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Urban and Rural Influencing Factors Based on the ISM Model and Their Improvement Suggestions

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Abstract

In recent years, the subject of urban-rural integrated development has garnered significant attention in academic circles. Digital technologies, which have been proliferating consistently, have played a pivotal role in driving this integration forward. Drawing from the theoretical lens of urban-rural integration, this study conducted a comprehensive review and analysis of recent literature pertaining to the subject. From this analysis, we distilled various perspectives and pinpointed 11 crucial factors that influence urban-rural integrated development. To further unpack the intricate relationships among these influencing factors, we employed the Interpretive Structural Modeling (ISM) approach. This allowed us to elucidate the hierarchical relationships and logical connections among them. Based on this solid foundation and from the perspective of digital technology empowerment, we formulated pertinent recommendations that serve as a theoretical foundation for further enhancing urban-rural integration.

Keywords

Digital Empowerment, Urban-Rural Integrated Development, The Ism Model, Influencing Factors, China

1. Introduction

Currently, the urban-rural development imbalance and rural lag are the key issues in China's urban-rural relations. Addressing this contradiction lies in accelerating urban-rural integration. Guided by the national strategy of digital village construction, leveraging digital technologies to empower urban-rural integration and expedite digital society development is an inevitable trend. In May 2019, the central government released the "Digital Village Development Strategy Outline,"

emphasizing digital villages as a core aspect of Digital China, aiming to accelerate informatization and drive agricultural and rural modernization (General Office of the CPC Central Committee and General Office of the State Council, 2019). Further, in January 2022, the "Digital Village Development Action Plan (2022-2025)" outlined a roadmap for digital village construction during the 14th Five-Year Plan (Ten Departments, 2022), fostering a conducive environment for urban-rural integration.

Across the country, various localities and departments have actively implemented the "Dripping the Digits Down" initiative, leveraging the powerful role of digital technologies in revitalizing rural areas and promoting urban-rural integration. The new round of registered residence system reform has opened up, enhancing institutional frameworks for urban-rural integrated development and facilitating population mobility. Yearly, central government fiscal investment in agriculture has increased, bolstering rural infrastructure such as water conservancy projects and environmental sanitation, laying a solid foundation for integrated urban-rural development (The No. 1 Central Document of 2020 (Full Text), 2020). Significant strides have also been made in urban-rural public services, with most provinces and cities establishing a basic urban-rural pension insurance system, essentially achieving integrated planning and provision. Nevertheless, rural development faces challenges: incomplete industrial systems, persistent wealth disparities, and impeded two-way flow of factors, along with unbalanced infrastructure and public service allocation. Urgently needed is digital technology empowerment to address these obstacles and pave the way for urban-rural integration. In this context, this article utilizes the Interpretive Structural Modeling (ISM) to elucidate the inherent mechanisms and hierarchical factors of integrated urban-rural development, aiding in overcoming various obstacles on the path to urban-rural integration.

2. Literature Review

After a thorough literature review and content analysis, this study pinpoints numerous pivotal factors shaping urban-rural integrated development. Field investigations in villages exhibiting demonstration features were subsequently conducted. The National Development and Reform Commission highlights that since the 14th Five-Year Plan, noteworthy progress has been achieved in urban-rural integration, marked by smoother factor flows, balanced allocation of public services, and advancements in infrastructure integration. This research subsequently clarifies the four core indicators of urban-rural integrated development: industrial integration, factor integration, infrastructure integration, and the equalization of public services (**Figure 1**).

Firstly, industrial integration is a crucial indicator and driving force for advancing urban-rural integrated development. Industrial integration encompasses the amalgamation of agriculture with industry and services. The literature suggests that promoting rural revitalization and urban-rural integrated development, while fostering a new development pattern where domestic and foreign

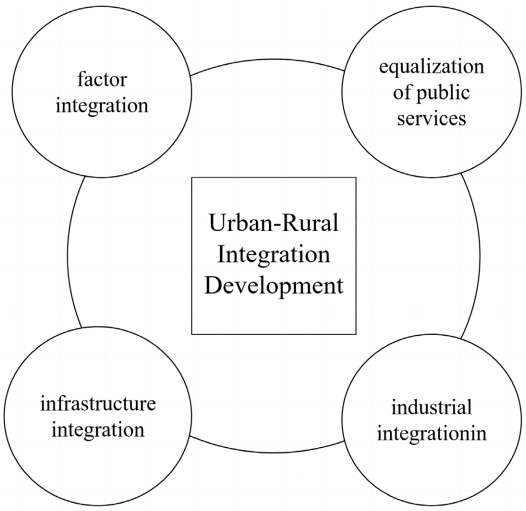

Figure 1. Four fundamental indicators of urban-rural integration development.

markets can boost each other, with the domestic market as the mainstay, endows the high-quality development of agriculture, rural areas, and the service industry in the moderately prosperous society with a new mission and contemporary requirements (Zhang & Duan, 2023). Simultaneously, the agricultural product processing industry serves as a foundational link in the rural industrial chain, playing a pivotal role in agricultural production and operations. For instance (Jin et al., 2024), Moutai Town in Renhuai, Guizhou, has leveraged the advantages of the integration of the wine and tourism industries, developing an industrial integration model that encompasses comprehensive development across multiple sectors, including industry, agriculture, tourism, and culture, effectively promoting rural revitalization and urban-rural integrated development (Zhang & Liu, 2024).

Secondly, through literature analysis, we find that the integration of critical factors such as land, talent, and capital is equally significant. By synthesizing and consolidating insights from numerous studies, we discover that implementing an integrated urban-rural population management system, promoting the revitalization of urban and rural land resources, and facilitating the reasonable allocation of funds between urban and rural areas can accelerate the realization of urban-rural integrated development. Moreover, relevant literature suggests adopting innovations in the institutional mechanisms governing the three major factors of land, talent, and capital as an entry point, constructing a policy framework that fosters urban-rural integrated development, and promoting bidirectional flow of factors between urban and rural areas, with a particular emphasis on the flow of advanced factors from urban to rural areas (Zhang, 2023a).

Furthermore, based on in-depth explorations of different research domains and case studies, infrastructure integration plays a pivotal role in facilitating the mobility of material and human resources between urban and rural areas. Infrastructure encompasses transportation networks, communication networks, and other foundational systems. The literature indicates that highly integrated ur-

ban-rural transportation networks, communication networks, and other infrastructure can provide favorable conditions for the development of integrated urban-rural villages, thereby attracting large urban populations to these villages for employment, entrepreneurship, and residential purposes (Kong, 2022), promoting urban-rural integration. For example, Shandong Province has optimized its rural infrastructure network, enhancing transportation and water-electricity supply capabilities, while also establishing a comprehensive logistics service network system to facilitate bidirectional rural logistics, effectively advancing integrated urban-rural development (Zhang, 2023b).

Finally, through an in-depth examination of various aspects, including public health services, basic education services, and public governance, we discern the critical role of public services in bridging the urban-rural gap and promoting social integration. Research demonstrates that advancing the equalization of basic public services, such as education, healthcare, social security, elderly care, culture, and sports, constitutes a vital component of urban-rural integrated development (He et al., 2022). Additionally, by establishing an effectively interconnected and complementary system of infrastructure and public services between urban and rural areas, coupled with promoting flexible governance for mobile populations and governance of urban-rural in the spheres of natural and social, urban-rural integrated development can be accelerated (Jiang, 2020).

Therefore, building upon the foundation of literature research, this study constructs an Interpretive Structural Model to uncover the influencing factors, with the aim of providing decision-making support and reference for better empowering urban-rural integrated development through digital technologies.

3. Methods and Model

Given the intricate and complex relationships that exist among the various factors within the aforementioned system of influencing factors for urban-rural integration, which render direct quantitative processing challenging, this study proposes the adoption of the Interpretive Structural Modeling (ISM) method for analysis.

The ISM model was introduced by Professor J. Warfield of the United States in 1973 and has since become one of the most widely applied tools for addressing problems involving complex structural relationships. Through matrix operations, it enables the decomposition of an intricate system into multiple subsystems, transforming ambiguous subsystems into more intuitive structural relationship models. It facilitates the gradual analysis of the interrelated factors within the system and the construction of a hierarchical structural model, making it well-suited for analyzing systems characterized by numerous factors, intricate interrelationships, and an overall lack of structural clarity (Wang & Kang, 2017).

In December 2019, the national government approved 11 national urban-rural integrated development pilot zones. Among them, Pidu District in Chengdu holds the dual status of being both a "National Digital Countryside Pilot Area" and a "National Urban-Rural Integrated Development Experimental Zone." Le-

veraging the continuous Shared Garden experiments conducted in recent years, Pidu District has successfully integrated digital technology with urban-rural development, completing the digital transformation of urban-rural development with a strong momentum. Accordingly, the research team conducted field investigations in advanced rural villages such as Zhanqi Village and Anlong Village in Chengdu's Pidu District. Through the synthesis and consolidation of extensive research texts and interview transcripts, the following specific hypothetical model was designed (Table 1).

To determine the relationships among factors related to urban-rural integration, field investigations were conducted through site visits, extensive review of past research papers, and consultations with relevant experts, to establish the logical relationships among the influencing factors of urban-rural integration. For instance, the team traveled to dozens of villages such as Anlong Village, Zhanqi Village, Yongdu Village, and Donglin Village in Pidu District, Chengdu. They conducted in-depth interviews with 57 experts in related fields, including village committee heads and business leaders, resulting in 57 interview records. Based on the information gathered from these interviews and the objective facts

Table 1. Factors influencing urban-rural integration.

Primary Indicator	Secondary Indicator	Serial Number	Specific Digital Technology Practice Points
Industrial integration	Agriculture	A1	"Technology + Agriculture", Modern Agricultural Production Technologies, Smart Greenhouses, E-commerce Development for Online Sales
	Industry	A2	Utilizing Digital Technology to Enhance Production and Processing Efficiency and Quality, Corporate Cloud Sales
	Services	A3	Digital Rural Cultural Services Industry, Digital Cultural and Tourism Management Platform, Online Film and TV Production, IP Creation, VR
Primary indicator	Secondary Indicator	Serial Number	Specific Digital Technology Practice Points
Factor integration	Land	B1	Rural Residential Land Information Management Platform
	Labor	B2	"Double Innovation Incubation Park" Digital Platform, Talent Training, Talent Matchmaking Information Platform
	Capital	B3	Financial Integration Information Management Platform
Infrastructure integration	Transportation logistics	C1	Advanced Information Technology Empowering Transportation, Digital Intelligent Logistics Chain
	Disaster prevention communication	C2	Intelligent Fire Detection and Remote Monitoring Systems, All-Weather Safety System Construction
Equalization of public services	Basic education	D1	Digital Research and Study Education, Rural Smart Classrooms
	healthcare	D2	Remote Medical Information Service System
	Basic governance	D3	Smart Community "One Database One Platform," Integrated Platform for Grassroots Governance, and Smart Management Tools like Enterprise WeChat

obtained from field research, the team was able to establish the relationships among various factors. Table 2 presents the interrelationships among the 11 factor indicators. If factor Pi influences factor Pj, then the value in the ith row and jth column of the table is 1, otherwise, it is 0.

4. Calculating

In this study, the ISM model is employed to structurally categorize the 11 identified specific factors. It reflects the mutual influences and constraints among the factors vertically while also elucidating the interrelationships among factors at the same level horizontally. This approach avoids the subjectivity of expert scoring and weighting, as well as the risk of the model becoming disconnected from reality. Furthermore, based on the 11 factors influencing urban-rural integration, an influencing factor model is constructed. The main calculation steps are as follows:

1) Construct the adjacency matrix based on the relationships among factors

Building upon the identified associations among factors (Table 2), an adjacency matrix is utilized to describe the logical relationships among the factors, yielding the adjacency matrix A for the indicators. A is an 11th-order square matrix, where the elements are defined as aij = 1 (Ii directly influences Ij, where Ii is an element of the adjacency matrix, describing the mutual influence between Pi and Pj) or aij = 0 (Ii does not directly influence Ij), as shown in Table 3.

2) The adjacency matrix A belongs to the Boolean matrix, following the rules of Boolean algebra, *i.e.*, 0 + 0 = 0; 0 + 1 = 1; 1 + 1 = 1; 1 × 0 = 0; 0 × 1 = 0; 1 × 1 = 1.

Based on these operational rules, if the matrix R satisfies the conditions of

Table 2. Relationships between factors influencing urban-rural integration.

Relationships Between Factors Influencing Urban-Rural Integration											
Element	A1	A2	A3	B1	B2	B3	C1	C2	D1	D2	D3
A1	0	1	1	0	0	0	0	0	0	0	0
A2	1	0	0	0	0	0	0	0	0	0	0
A3	1	0	0	0	0	0	0	0	0	0	0
B1	1	1	0	0	0	0	1	1	0	0	1
B2	1	1	1	0	0	0	1	1	1	1	1
B3	1	1	1	1	1	0	1	1	0	1	0
C1	1	1	0	0	0	0	0	0	0	0	0
C2	1	0	0	0	0	0	0	0	0	0	0
D1	0	0	0	0	0	0	0	1	0	0	0
D2	0	0	0	0	0	0	0	1	0	0	0
D3	0	0	0	0	0	0	1	0	0	0	0

Table 3. Adjacency matrix A.

Adjacency Matrix A											
Element	A1	A2	A3	B1	B2	B3	C1	C2	D1	D2	D3
A1	0	1	1	0	0	0	0	0	0	0	0
A2	1	0	0	0	0	0	0	0	0	0	0
A3	1	0	0	0	0	0	0	0	0	0	0
B1	1	1	0	0	0	0	1	1	0	0	1
B2	1	1	1	0	0	0	1	1	1	1	1
B3	1	1	1	1	1	0	1	1	0	1	0
C1	1	1	0	0	0	0	0	0	0	0	0
C2	1	0	0	0	0	0	0	0	0	0	0
D1	0	0	0	0	0	0	0	1	0	0	0
D2	0	0	0	0	0	0	0	1	0	0	0
D3	0	0	0	0	0	0	1	0	0	0	0

Equations (1) and (2), then R is referred to as the accessibility matrix of A. Equation (3) represents the matrix operation formula.

$$k \le n - 1 \tag{1}$$

$$R = (A + I)k \tag{2}$$

$$(A + I) \ne (A + I)2 \ne \cdots \ne (A + I)k = (A + I)k + 1 \tag{3}$$

where: I is the identity matrix; k is the number of transformations for the reachability matrix; n is the order of the matrix.

By performing the corresponding operations on the adjacency matrix A using the SPSS software, the corresponding reachability matrix can be obtained, as shown in Table 4.

3) Determining the Hierarchical Structure among Factors

Based on the ISM model and the reachability matrix R obtained previously, the factors influencing rural-urban integration are categorized into three levels: reachable set, antecedent set, and common set, yielding the corresponding hierarchical structure of importance. With the large number of factors affecting rural-urban integration, the SPSS software was utilized to perform the calculations, resulting in a 5-level hierarchical division of the rural-urban integration factors. The final hierarchical results are presented in Table 5. The same requirements apply.

4) Constructing the Hierarchical Digraph

Based on Table 5, the hierarchical digraph of the factors influencing rural-urban integration can be constructed, as shown in Figure 2.

4.1. Analysis

Based on the preceding conclusions, a directed graph is crafted to visually represent the structural hierarchy of the model following a hierarchical division.

Table 4. Reachability matrix R.

Reachability Matrix R											
Element	A1	A2	A3	B1	B2	B3	C1	C2	D1	D2	D3
A1	1	1	1	0	0	0	0	0	0	0	0
A2	1	1	1	0	0	0	0	0	0	0	0
A3	1	1	1	0	0	0	0	0	0	0	0
B1	1	1	1	1	0	0	1	1	0	0	1
B2	1	1	1	0	1	0	1	1	1	1	1
B3	1	1	1	1	1	1	1	1	1	1	1
C1	1	1	1	0	0	0	1	0	0	0	0
C2	1	1	1	0	0	0	0	1	0	0	0
D1	1	1	1	0	0	0	0	1	1	0	0
D2	1	1	1	0	0	0	0	1	0	1	0
D3	1	1	1	0	0	0	1	0	0	0	1

Table 5. Hierarchy situations.

Hierarchy	Element
First Layer	A2, A3
Second Layer	A1
Third Layer	C1, C2
Fourth Layer	B1, B2, D1, D2, D3
Fifth Layer	B3

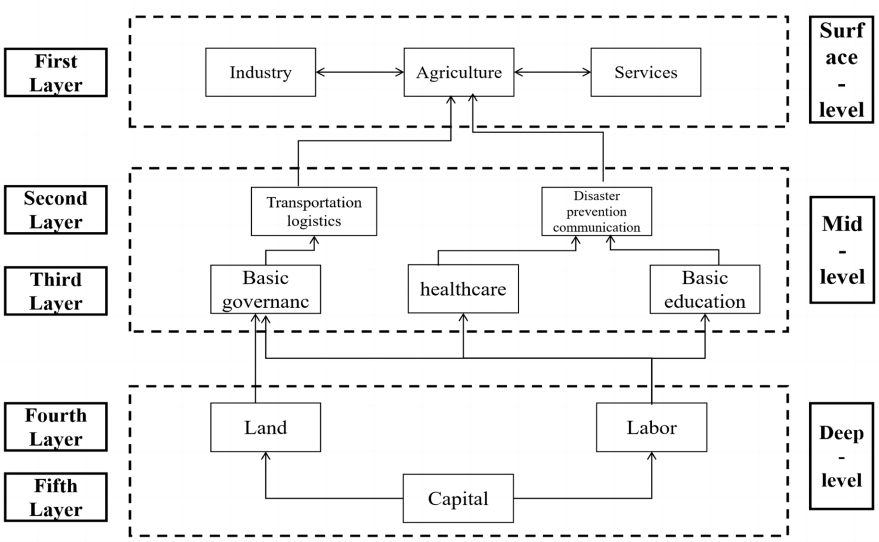

Figure 2. Hierarchical structure of factors affecting urban-rural integration.

Factors within the same level are aligned horizontally within boxes, while directed line segments connect them hierarchically, reflecting their logical rela-

tionships. Lastly, the symbolic representations are substituted with their definitions, resulting in the ISM model diagram that illustrates the factors influencing rural-urban integration development, as depicted in the figure. The same requirements remain applicable.

4.2. Deep-level Influencing Factors

Land, capital and labor constitute the foundational layer of the model.

Capital, as the backbone of economic growth, plays a pivotal role in orchestrating the aggregation and distribution of diverse production factors. It is also a driving force behind the advancement of social productive capabilities. Efficient capital allocation not only aids in the refinement and modernization of industrial structures but also boosts overall economic performance. Furthermore, capital spurs innovation and technological advancements, spawning a constant flow of novel technologies, products, and services, thereby fostering employment and societal stability.

Land, the fundamental bedrock of human existence and the linchpin of economic and social progress, supplies spatial resources for human endeavors and livelihoods, encompassing agricultural and industrial land alike. Rational planning and development of land have been instrumental in bridging the gap in basic public services between urban and rural areas, serving as a critical catalyst for rural-urban integration. By optimizing the allocation of land resources and enhancing land utilization efficiency, we can better satisfy the production and living needs of both urban and rural inhabitants, thereby propelling the process of rural-urban integration.

As a fundamental component of production activities, the modern labor force is engaged across diverse sectors including agriculture, manufacturing, services, infrastructure management, healthcare, and fundamental education. The subjective initiative of the workforce holds immense sway, with their vast knowledge repositories and innovative prowess driving technological advancements and industrial transformations. Concurrently, the labor force accrues material prosperity through their diligent efforts, thereby fostering social equity and enhancing livelihood standards.

4.3. Mid-Level Influencing Factors

Transportation logistics, disaster prevention communication, basic governance, healthcare, and basic education constitute the middle layer of the model.

On one hand, basic education and healthcare jointly enhance the effectiveness of disaster prevention communication, fostering its progress. By disseminating disaster prevention knowledge and skills, basic education boosts public awareness and readiness, teaching individuals to recognize warning signals, adopt protective measures, and communicate effectively in the aftermath. Concurrently, the healthcare system swiftly responds to disasters, offering timely medical care and prevention services, safeguarding livelihoods and production activities.

On the other hand, sound basic governance provides a robust material base for transportation logistics. Efficient and user-friendly infrastructure boosts logistics efficiency, while intelligent management systems streamline traffic flow. Additionally, governance involves policy formulation and enforcement, normalizing market order, safeguarding fair competition, and fostering innovation and development in logistics enterprises.

Finally, under robust transportation logistics and disaster prevention communication systems, the accelerated flow of factors optimizes rural agricultural resource allocation and enhances urban-rural integration. For instance, efficient logistics facilitates agricultural product distribution. Furthermore, advanced disaster prevention communication systems support sustainable agricultural development, offering technical assistance to the vulnerable sector. These two aspects jointly propel agricultural growth and drive the revitalization of urban-rural integration mechanisms.

4.4. Surface-Level Influencing Factors

Agriculture, industry, and services constitute the top layer of the model.

Firstly, agriculture, the cornerstone of urban-rural relations, fulfills cities' basic living needs with grains and vegetables, while generating economic benefits for rural areas, elevating farmers' living standards. It also serves as a bridge for cultural exchange and factor flows, enhancing urban-rural economic ties and cultural interactions.

Secondly, industry relies heavily on agricultural resources and raw materials, including grains, cotton, and oilseeds, vital for numerous industrial sectors. With agricultural modernization and farmers' income growth, rural markets' demand for industrial products expands, creating a broader market for industry and fostering urban-rural economic exchange. Industrial machinery, such as seed drills, harvesters, and intelligent greenhouses, significantly enhances agricultural production efficiency and quality.

Lastly, the integration of agriculture, industry, and services optimizes resource allocation and industrial structure transformation, fostering urban-rural economic interaction and coordinated development, enhancing the quality of life for both urban and rural residents. Rural agricultural specialties enrich tourism, spurring rural tourism growth, diversifying farmers' income sources, and creating more service-sector jobs. Additionally, agricultural production services offer farmers comprehensive support in machinery, storage, and processing, boosting efficiency. Financial assistance addresses farmers' funding challenges, promoting sustainable agricultural growth and further balancing urban-rural relations.

5. Recommendation

5.1. Multiple Entities Jointly Construct, Accelerating the Flow of Fundamental Factors

Derived from the ISM hierarchical structure diagram, capital, land, and labor

occupy the foundational layer, crucial for rural-urban integration. Accelerating their flow and development is vital for industrial growth and integration.

Rural-urban integration hinges on capital injection and its effective utilization. Local governments must broaden cooperation with higher authorities and enterprises to bolster rural finances, optimizing factor allocation. The government should enhance agricultural funding, improving efficiency and facilitating factor flow. Establishing agricultural support systems, promoting technological innovation, and boosting productivity are key. Villages must take initiative, attracting investments and fostering village-enterprise collaborations. This stimulates resource circulation between urban and rural areas, propelling local industrial growth and injecting vitality into rural-urban integration (Pu, 2020).

Secondly, promoting land system reforms and hastening urban-rural integrated development is paramount. Villages must establish land rights sharing as a foundation, separating ownership, contract, and management rights to facilitate sharing of property, produce, livelihoods, and ecology. Land serves as a bridge, fostering a bidirectional "citizens-land-farmers" relationship (Chen, 2020). Reform will redirect idle rural land to collective operations, leveraging industrial support to integrate unused resources and pursue differentiated village-specific development. This enhances farmers' employment opportunities, bolsters the collective economy, and advances rural-urban integration.

Finally, it is essential to emphasize talent development and encourage more labor force migration to rural areas through various talent introduction and training programs. On one hand, efforts should be made to strengthen talent introduction. By simplifying the intermediate processes of talent flow, establishing a comprehensive digital service platform, and implementing incentive mechanisms such as financial support, collection release of social security policy preferential information, the entrepreneurial conditions for new farmers can be optimized, thereby guiding more accomplished young people to return to their hometowns for entrepreneurship as new farmers, utilizing their new technologies to transform characteristic industries and improve quality and efficiency. On the other hand, rural areas should also focus on cultivating local talent. Based on the specific needs of characteristic industrial development, villages should provide targeted training to enhance the digital literacy and skill levels of local residents through initiatives such as "digital incentive programs" and regular courses, enabling them to participate in industrial production and adapt to the process of digital village development.

5.2. Attention to Infrastructure Construction and Enhancing Public Service Quality

While underlying production factors are indeed pivotal, mid-level ones are equally important. Currently, China faces significant disparities in infrastructure and public services between urban and rural regions. Hence, urban-rural integrated development must prioritize these aspects.

Firstly, enhancing the multi-source investment mechanism, primarily fiscal resources, is crucial (Sheng, 2020). Fiscal funds allocation, public facility provision, tax incentives, and subsidies can boost rural governance investment. Additionally, leveraging social capital and financing leases for multi-stakeholder rural construction participation is vital. With robust supervision and reporting mechanisms, proactive financing channel expansion, investment and financing model innovation, and diverse social capital encouragement can foster the involvement of outstanding social organizations in rural construction, fostering innovation in primary-level and community governance models in China (Cao & Xian, 2023).

Secondly, refining the rural cadre assessment mechanism is crucial. A categorized evaluation system tailored to different development levels and types should be established to avoid a one-size-fits-all approach. Implementing a combined evaluation method, including both prescribed and optional projects, encourages local innovation while ensuring essential work content and allowing for locally tailored optional initiatives. Additionally, promoting accountability evaluations with dual assessments for units and individuals highlights responsible entities and enhances leadership cadre accountability.

Finally, digital empowerment in rural construction and leveraging internet technologies are vital for promoting urban-rural public service equalization. By harnessing modern technologies like the internet, we can overcome town-country barriers, transcend spatial distances, and establish an integrated urban-rural public service system. This extends quality public services from cities to rural areas, enabling rural children to access top-tier urban educational resources remotely and rural residents to enjoy equivalent healthcare services. In doing so, we achieve urban-rural public service equalization.

5.3. Digital Technologies Breaking Down Barriers, Enhancing Urban-Rural Integration

As digital technologies rapidly progress, the barriers to urban-rural integration are steadily dissolving. These technologies not only streamline resource allocation and foster industrial collaboration but also ease population movement and bolster infrastructure development, breathing new life into urban-rural integration.

Utilizing digital technologies to optimize urban-rural resource allocation, we leverage advancements like big data and cloud computing. These enable comprehensive perception and precise analysis of urban and rural resources, providing crucial decision-making support. Additionally, digital technologies enhance the intelligence of resource allocation; algorithms and models automate resource matching and scheduling, greatly enhancing efficiency and accuracy. In agriculture, intelligent systems streamline the scheduling of farmland, water conservation, and machinery, boosting production efficiency. Furthermore, digital technologies promote the sharing and interconnectivity of urban and rural

resources, transcending geographical limitations for optimized allocation across wider scopes.

Enhancing digital technologies propels urban-rural industrial synergy. Eliminating industry boundaries enhances seamless info exchange among agriculture, industry, and services, deepening industrial chain integration. This integration spurs digital transformation in agriculture and spawns novel integrated models, like agro-cultural-tourism fusion and primary-secondary-tertiary integration. Digital technologies fuel urban-rural industry innovation, introducing advanced tools, boosting competitiveness, and revitalizing rural economies.

Digital technologies streamline urban-rural population mobility, making it more convenient, efficient, and structured. They offer efficient info acquisition and matching, enabling informed decisions on urban-rural disparities and advantages. These technologies reduce mobility barriers and costs, opening employment and entrepreneurship opportunities. New industries like rural e-commerce and tourism create jobs for rural folk, fostering urban-rural industrial synergy and innovative collaboration.

Empowering digital technologies bolsters urban-rural infrastructure construction. They enhance planning and construction efficiency, minimizing blind investment and resource waste. Digital technologies also raise intelligence and automation levels, optimizing facility operations and management. Smart grids, for instance, enable remote monitoring and dispatching, elevating energy utilization efficiency.

6. Conclusion

This article constructs a framework of factors influencing the integrated development of urban and rural areas from four dimensions: industrial integration, factor integration, infrastructure integration, and equalization of public services. It identifies eleven influencing factors and employs the Interpretive Structural Modeling (ISM) method to analyze their interrelationships, forming a hierarchical structure diagram. Initially, the qualitative relationships among various factors are analyzed, followed by a quantitative analysis using the ISM model. The hierarchical structure diagram is divided into surface, middle, and bottom layers, with progression from the bottom to the surface layer enhancing the logical organization of the analysis. The use of levels to combine the four aspects of influence—industrial integration, factor integration, infrastructure integration, and public service equalization—makes the analysis more comprehensive and detailed, providing a basis for the study of factors affecting the integrated development of urban and rural areas.

According to the study's findings, the three fundamental elements of capital, land, and labor are the deepest factors influencing the integrated development of urban and rural areas, while the coordinated development of industries directly impacts this integration. The research team, starting from the results of the ISM model, proposes several strategies for promoting high-quality integrated ur-

ban-rural development. These include multi-stakeholder construction, accelerating the flow of fundamental factors, focusing on infrastructure development, enhancing the quality of public services, and breaking down barriers with digital technology to improve the quality and efficiency of urban-rural integration. These approaches can serve as references for relevant departments to further promote the integrated development of urban and rural areas.

Conflicts of Interest

The authors declare no conflicts of interest regarding the publication of this paper.

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