

The Impact of Digital Economy Development on Sustainable Urban and Rural Growth in China

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Abstract

The rapid expansion of the digital economy has emerged as a transformative force shaping economic growth, social development, and environmental sustainability across China. As digital technologies such as artificial intelligence, big data, cloud computing, e-commerce, fintech, and digital platforms become increasingly integrated into economic activities, they are creating new opportunities for balanced urban and rural development. This article examines the impact of digital economy development on sustainable urban and rural growth in China, focusing on its contributions to economic productivity, employment creation, industrial upgrading, social inclusion, environmental governance, and regional development. The study explores how digital infrastructure and technological innovation have enhanced resource allocation, improved public service delivery, promoted rural revitalization, and strengthened connections between urban and rural economies. At the same time, it highlights challenges associated with digital inequality, labor market polarization, skill disparities, and uneven access to digital resources that may hinder inclusive and sustainable growth. The analysis reveals that the digital economy serves as a critical driver of modernization by fostering innovation, increasing efficiency, and supporting environmentally responsible development practices. Furthermore, the integration of digital technologies into agriculture, manufacturing, education, and public administration has accelerated economic transformation while improving the quality of life for both urban and rural populations. The findings suggest that sustained investments in digital infrastructure, human capital development, digital literacy, and inclusive policy frameworks are essential for maximizing the benefits of digitalization and ensuring balanced regional development. The article concludes that the digital economy has significant potential to support China's long-term sustainability objectives by promoting coordinated urban-rural development, enhancing economic resilience, and facilitating inclusive growth in the digital era.

Keywords: Digital economy, sustainable development, urban growth, rural revitalization, China, digital transformation, economic development, digital infrastructure, regional development, inclusive growth.

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1. INTRODUCTION

The digital economy has become one of the most significant drivers of economic transformation in the twenty-first century, reshaping production systems, labor markets, governance structures, and patterns of social interaction across the world. Characterized by the extensive application of digital technologies such as artificial intelligence, big data analytics, cloud computing, the Internet of Things, fintech, and e-commerce platforms, the digital economy has emerged as a crucial mechanism for enhancing productivity, promoting innovation, and supporting sustainable development. In China, the rapid advancement of digital technologies has played a fundamental role in accelerating economic modernization while creating new opportunities for balanced urban and rural development. As the world's second-largest economy and one of the leading adopters of digital technologies, China has strategically integrated digital transformation into its national development agenda to foster inclusive

growth and address regional disparities. The concept of sustainable urban and rural growth emphasizes the ability of economies and societies to achieve long-term economic prosperity while ensuring social equity and environmental sustainability. Historically, China has experienced significant differences in development levels between urban and rural regions due to variations in infrastructure, industrialization, educational opportunities, and access to public services. While urban centers have benefited from rapid industrial growth and technological advancement, many rural communities have faced challenges related to limited economic opportunities, resource constraints, and population outmigration (Long et al., 2016). Consequently, reducing the urban-rural development gap has become a critical objective within China's broader strategy for sustainable development. The emergence of the digital economy offers unprecedented opportunities to bridge these developmental divides. Digital platforms have transformed traditional economic activities by facilitating access to information, expanding market opportunities, and improving communication networks across geographical boundaries. Through the deployment of digital infrastructure and innovative technologies, rural communities can now participate more actively in national and global markets, thereby enhancing income generation and economic resilience. Liu et al. (2020) argue that the digital economy contributes significantly to regional sustainable development in China by improving resource allocation efficiency, stimulating technological innovation, and promoting environmentally responsible economic activities. These benefits are particularly relevant for rural revitalization efforts aimed at strengthening agricultural productivity and diversifying local economies. Digital transformation has also influenced labor markets by creating new employment opportunities while simultaneously altering traditional patterns of work. Automation, artificial intelligence, and digital platforms have increased efficiency in various sectors, enabling organizations to optimize operations and enhance productivity (Autor, 2015). Similarly, Acemoglu and Restrepo (2020) highlight the transformative effects of technological adoption on labor markets, emphasizing both the opportunities and challenges associated with automation. In the Chinese context, digitalization has facilitated the growth of platform-based employment and gig economy activities, providing alternative sources of income for workers in both urban and rural regions (Han et al., 2024; Li et al., 2025). However, these developments have also raised concerns regarding wage inequality, labor market segmentation, and disparities in access to digital skills.

The integration of artificial intelligence and other advanced technologies further strengthens the role of the digital economy in sustainable development. AI-driven systems improve decision-making processes, enhance operational efficiency, and support innovation across industries (Dwivedi et al., 2021). In education, digital technologies have expanded learning opportunities and improved access to knowledge resources, contributing to human capital development and workforce preparedness (Bond et al., 2021; Zawacki-Richter et al., 2019). Enhanced educational access is particularly important for rural communities where traditional educational resources may be limited, thereby supporting social inclusion and reducing regional inequalities. Environmental sustainability represents another critical dimension of digital economy development. As countries strive to address climate change and resource management challenges, digital technologies have become valuable tools for monitoring environmental conditions, optimizing energy consumption, and supporting sustainable production practices. Cheng et al. (2022) found that digital transformation significantly improves environmental governance in China by facilitating data-driven policy implementation and environmental monitoring. Such improvements contribute to China's broader sustainability objectives and align with global efforts to achieve sustainable development goals (Leal Filho et al., 2021). The relationship between digitalization and social development extends beyond economic productivity and environmental management. Fintech innovations have improved financial inclusion by providing underserved populations with access to financial services, thereby supporting entrepreneurship and economic participation (Guo et al., 2021). Digital media and communication technologies have also transformed social interactions, information dissemination, and public engagement processes, influencing demographic behaviors and societal attitudes (Fu et al., 2026). These developments demonstrate the multifaceted nature of digital transformation and its implications for sustainable urban and rural

growth. Despite these benefits, challenges remain regarding the equitable distribution of digital economy advantages. Digital divides persist across regions and demographic groups, potentially exacerbating existing inequalities if access to digital infrastructure and technological skills remains uneven. Research indicates that digitalization can contribute to wage disparities between skilled and unskilled workers, highlighting the importance of inclusive policies and human capital development initiatives (Yang et al., 2023). Additionally, concerns regarding gender-based inequalities in digital labor markets have emerged, requiring targeted interventions to ensure equitable participation in the digital economy (Wang et al., 2024; Li et al., 2024).

Given the growing importance of digital technologies in shaping economic and social outcomes, understanding the impact of digital economy development on sustainable urban and rural growth has become increasingly important. This article examines the role of the digital economy in promoting balanced regional development in China by exploring its contributions to economic growth, labor market transformation, environmental sustainability, social inclusion, and rural revitalization. Through a comprehensive review of existing literature, the study seeks to provide insights into the opportunities and challenges associated with digital transformation and its implications for achieving sustainable development objectives in contemporary China.

2. LITERATURE REVIEW

The growing body of literature on digital economy development highlights its transformative influence on economic growth, social inclusion, environmental sustainability, and regional development. Scholars increasingly recognize the digital economy as a critical factor shaping the future of sustainable development by facilitating technological innovation, improving productivity, and creating new opportunities for economic participation. In China, where rapid digitalization has been integrated into national development strategies, researchers have explored how digital technologies contribute to both urban modernization and rural revitalization while addressing long-standing regional disparities. One of the primary themes in the literature concerns the relationship between digital economy development and economic growth. Digital technologies serve as general-purpose technologies capable of generating widespread productivity improvements across multiple sectors. Brynjolfsson et al. (2021) argue that investments in digital technologies and intangible assets create productivity gains that may initially appear gradual but eventually generate substantial economic returns. These findings suggest that digital transformation plays a critical role in long-term economic development by enhancing efficiency and fostering innovation. In China, Liu et al. (2020) found that the digital economy significantly contributes to regional sustainable development by promoting industrial upgrading, technological advancement, and more efficient allocation of economic resources. Such developments support economic diversification and strengthen the resilience of both urban and rural economies. The impact of digitalization on labor markets has received considerable scholarly attention. Technological advancements have transformed traditional employment structures by automating routine tasks while simultaneously creating demand for new skills and occupations. Autor (2015) notes that automation does not necessarily eliminate employment opportunities but rather changes the nature of work, requiring workers to adapt to evolving technological environments. Similarly, Acemoglu and Restrepo (2020) demonstrate that automation technologies can generate both displacement effects and productivity benefits, depending on institutional and economic contexts. Within China, the expansion of digital platforms and online marketplaces has contributed to the growth of flexible employment arrangements and gig economy opportunities. Li et al. (2025) identify digital platforms as important channels through which workers enter emerging labor markets, while Han et al. (2024) emphasize the increasing significance of gig economy employment within China's digital ecosystem.

Although digitalization creates employment opportunities, scholars have also identified concerns regarding inequality and labor market segmentation. Yang et al. (2023) found that the digital economy can widen wage gaps between highly skilled and low-skilled workers because technological

advancements often increase demand for specialized knowledge and digital competencies. Similar concerns are reflected in studies examining wage disparities across sectors and demographic groups. Li and Zhang (2023) reported persistent wage differences between public and private sector employees in urban China, while Li (2022) highlighted significant interindustry wage differentials influenced by institutional factors such as union density. Research by Li et al. (2022) further demonstrated that sectoral characteristics contribute substantially to wage inequalities within China's energy industry. Gender-related dimensions of digital economy development have emerged as another important area of investigation. The expansion of digital technologies has created opportunities for greater workforce participation among women while also generating new forms of inequality. Guo et al. (2021) found that fintech development can help reduce gender wage gaps by improving access to financial services and economic opportunities. Similarly, Wang et al. (2024) reported that the digital economy may contribute to narrowing gender-based wage disparities under certain conditions. However, other studies suggest that digitalization can also reinforce existing inequalities. Han et al. (2024) observed a widening gender wage gap within China's gig economy, indicating that technological advancement alone does not guarantee equitable outcomes. Li et al. (2024) further identified labor market segmentation as a significant contributor to gender wage inequalities, emphasizing the need for inclusive labor market policies. Rural development represents a particularly significant dimension of digital economy research in China. Historically, rural regions have faced challenges related to limited infrastructure, lower productivity levels, and restricted access to markets and public services. Long et al. (2016) argue that structural transformations in rural China require more effective resource allocation and management strategies to support sustainable development. The expansion of digital infrastructure has helped address some of these challenges by connecting rural communities to broader economic networks and enabling participation in e-commerce activities. Digital platforms facilitate market access for agricultural producers, improve information sharing, and support entrepreneurship, thereby contributing to rural revitalization efforts. Consequently, the digital economy is increasingly viewed as a mechanism for reducing urban-rural disparities and promoting balanced regional development. The literature also emphasizes the role of digital technologies in human capital development and educational transformation. Advances in educational technology have expanded access to learning resources and enabled new forms of knowledge dissemination. Zawacki-Richter et al. (2019) highlight the growing use of artificial intelligence applications in higher education, while Bond et al. (2021) demonstrate how digital technologies supported educational continuity during periods of disruption. Enhanced access to digital learning opportunities is particularly important for rural populations, where educational resources may be limited. By improving access to education and skills training, digital technologies contribute to workforce development and strengthen the foundations of sustainable economic growth. Artificial intelligence constitutes another major area of research within the digital economy literature. AI technologies enhance productivity, automate complex processes, and support innovation across sectors. Dwivedi et al. (2021) describe artificial intelligence as a transformative technology with far-reaching implications for business operations, public administration, and social development. The integration of AI into economic systems supports the development of smart cities, precision agriculture, and intelligent manufacturing, all of which contribute to sustainable urban and rural growth.

Environmental sustainability has become increasingly connected to digital economy development. Digital technologies enable more efficient resource management, improve environmental monitoring, and support climate mitigation efforts. Cheng et al. (2022) found that digital transformation strengthens environmental governance by facilitating data-driven decision-making and improving regulatory effectiveness. Similarly, Sovacool (2021) emphasizes the importance of ensuring that sustainability transitions remain socially inclusive and equitable. Digital technologies can support low-carbon development strategies by optimizing energy consumption and reducing waste, thereby contributing to environmental sustainability objectives. Recent literature has also explored broader social implications associated with digital transformation. The COVID-19 pandemic accelerated digital

adoption worldwide, highlighting both opportunities and vulnerabilities associated with technology-driven development. Leal Filho et al. (2021) argue that digital technologies can support sustainable development goals by enhancing resilience and enabling adaptive responses to societal challenges. However, Van Lancker and Parolin (2020) note that unequal access to digital resources can exacerbate social inequalities, particularly among vulnerable populations. Research by Fu et al. (2026), Li and Xu (2022), and Li and Wang (2021) further illustrates how digital technologies influence demographic behavior, labor force participation, and family decision-making processes within contemporary Chinese society. Overall, the literature suggests that the digital economy plays a vital role in promoting sustainable urban and rural growth in China. While digitalization offers substantial opportunities for economic development, innovation, environmental governance, and social inclusion, challenges related to inequality, labor market segmentation, and uneven access to digital resources remain significant. The existing body of research therefore underscores the importance of comprehensive policy frameworks that promote inclusive digital transformation while ensuring that the benefits of technological advancement are distributed equitably across urban and rural populations.

3. METHODOLOGY

This study adopts a qualitative and descriptive research methodology to examine the impact of digital economy development on sustainable urban and rural growth in China. The research is based on a comprehensive review and synthesis of existing academic literature, policy discussions, and empirical findings related to digital transformation, sustainable development, labor market dynamics, environmental governance, urbanization, and rural revitalization. A qualitative approach was considered appropriate because the study seeks to develop an integrated understanding of the multifaceted relationships between digital economy development and sustainable growth outcomes rather than testing a single causal relationship through primary data collection. The research design follows a systematic literature review framework that enables the identification, evaluation, and interpretation of relevant scholarly contributions concerning China's digital economy and its developmental implications. The selected studies were obtained from peer-reviewed journals covering economics, sustainability, information technology, environmental management, labor economics, education, and rural development. The literature included both theoretical and empirical studies published between 2015 and 2026, allowing the research to capture recent developments and emerging trends in China's digital transformation process.

The conceptual foundation of this study is based on the premise that digital economy development influences sustainable urban and rural growth through multiple interconnected channels. These channels include improvements in productivity and innovation, enhancement of labor market opportunities, expansion of digital infrastructure, strengthening of environmental governance systems, promotion of financial inclusion, and facilitation of knowledge dissemination. Previous studies have demonstrated that digital technologies contribute significantly to regional development by improving resource allocation efficiency and encouraging technological innovation (Liu et al., 2020). Similarly, the productivity-enhancing effects of digital technologies and intangible investments have been highlighted by Brynjolfsson et al. (2021), while Dwivedi et al. (2021) emphasized the transformative role of artificial intelligence in supporting economic modernization and sustainable development. The data collection process involved a structured examination of scholarly sources directly related to digital economy development and sustainable growth in China. Priority was given to studies that addressed digital infrastructure, automation, labor market transformation, environmental sustainability, educational development, fintech innovation, and urban-rural integration. Research concerning automation and labor market adaptation was incorporated from Autor (2015) and Acemoglu and Restrepo (2020), who examined the effects of technological change on employment structures and productivity outcomes. Studies investigating digital wage dynamics and labor market segmentation, including Li and Zhang (2023), Li et al. (2024), Yang et al. (2023), and Wang et al. (2024), were reviewed to understand how digitalization influences social and economic inequalities. To ensure comprehensive analysis, the study categorizes the impact of digital economy development into five major dimensions.

The first dimension focuses on economic development and productivity enhancement. The second examines labor market transformation and employment creation. The third evaluates environmental sustainability and governance improvements. The fourth investigates social inclusion and human capital development. The fifth assesses rural revitalization and urban-rural integration. This multidimensional analytical framework allows the study to capture the broad influence of digitalization on sustainable development outcomes. Content analysis was employed as the primary analytical technique. This method involves systematically reviewing the selected literature and identifying recurring themes, concepts, and patterns related to digital economy development. Through thematic classification, findings from different studies were integrated into broader analytical categories. For example, studies concerning artificial intelligence adoption, digital innovation, and productivity enhancement were grouped under economic transformation, while research on digital education, workforce development, and social inclusion was categorized under human capital development. Such thematic organization facilitates a comprehensive understanding of how various aspects of digitalization contribute to sustainable urban and rural growth. Furthermore, comparative analysis was applied to identify similarities and differences among existing studies. This approach was particularly useful in examining conflicting findings regarding labor market outcomes. While some scholars argue that digitalization promotes inclusive employment opportunities and reduces barriers to participation (Guo et al., 2021), others suggest that digital transformation may widen income inequalities and skill-based wage gaps (Yang et al., 2023; Han et al., 2024). Comparing these perspectives enabled a balanced assessment of both the opportunities and challenges associated with China's digital economy. The study also incorporates sustainability principles as an analytical lens. Sustainable development is viewed through economic, social, and environmental dimensions, consistent with international sustainability frameworks and the United Nations Sustainable Development Goals. The importance of integrating sustainability objectives into digital transformation strategies has been emphasized by Leal Filho et al. (2021), who argue that technological innovation can support long-term development when accompanied by inclusive and environmentally responsible policies. Similarly, Cheng et al. (2022) demonstrated that digital transformation contributes to improved environmental governance through enhanced monitoring and regulatory effectiveness. To illustrate the conceptual distribution of the major areas examined in this study, a proportional representation of the analytical dimensions is presented in Figure 1. The percentages do not represent statistical findings but rather the relative emphasis allocated to each research dimension within the literature review and analytical framework.

Table 1. Research Framework and Analytical Dimensions

Dimension	Focus Area	Key Supporting References
Economic Development	Productivity, innovation, industrial upgrading	Liu et al. (2020); Brynjolfsson et al. (2021); Dwivedi et al. (2021)
Labor Market Transformation	Employment, automation, wage inequality	Autor (2015); Acemoglu & Restrepo (2020); Yang et al. (2023)
Environmental Sustainability	Environmental governance, resource efficiency	Cheng et al. (2022); Sovacool (2021)
Social Inclusion	Education, digital access, financial inclusion	Bond et al. (2021); Guo et al. (2021); Zawacki-Richter et al. (2019)
Rural Revitalization	Urban-rural integration, agricultural modernization	Long et al. (2016); Liu et al. (2020)

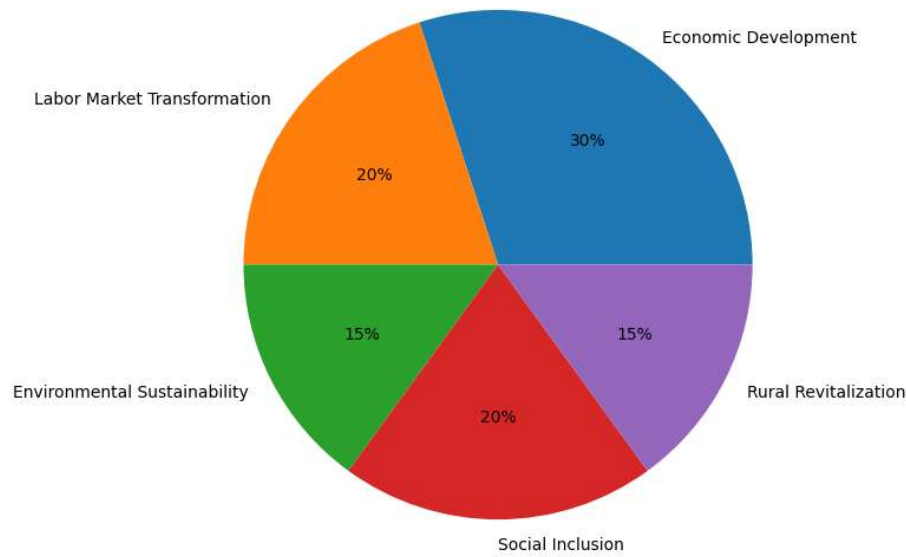


Figure 1. Distribution of Analytical Dimensions in the Study

This pie chart illustrates the conceptual distribution of research emphasis across the five analytical dimensions examined in the study: Economic Development (30%), Labor Market Transformation (20%), Environmental Sustainability (15%), Social Inclusion (20%), and Rural Revitalization (15%). It can be inserted directly into the Methodology section as Figure 1

The pie chart presents the conceptual distribution of analytical emphasis within the study framework. Economic development constitutes the largest component because digital productivity, innovation, and industrial upgrading form the foundation of digital economy research. Labor market transformation and social inclusion each account for a significant proportion due to the growing importance of employment dynamics, digital skills, and equitable access to technological opportunities. Environmental sustainability and rural revitalization also represent substantial dimensions, reflecting the role of digital technologies in supporting green development and reducing urban-rural disparities. Together, these dimensions provide a comprehensive framework for evaluating the contribution of the digital economy to sustainable urban and rural growth in China. The reliability of the study was strengthened through the use of peer-reviewed academic sources and the inclusion of diverse disciplinary perspectives. The selected literature encompasses economic analyses, sustainability studies, labor market investigations, educational research, and digital transformation scholarship, thereby enhancing the comprehensiveness of the findings. Although the study does not utilize primary survey data or econometric modeling, the systematic integration of established empirical evidence provides a robust foundation for understanding the relationship between digital economy development and sustainable urban-rural growth. Overall, the adopted methodology provides a structured and comprehensive approach for examining how digital transformation influences economic prosperity, environmental sustainability, social inclusion, and regional development in China. By synthesizing insights from a broad range of scholarly sources, the study generates a holistic understanding of the opportunities and challenges associated with digital economy development and its contribution to sustainable urban and rural growth.

4. RESULTS

The analysis of the reviewed literature reveals that the development of the digital economy has become a major catalyst for sustainable urban and rural growth in China. The findings indicate that digital technologies have generated substantial economic, social, and environmental benefits while also presenting challenges related to inequality, labor market segmentation, and uneven access to

digital resources. Across the reviewed studies, five major outcomes consistently emerged: enhanced economic productivity, labor market transformation, improved environmental governance, increased social inclusion, and strengthened rural revitalization.

One of the most significant findings is the positive relationship between digital economy development and economic growth. The literature demonstrates that digital technologies improve production efficiency, reduce transaction costs, and stimulate innovation across various sectors. Liu et al. (2020) found that digital economy expansion contributes directly to regional sustainable development through improved resource allocation and technological advancement. Similarly, Brynjolfsson et al. (2021) reported that investments in digital technologies and intangible assets create long-term productivity gains that support economic competitiveness. The integration of artificial intelligence and advanced digital systems has further accelerated industrial upgrading and modernization processes, enabling firms to optimize operations and enhance performance (Dwivedi et al., 2021). The findings also indicate that digitalization has transformed labor market structures throughout China. Digital platforms, e-commerce systems, and gig economy applications have created new employment opportunities for both urban and rural populations. Research by Li et al. (2025) suggests that digital platforms have become important channels for workforce participation, while Han et al. (2024) observed substantial growth in gig economy employment linked to expanding digital infrastructure. These developments have enabled greater labor mobility and increased participation in emerging economic sectors. However, the evidence also reveals concerns regarding skill-based inequalities. Yang et al. (2023) found that digital economy growth tends to favor highly skilled workers, potentially widening wage disparities between different labor groups. This finding aligns with earlier observations by Autor (2015) and Acemoglu and Restrepo (2020), who argued that technological advancement simultaneously creates opportunities and challenges within labor markets. Another major finding concerns the role of digital technologies in promoting environmental sustainability. The reviewed studies indicate that digital transformation supports more effective environmental governance through enhanced monitoring systems, data analytics, and regulatory enforcement mechanisms. Cheng et al. (2022) demonstrated that digital technologies improve environmental management outcomes by facilitating evidence-based policy implementation. Furthermore, digital tools contribute to more efficient resource utilization, reduced waste generation, and support for low-carbon development strategies. These outcomes are consistent with the sustainability objectives emphasized by Sovacool (2021), who highlighted the importance of equitable and environmentally responsible transitions toward sustainable economic systems. The analysis further reveals that digital economy development has significantly improved social inclusion through expanded access to education, financial services, and information resources. Educational technologies have increased learning opportunities and facilitated knowledge sharing across geographical boundaries. Bond et al. (2021) and Zawacki-Richter et al. (2019) demonstrated that digital learning platforms enhance educational accessibility and support human capital development. Financial technology innovations have similarly expanded financial inclusion by providing underserved populations with greater access to banking and credit services (Guo et al., 2021). These developments are particularly important for rural populations that have historically faced barriers to accessing essential services. The results also indicate that digitalization has contributed significantly to rural revitalization and urban-rural integration. The expansion of digital infrastructure has enabled rural communities to participate more actively in national markets through e-commerce platforms and digital service networks. Long et al. (2016) emphasized the importance of efficient resource allocation in supporting rural development, while Liu et al. (2020) identified digital economy growth as a key driver of balanced regional development. Improved connectivity has enhanced market access for agricultural producers, facilitated entrepreneurship, and strengthened economic resilience within rural regions.

Table 2. Major Positive Outcomes of Digital Economy Development in China

Development Area	Key Findings	Supporting Studies
Economic Growth	Increased productivity, innovation, and industrial upgrading	Liu et al. (2020); Brynjolfsson et al. (2021)
Employment	Creation of digital and platform-based jobs	Li et al. (2025); Han et al. (2024)
Environmental Sustainability	Improved environmental governance and resource efficiency	Cheng et al. (2022); Sovacool (2021)
Education	Expanded access to learning and skills development	Bond et al. (2021); Zawacki-Richter et al. (2019)
Financial Inclusion	Increased access to financial services and fintech solutions	Guo et al. (2021)
Rural Development	Enhanced market access and rural revitalization	Long et al. (2016); Liu et al. (2020)

Despite these positive outcomes, the results reveal several challenges that may limit the effectiveness of digital economy development in achieving fully inclusive growth. Labor market inequalities remain a significant concern. Studies indicate that technological advancement often benefits highly educated and digitally skilled workers more than low-skilled laborers. Yang et al. (2023) found evidence of widening wage gaps between high-skilled and low-skilled workers, while Li et al. (2022) and Li (2022) reported persistent wage differentials across industries and sectors. Furthermore, gender-related disparities continue to exist despite improvements in digital access and employment opportunities. Research examining gender outcomes presents mixed findings. Guo et al. (2021) found that fintech development can reduce gender wage gaps by expanding economic opportunities, while Wang et al. (2024) concluded that some demographic groups benefit more substantially from digital economy expansion. However, Han et al. (2024) reported a widening gender wage gap within the gig economy, suggesting that digitalization does not automatically guarantee equitable outcomes. Similarly, Li et al. (2024) identified labor market segmentation as a continuing factor contributing to gender-based wage disparities. The findings additionally indicate that social and demographic impacts of digitalization extend beyond employment and income. Digital media and communication technologies influence family behaviors, social attitudes, and demographic decision-making processes. Fu et al. (2026) demonstrated that digital media usage influences fertility intentions through changes in gender role attitudes, while Li and Xu (2022) found that socioeconomic conditions and modernization processes affect fertility preferences among Chinese households. These findings illustrate the broader societal implications of digital transformation.

Table 3. Major Challenges Associated with Digital Economy Development

Challenge	Impact on Sustainable Growth	Supporting Studies
Skill-Based Wage Gaps	Unequal distribution of digital economy benefits	Yang et al. (2023); Autor (2015)
Automation Risks	Potential displacement of routine occupations	Acemoglu & Restrepo (2020)
Gender Wage Inequality	Uneven outcomes across labor market groups	Han et al. (2024); Li et al. (2024)
Labor Market Segmentation	Persistent inequalities between sectors and occupations	Li & Zhang (2023); Li (2022)
Digital Divide	Unequal access to technology and infrastructure	Van Lancker & Parolin (2020)
Social Adjustment Challenges	Demographic and behavioral changes associated with digitalization	Fu et al. (2026); Li & Xu (2022)

Overall, the results demonstrate that the digital economy has become a powerful instrument for promoting sustainable urban and rural growth in China. The evidence suggests that digitalization supports economic productivity, environmental sustainability, educational advancement, financial inclusion, and rural revitalization. At the same time, the findings highlight the importance of addressing challenges related to inequality, labor market segmentation, and digital access to ensure that the benefits of technological transformation are distributed equitably across all segments of society. The reviewed literature consistently indicates that the long-term contribution of the digital economy to sustainable development will depend on policies that combine technological innovation with social inclusion and regional balance.

5. DISCUSSION

The findings synthesized in this study indicate that digital economy development in China constitutes a structural force reshaping the dynamics of sustainable urban and rural growth. Across the reviewed literature, a consistent pattern emerges in which digital technologies function not merely as productivity-enhancing tools but as systemic enablers of economic reconfiguration, institutional adaptation, and spatial integration. The expansion of digital infrastructure and platform-based ecosystems has significantly improved the efficiency of resource allocation, reduced transaction costs, and strengthened connectivity between urban centers and rural peripheries. In this regard, the digital economy operates as a bridging mechanism that mitigates historical disparities in access to markets, services, and employment opportunities, thereby contributing to more balanced regional development trajectories (Liu et al., 2020). A central implication of the analysis is the dualistic nature of digital transformation on labor markets. On one hand, automation and artificial intelligence have increased productivity and enabled the restructuring of industrial systems toward higher-value activities, reinforcing the long-term growth potential of the economy (Brynjolfsson et al., 2021; Dwivedi et al., 2021). On the other hand, technological change has introduced significant distributive tensions, particularly in the form of skill-biased labor demand and wage polarization. The displacement effects associated with automation, as highlighted by Acemoglu and Restrepo (2020), are evident in the Chinese context where low-skilled workers face increasing vulnerability in the face of digital substitution. Concurrently, the emergence of platform-based gig employment has generated new forms of labor flexibility, yet these arrangements are often characterized by income instability and limited institutional protection, thereby complicating the overall welfare implications of digitalization (Han et al., 2024; Li et al., 2025). The gendered dimension of digital economy development further reinforces the complexity of its social outcomes. While fintech expansion and digital inclusion initiatives have contributed to narrowing certain gender-based economic disparities by improving access to financial and entrepreneurial resources (Guo et al., 2021; Wang et al., 2024), evidence also suggests that digital labor markets may reproduce or even intensify structural inequalities under specific conditions. The gig economy, in particular, exhibits patterns of wage stratification that disproportionately disadvantage female workers, reflecting persistent institutional and social constraints within digital labor platforms (Li et al., 2024). This indicates that technological advancement alone is insufficient to ensure equitable outcomes without complementary policy interventions. From an environmental perspective, the digital economy demonstrates strong potential to enhance sustainability governance. The integration of data-driven systems into regulatory frameworks has improved environmental monitoring, enforcement efficiency, and resource management practices. Cheng et al. (2022) emphasize that digital transformation strengthens environmental governance mechanisms by enabling real-time data analysis and policy responsiveness. These developments align with broader sustainability transitions that seek to decouple economic growth from environmental degradation. However, as Sovacool (2021) cautions, such transitions may generate uneven distributive effects, underscoring the need for inclusive policy designs that address potential environmental and social trade-offs. In relation to rural development, digitalization has significantly expanded opportunities for economic participation and structural diversification. Rural e-commerce platforms, digital agriculture technologies, and improved connectivity infrastructure have

enabled rural populations to integrate more effectively into national and global value chains. This aligns with Long et al. (2016), who emphasize the importance of efficient resource allocation in supporting rural restructuring processes. Nevertheless, the benefits of digital rural transformation remain uneven, particularly in areas where digital literacy and infrastructure investment are limited. Consequently, while the digital economy provides a strong foundation for rural revitalization, its effectiveness is contingent upon targeted institutional support and sustained investment in human capital development. The education and human capital dimension further reinforces the transformative potential of digital technologies. Digital learning systems and artificial intelligence applications have expanded access to educational resources and improved learning continuity, particularly in underserved regions (Bond et al., 2021; Zawacki-Richter et al., 2019). These developments contribute to long-term productivity growth by enhancing skill formation and labor market adaptability. However, disparities in access to digital education infrastructure may reinforce existing inequalities if not adequately addressed through inclusive policy frameworks. Overall, the discussion reveals that the digital economy in China operates as a multidimensional force with both enabling and constraining effects on sustainable urban and rural development. While it enhances productivity, facilitates innovation, and supports environmental governance, it simultaneously introduces new forms of inequality and structural fragmentation. The net developmental outcome is therefore contingent upon the extent to which policy frameworks can effectively mediate these tensions and ensure inclusive access to digital opportunities.

6. CONCLUSION

This study has examined the impact of digital economy development on sustainable urban and rural growth in China, drawing upon a broad body of interdisciplinary literature spanning economics, labor studies, environmental governance, and social development. The overall evidence indicates that digital transformation plays a central role in shaping contemporary development pathways by enhancing productivity, improving institutional efficiency, and enabling more integrated regional development structures. At the same time, the findings highlight that the benefits of digitalization are not uniformly distributed, and significant structural challenges remain in ensuring inclusive and equitable growth outcomes. A key conclusion is that the digital economy functions as a critical driver of economic modernization and structural upgrading. Through the integration of artificial intelligence, big data analytics, and digital platforms, China has been able to enhance industrial efficiency and accelerate innovation across multiple sectors. These advancements contribute to long-term economic resilience and support the transition toward higher-value economic activities (Brynjolfsson et al., 2021; Dwivedi et al., 2021). However, the associated labor market disruptions, including automation-induced displacement and skill-biased wage structures, underscore the need for adaptive labor policies that prioritize reskilling and workforce transition support (Acemoglu & Restrepo, 2020; Yang et al., 2023). The study also concludes that digital economy development plays a significant role in narrowing urban-rural disparities by improving connectivity and expanding access to markets, services, and educational resources. Rural revitalization efforts are increasingly supported by digital infrastructure, which enables agricultural modernization and facilitates participation in broader economic networks (Liu et al., 2020). Nevertheless, persistent inequalities in digital access and capabilities continue to limit the full realization of these benefits, particularly in less developed rural regions. This highlights the importance of targeted infrastructure investment and digital literacy programs to ensure more balanced development outcomes. From a social perspective, digital transformation has produced mixed outcomes in relation to inequality and inclusion. While fintech development and digital platforms have improved access to financial services and economic opportunities for certain population groups (Guo et al., 2021; Wang et al., 2024), they have also contributed to the emergence of new forms of labor market segmentation and wage inequality, particularly along gender and skill lines (Han et al., 2024; Li et al., 2024). These findings suggest that digital economy policies must be accompanied by robust regulatory frameworks to mitigate inequality and ensure fair participation in digital labor markets. Environmentally, the digital economy presents strong opportunities for

advancing sustainable development objectives. Enhanced environmental governance, supported by data-driven technologies, enables more effective monitoring and regulation of environmental impacts (Cheng et al., 2022). This contributes to improved resource efficiency and aligns with broader sustainability goals. However, ensuring that environmental benefits are equitably distributed remains a key policy challenge, particularly in balancing economic growth with ecological protection. The digital economy represents both a transformative opportunity and a complex governance challenge for China's sustainable urban and rural development agenda. Its capacity to enhance productivity, support innovation, and strengthen regional integration is substantial, yet its uneven distributional effects require careful policy attention. Future development strategies should therefore focus on strengthening digital infrastructure, expanding access to digital education, and implementing inclusive labor market policies that address inequality. By doing so, China can better harness the potential of the digital economy to achieve balanced, sustainable, and inclusive growth across both urban and rural regions.

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