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# *Exploring the Impact of Digital Inclusive Finance on China's Rural Areas from the Perspective of Digital Rural Construction*

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***Abstract:*** The service of digital inclusive finance is becoming popular in rural regions of China. Meanwhile, digital rural construction attracts much attention. Clarifying the impact of digital inclusive finance on the quality of life for residents and its connection to digital infrastructure is of significant importance. Based on the existing literature, this paper comprehensively analyzes the influence of digital inclusive finance on rural areas and the practical role that digital construction plays, and the empirical research proves that digital inclusive finance can effectively lead to rural revitalization, and digitization is a considerable component in this process. However, the issue of endogeneity is a concern of researchers and heterogeneity does exist. Moreover, this article also points out the existing issues related to digital inclusive finance and digital construction in rural regions, such as the weakness of infrastructure in the countryside undermining the effectiveness of digital inclusive finance and the lack of professional workers that may hinder the construction of a digital village. This paper suggests several possible solutions, such as investing in internet equipment and coordinating regional development.

***Keywords:*** Digital inclusive finance, Digitization, Digital construction, Rural revitalization.

## 1. Introduction

The limited accessibility of financial services is a concern in the rural areas of China. However, it is generally believed that the popularization of the digital financial system can effectively promote the development of digital financial inclusion. Thus, despite the existence of several obstacles, the development of digital inclusive finance (DIF) is necessary to raise the quality of financial services in China's rural areas. Meanwhile, with the rapid advancement of digitization in terms of big data, Internet and cloud computing, digital rural construction has become a growing trend. Digital rural construction can inject new impetus into rural areas as this provides a platform for citizens who live in rural areas to get involved in economic activities and improve their living standards. Therefore, DIF and digital construction are playing an important role in the sustainable development of rural areas.

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The significant role of digital construction in the countryside is a common topic in previous research and many econometric models are created. Some of them consider digitization when analyzing the relationship between DIF and rural revitalization or other economic performance. For instance, Xiong shows that the effect of digitization is likely to be non-linear and there is a threshold effect [1]. This research implies the necessity of digital construction in rural areas. Meanwhile, Zhang focuses on the relationship between DIF and the level of digitization, while Cai reveals that digital village construction can enhance the income of residents [2, 3]. These studies highlight the importance of a detailed analysis of digitalization. However, some researchers also analyze the validity of these analyses. Wang reckons that regional heterogeneity does exist as DIF is more useful in the eastern area [4]. Qiu reveals that the reverse causality and omitted variable bias will lead to the issue of endogeneity [5]. Ren agrees that the level of digitization is a reason that leads to such a situation, which further emphasizes the importance of digitization in rural areas [6].

Therefore, based on the above literature, this study first discusses the characteristics and applications of digital village construction. Then, the analysis focuses on how DIF can promote the establishment of digital villages, to promote rural revitalization. This paper also refines some of the difficulties and obstacles in the construction of DIF and digital countryside and then puts forward the corresponding improvement. This paper supplements the weak research on DIF and digital rural construction in this research area.

## 2. Feature and Application of Digital Inclusive Finance in Digital Rural Construction

Nowadays, China's DIF is booming. DIF refers to the system that provides safe and convenient financial services to all members of society effectively at an affordable cost. The support of digital technology is essential for the development of DIF.

### 2.1. Feature of Digital Rural Construction

The development of DIF requires the construction of a platform that provides financial services. However, the availability of the Internet and digital devices depends on the condition of the network infrastructure, which emphasizes the importance of digital construction. It is widely acknowledged that there are several features of digital construction in China's rural areas.

#### 2.1.1. Digital Construction Exists in Regional Heterogeneity

The quality of infrastructure in the western areas is thought to be worse than that in the eastern areas [1]. Meanwhile, some remote areas are less attractive to the talents [7]. Such phenomena lead to the different effects of digital development. The heterogeneity analysis indicates that the impact of digital rural development on the urban-rural income gap varies by region, with significant effects observed in the eastern and central regions of China [3].

#### 2.1.2. Digital Construction Helps to Increase Financial Inclusion Rates

Digital rural construction provides the tools to overcome geographical restrictions, which is thought to be essential for the enhancement of financial inclusion rates of financial services [7]. Wan argues that a digital financial platform can provide high-quality financial services to the majority of rural residents at an affordable cost, whereas the use of modern digital tools is crucial [7].

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#### 2.1.3. Innovation of Local Governance

Digital rural construction accelerates the process of rural digital transformation and improves rural governance efficiency. The government can take advantage of digital tools such as Internet, which will lower down operation cost and increase efficiency.

#### 2.1.4. Increase of Rural Family Resilience

Cai argues that the increase in the quality of digital facilities, such as high-speed internet connections, provides opportunities for families in rural areas to recover from an external change, which is shown by the concept of Rural Family Resilience (RFR) [3]. In the condition of widespread rural financial institutions, farmers have entrepreneurial dynamism and they are more willing to explore new modes of agricultural production, which can enlarge the source of family income, and promote income stability, which promotes the RFR [3].

### 2.2. The Application and Role of Digital Inclusive Finance in Rural Construction

As for DIF, the feature of being highly digitized increases the efficiency of providing safe and convenient financial services at an affordable cost in rural areas. The application and characteristics of DIF can be listed as follows.

#### 2.2.1. Elimination of Geographical Constraints

DIF can promote the development of e-commerce, which can eliminate geographical constraints and create a large potential customer base for residents to open offline retail stores and online stores [8]. The sellers in the online marketplace can showcase their vast array of products and make transactions with consumers on e-commerce platforms [8]. The emergence of digital infrastructures such as online payment systems provides a platform for entrepreneurs to have an interaction with consumers and collect market information from consumers timely. Take Taobao village development in Zhejiang Province as an example, it upgrades from isolated workshops in rural areas to small manufacturing clusters and is further incorporated into the global urban economy [9].

#### 2.2.2. Promote Rural Education and Training

The popularity of DIF platforms can encourage rural residents to take advantage of online learning platforms. To be specific, they have the chance to master financial tools and improve the level of human capital. Therefore, the development of e-commerce can stimulate the demand for acquiring knowledge and improve the literacy level in rural areas.

#### 2.2.3. Narrow the Income Gap Between Urban and Rural Areas

Digital rural construction promotes the transformation of industrial structures. Changes in industrial structure increase the proportion of secondary and tertiary industries [10]. Increasing the proportion of secondary and tertiary industries reduces the income gap between urban and rural areas.

## 3. Empirical Research on Digital Inclusive Finance, Level of Digitization and Rural Revitalization

The criteria adopted to measure the situation of DIF in rural areas may change from different research, but the Peking University Digital Financial Inclusion Index of China (PKU-DFIIC) is a widely selected option, and it is considered to be a critical standard in the analysis of China's DIF. Three dimensions – "breadth of coverage", "depth of usage", and "level of digitization" are measured in

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this index [11]. Most researchers agree that the development of DIF is positively related to the quality of life in the countryside, and they also reach a consensus that the construction of a digital village is necessary. Furthermore, several researchers set indexes related to digital construction in the countryside as explained or explanatory variables. The problem of endogeneity and heterogeneity is also recognized.

### 3.1. The Analysis of the Relationship between Digital Inclusive Finance and Rural Revitalization

Many researchers pay attention to how DIF affects life in the village, rather than researching digital construction itself. It is widely accepted that the development of rural regions can be promoted by the growth of DIF. However, the level of digitization plays an important role in this process.

Sun uses the PKU-DFIIC as an explanatory variable and the urban-rural income gap is set as the explained variable to build an econometric model, and several control variables are considered [12]. The conclusion is that the development of DIF will reduce the income gap [12]. From the side of users, compared to the traditional mode, the improved availability of DIF can satisfy residents' need for financial services in rural areas [12]. From the side of providers, the economies of scale are advantages of DIF, and the providers can run the business at a lower cost [12]. Furthermore, Sun also points out that access to the internet and digital devices for the user is critical [12].

Wang analyzes the effect of DIF in the countryside on the residents' consuming behaviors by setting PKU-DFIIC as the explanatory variable and the consumption inequality as the explained variable [4]. After all of the control variables are considered, the consumption inequality will reduce by 3.5% with one unit increase in the development of DIF, and Wang claims that DIF can significantly alleviate the issue of consumption inequality, which means the relative poverty problem can be relieved [4]. Two possible reasons are raised, one is that the development of DIF also led to the development of e-commerce, which means a more convenient online shopping experience and more choices of goods become available in rural areas; another possible reason is that the development of DIF may "alleviate credit constraint and promote the entrepreneurship", which means the income of residents in the rural area will be increased [4]. These two articles both imply that digital construction in the countryside is important.

Some other researchers have considered more aspects besides a single standard and made regression on the index of digitization. For instance, Xiong sets a new index, named "rural revitalization index", as the explained variable, which is constructed by the multiple indicators weighted by the entropy weight method [1]. This is a more comprehensive criterion that fairly reflects five aspects, called first-level indexes. Each of them is measured by several second and third-level indexes, while PKU-DFIIC is the explanatory variable [1]. The coefficient is 3.793, which is significant at a significance level of 1% [1]. This result supports the positive role of DIF in improving the quality of life in rural areas. However, a few additional models are also created, including the regression of level digitization, which is one component of PKU-DFIIC, on the rural revitalization index in this research [1]. It shows that the level of digitization is insignificant in a linear model, with a coefficient of 0.336. However, Xiong argues the poor condition of digitization in earlier periods would undermine the advantages that DIF has, and the benefits of digital construction may take some time for the researchers to notice [1]. By considering 2017 as a time node, Xiong shows that from 2011 to 2016, the coefficient of the level of digitization is -1.531 whereas from 2017 to 2020, the coefficient is 3.427, both coefficients are significant. Such results indicate the existence of a non-linear relationship between the level of digitization and rural revitalization [1]. This conclusion is further proven by another model that is quadratic in the level of digitization, in which the coefficients for the level of digitization and the squared term of the level of digitization are both significant [1].

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However, although the level of digitization of financial services is one of three factors that the PKU-DFIIC includes, the research on digital construction in the countryside is not fully reflected in this index. In general, the empirical analysis to show the significance of the construction of digital villages is still not adequate.

### 3.2. Set the Level of Digitization as Explained or Explanatory Variables

Some researchers conduct empirical analysis on digital construction in rural regions. It is thought that DIF would significantly encourage the construction of digital villages. Moreover, digital construction may also enhance the quality of life of villagers. Consequently, researchers treat digital construction in the village from different sides, some of them consider it as the explained variable but some of them consider it as the explanatory variable.

Zhang uses PKU-DFIIC to measure the situation of DIF, which appears as the explanatory variable. An index called 'digital village' is set as the explained variable, constructed by the entropy weighting method with data collected from financial investment, infrastructure, agricultural production, and living services [2]. An OLS model is constructed to explore the relationship between DIF and digital village, while several control variables are included, such as the current gross regional product per capita, and this research claims that there will be an increase of 1.037 in the index of "digital village" when the PKU-DFIIC index increases by one percent, and this coefficient is significant [2]. Zhang argues that one reason is that the popularity of DIF will enhance the digital literacy of villagers, which is essential for digital village construction [2]. Another reason is that compared to their traditional counterparts, DIF can promote technology innovation due to technology spillover, which facilitates the development of digital construction in rural areas [2]. Consequently, the development of DIF is beneficial for digital construction in China's rural areas.

Li and Yang use the logarithm of the county-level digital countryside index as the explanatory variable, which is an index designed by Peking University and AliResearch of Alibaba Group, and the logarithm of household income, which is collected from the China Household Finance Survey (CHFS), as the explained variable [13]. This research gives a significant coefficient of 0.5179 and reveals that constructing a digital village can increase household income [13]. They argue that improved information efficiency is the main reason: From an employee's view, digital construction alleviates the cost of finding jobs, and e-commerce can create numerous job vacancies [13]. In an employer's opinion, the reduced cost of running a business with the new mode with digital technology also enhances the profit of local entrepreneurs [13].

Cai researches the influence of digital construction on the residents from another view. On the one hand, this research uses three variables, including internet access (IA), internet management (IM) and inclusive finance (IF), as the explanatory variables that measure the digital construction of rural regions [3]. On the other hand, RFR is adopted as the explained variable, which is beyond the economic gain, and this concept is defined to be a family's ability to recover from a sudden change in economic situation or other factors [3]. The model used in this research is a DiD model, and RFR is based on the data collected from CHFS [3]. After adding control variables, the coefficients of IA, IM and IF are 0.043, 0.048 and 0.009 respectively and all of them are considered to be significant, which means all of them can improve the RFR of families [3]. Such phenomenon might be caused by the reduced information inequality due to the wide use of the Internet, and the digital construction also leads to the boom in e-commerce, which increased the sales of local products as more consumers are attracted [3].

These researchers reveal that digital construction plays an important role when DIF ameliorates the condition of the people living in the villages. They also imply that analyzing digital construction research is necessary when evaluating the impact of DIF on rural areas.

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### 3.3. The Issue of Endogeneity and the Regional Heterogeneity Analysis Related to Digital Inclusive Finance

However, other factors may influence the variables selected, which sometimes makes the coefficient selected unreliable and leads to the issue of endogeneity. Both Cai and Zhang argue that digital construction will also encourage the development of DIF, leading to the issue of reverse causality [2, 3]. Meanwhile, Both Qiu and Zhang argue that the issue of omitted variables is also worrying [2, 5]. To support the validity of the research, Zhang conducts an additional endogeneity test by employing the instrumental variable method and shows that DIF does encourage digital construction [2].

Researchers widely acknowledge that the issue of regional heterogeneity does exist when analyzing the effect of DIF and digital construction in rural regions. Xiong reckons that DIF can enhance the rural realization index more significantly in the central area than the eastern area, but it is not very useful in the western area, which indicates the lack of information technology in the western area would hinder the development of DIF [1]. Cai argues that in the eastern area, many digital facilities have already been built, and it is less beneficial to construct new ones compared to other regions, which means the coefficient of the regression of IA on RFR in the eastern regions (0.034) is lower than the average of China (0.043) [3]. Wang also reckons that the “digital divide” put the western area of China at a disadvantage [4]. Ren agrees that it is required to develop digital facilities in the western area to release the potential of DIF [6].

## 4. Problems in the Development of Digital Inclusive Finance and Obstacles Encountered in the Development of digital Villages

### 4.1. Outdated Digital Technology and Infrastructure

Some villages’ internet coverage is low, and a slow Internet speed will affect the quality of real-time communication made by residents and enterprises, hindering the development of rural regions. At the same time, some rural areas are not equipped with corresponding convenient electronic payment channels and financial facilities, such as branches of banks and ATMs, resulting in difficulties for residents in certain financial operations and reducing their willingness to use digital technology.

### 4.2. Inadequate Credit System

It is hard for financial institutions to precisely assess the borrowers’ credit risk based on the incomplete credit reporting system in rural areas. In the case of the difficulty of credit reporting and the unreliable source of information obtained, financial institutions may adopt a more conservative lending policy, and the cost of loans has increased. For some poor residents, the entry threshold for financial markets is too high [14].

### 4.3. High Risk of Information Leakage

The sharing mechanism is not rigorous and is the main source of information risk. Rural areas lack comprehensive digital security measures, so residents' personal information, especially financial information, is vulnerable to network violations. Alice mentioned a study managed by the European Union in her paper, which argues that about 70% of Europeans mind the security of the data, and this situation in China may account for more proportion [15]. Compared with urban areas, in rural regions, the acceptance of digitalization is not high. Privacy leaks caused by digital technology will greatly reduce residents' trust in using digital services.

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### 4.4. Large Geographic Heterogeneity in Development

There are differences in the economic development level, education level, and infrastructure construction in different regions, leading to the difference in the development of DIF and digital rural areas. As a result, the state of DIF in different regions is different. Researchers widely acknowledge that the western areas are in a position with disadvantages, they tend to enjoy fewer benefits from DIF, and the situation of digital construction is not optimistic. Meanwhile, the process between urban and rural areas is also different.

### 4.5. Few Digital Construction Talents

Digital rural development is inseparable from technical talents, but some rural areas lack related digital technology education and training resources, and cannot foster digital technical talents, which restricts technological innovation, the promotion and operation of digital projects, affecting the speed and quality of digital rural development and digital financial inclusion development.

### 4.6. Backward Education in Rural Areas

Due to the backward education of rural areas compared to urban areas, the phenomenon of the digital gap between residents is serious, and residents with lower education levels cannot fully enjoy digital financial services. It is difficult for residents with low financial support to fully understand and use complex financial products and digital financial instruments.

### 4.7. High Opportunity Cost for Financial Institutions

Entering DIF may face many problems, including technical investment and platform maintenance costs, talent training costs, compliance costs, market promotion costs, data security costs, and human resources costs. These costs are difficult to return quickly in the early stage, which may affect the profitability and development of financial institutions. Financial institutions also need to cope with the fierce competition market and changing regulatory policies, which also increases the chance of entering the field of DIF.

## 5. Recommendations

### 5.1. Strengthen Rural Digital Infrastructure

To enhance the quality of digital facilities, it is necessary to provide rural areas with more computers and Internet equipment to the users. Also, it is important to build rural broadband networks and expand network coverage to improve network speed and quality, and on this basis, promote rural electronic payment and enhance the productivity of digital resource allocation. With a better digital infrastructure, the quality of DIF can be improved.

### 5.2. Improve the Credit System and Strengthen the Legal System and Supervision

In their article, Bin Wang and Xi Wang mention that one of the most crucial parts of the health of DIF is the establishment of a credit reporting system [16]. To solve related issues, relevant departments can assist the establishment of the credit reporting system and promote the establishment of a comprehensive, accurate, and secure personal credit information database in rural regions. Based on this, the credit reporting system is established to improve the degree of control of the credit status of borrowers in financial institutions and reduce risks.

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### 5.3. Coordinate Regional Development

The government can formulate a unified digital inclusive financial policy direction, clarify the development goals and priorities of different regions, and achieve a unified plan for digital financial development nationwide. Through the guidance and supervision of policies, the reasonable distribution of financial resources in different areas of China can be constructed, to ensure that financial resources can cover all parts of urban and rural areas.

### 5.4. Improve Welfare Benefits for Construction and Rural Areas

It is important to provide digital technology talents with a good working environment and welfare benefits, such as housing subsidies, children's education subsidies, medical insurance, etc. At the same time, making clear promotion and development paths to digital technology talents, and providing them with training and development opportunities to participate in the construction and application of advanced digital technology is significant, so that they can feel that they can also have room for career development and realize their self-worth by working in rural areas.

### 5.5. Encourage Residents to Receive Education

For residents in rural regions, relative departments can provide more digital educational resources, and conduct financial literacy training and promotional activities, including online courses and online teaching platforms, targeting rural residents and rural enterprises, to enhance their financial awareness, promote the digitization and intelligence of rural education, and enable them to understand and make good use of financial products.

### 5.6. Develop Financial Products According to Local Conditions

By researching the financial needs, such as the loan needs, savings needs, and investment needs of local farmers and rural enterprises, financial products consistent with the actual situation of the local area can be developed, which can be designed for the agricultural production of loan products, micro-credit products, and rural credit unions' mutual assistance and co-insurance products, etc.

### 5.7. Lower the Entry Barrier for Financial Institutions

The government can introduce regulatory policies for DIF, simplify the access procedures and requirements for financial institutions, and reduce the difficulty for regulators to approve new fintech products and services. It can also provide technical support to financial institutions for digital financial services, including the development and maintenance of digital financial platforms, data security technology, and the design of digital financial products, so as to reduce their technology development and maintenance costs. Meanwhile, financial institutions entering DIF can also be subsidized with monetary support and tax incentives.

## 6. Conclusion

This article responded to the rural revitalization strategy, and the impact of the development of DIF on the development of DIF on digital village construction concentrates on the research and literature of predecessors. The development of DIF has improved the rural inhabitants' life quality, strengthened the RFR of a single family, and promoted the establishment of a digital village. At the same time, this article also studied the impact of digital rural construction on the development of DIF and found that it was also positive.

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There are some limitations in this article in the research process. The research content focuses on theoretical research and is not sufficiently combined with the specific actual situation. In the collected documents, few of them focus on the direct research on the relationship between DIF and digital rural establishment. To solve the shortcomings of this study, the research scope in this topic might be expanded in the future. It is possible to conduct more in-depth research regarding digital rural development from China to the world and its connection with DIF. Although rich academic literature has emerged in DIF and rural areas, it is still in the growth period of research, and there is huge academic development potential and development space.

## Authors Contribution

All the authors contributed equally and their names were listed in alphabetical order.

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