inequality. Finally, further research should explore policy experimentation and institutional innovations aimed at advancing digital justice, especially in relation to platform labor regulation, data governance, and inclusive digital capacity-building strategies.

6.   Acknowledgment

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