Analysis on the Path of Digital Villages Affecting Rural Residents’ Consumption Upgrade: Based on the Investigation and Research of 164 Administrative Villages in the Pilot Area of Digital Villages in Zhejiang Province

1. Introduction

As one of the three troikas driving the national economy, consumption is the main driving force for the transformation of China’s economic structure and the realization of endogenous economic growth. With the successive proposals of China’s rural revitalization strategy and the dual-cycle strategy with the domestic market as the mainstay, it is of great significance to effectively activate the blue ocean of rural consumption and fully release the consumption potential of rural residents to empower rural development and smooth the domestic economic cycle. However, according to statistics, the total consumption of rural residents, who account for nearly 40% of China’s total population, only accounts for about 20% of the total consumption, and the consumption potential of rural residents has not been fully released.

Since the 18th National Congress of the Communist Party of China, the central government has attached great importance to digital construction, especially the digital construction of agriculture and rural areas, and it has also made strategic arrangements for digital construction many times. Accelerating the construction of rural infrastructure focusing on new infrastructure construction provides digital empowerment for expanding rural consumption and also provides a new perspective and opportunity for this paper.

The marginal contribution of this paper is that the existing research mainly focuses on the development and transformation of rural industries under the digital village policy, but few scholars have explored the impact of digital villages on the consumption upgrade of rural residents. From the perspective of digital villages, this paper uses the degree of policy understanding, policy participation, and policy influence as measurement indicators to quantify
digital village policies and innovatively explore the relationship between digital villages and rural residents’ consumption upgrades.

2. Literature Review and Research Hypotheses

With the proposal of the digital village policy, the impact of digital technology on the consumption of rural residents has become a new focus of academic attention. While promoting the industrial productivity and sustained economic growth [1]; digital technology profoundly affects people’s living habits and behaviors [2]; which in turn affects and changes the consumption concept, consumption pattern, and consumption structure of rural residents [3]. So, this paper draws the following hypothesis:

H1: the digital village has a significant positive impact on the consumption upgrade of rural residents.

Rural households often reduce risk by diversifying their income. The impact of the rural digital economy on income is a mixture of agricultural income such as agricultural product prices, output, sales, and nonagricultural income such as employment opportunities and wages [4]. Digital technology promotes rural economic development and farmers’ income levels by enhancing the mobility of factors between urban and rural areas [5]. Farmers’ income is specifically divided into four parts: farmers’ operating income, wage income, property income, and transfer income [6]. The digital village policy is conducive to encouraging rural labor to start businesses and employment, provides employment guidance and guarantees, promotes the continuous transfer of rural labor to nonagricultural industries, and vigorously promotes the continuous growth of farmers’ wage income, property income, and transfer income [7].

Regarding the impact of income on consumption, Flavin [8] believes that people’s consumption has a strong correlation with their future expected income and concludes that consumption is “excessively sensitive” to income. Zeldes [9] affirmed the influence ability of stochastic fluctuation income on consumption decisions by studying the influence of stochastic fluctuation income on consumption optimization behavior. From this research results, this paper draws the following hypothesis:

H2: the total income of rural residents, wage income, transfer income, property income, and household business income are the transmission paths of digital rural areas to promote the upgrading of rural residents’ consumption.

Initially, only a few foreign scholars conducted a simple exploration of farmers’ information literacy. Mohamedali [10] pointed out that agricultural development needs to educate agricultural practitioners to obtain information. Ejedarifu [11] pointed out that the cheapest input for rural development is knowledge. With the continuous and in-depth development of different policy environments, domestic and foreign scholars and related research institutions have begun to pay attention to the cultivation of farmers’ information literacy. Taking the information process as a framework, combining rural environmental changes and farmers’ own development requirements, they analyze information needs from the perspective of information literacy theory, information acquisition, information transmission, information cognition, information regeneration, and information effect, and then take these as the content elements of information literacy that farmers need to cultivate [12]. As for the influence of digital countryside on information literacy, some scholars have pointed out that digital countryside can improve rural residents’ participation in the digital economy through the penetration of the Internet [13]. Farmers can obtain various important information about agriculture through the Internet, learn about relevant agricultural policies in time, and reduce the degree of information asymmetry. Regarding the impact of information literacy on consumption upgrades, Nakasone et al.’s [14] research found that financial information literacy significantly improved household consumption expenditure and consumption propensity. Meng and Yan [15] believe that household information literacy significantly increases the total rural household consumption expenditure and service consumption expenditure. Therefore, this paper proposes the following hypothesis:

H3: the improvement of rural residents’ information literacy is the transmission path for the digital village to promote rural residents’ consumption upgrade.

3. Data Source, Variable Selection, and Model Construction

3.1. Data Sources. The scope of this study covers 164 villages in Lin’an District, Cixi City, Pinghu City, and Deqing County. The formal survey adopts the form of random distribution of questionnaires, and the questionnaires are divided into two parts: objective questions and subjective questions. The objective question is to investigate the basic information of local residents, including occupation and education level. The subjective question focuses on the construction of digital villages, the influence mechanism of rural residents’ consumption, and the consumption of rural residents. The questionnaires were divided into self-administered questionnaires and substitute-filled questionnaires. Elderly rural residents were assisted by members of the group to fill in, while the rest of the subjects completed the questionnaires by themselves. In view of the research requirements to ensure the effective recovery rate of the questionnaires, a total of 1204 questionnaires were issued, and the final questionnaire was recovered and confirmed to be 1034 valid copies, with an effective questionnaire rate of 85.88%. The valid questionnaire will also be used as the original data of the later writing report.

3.2. Variable Selection

3.2.1. Control Variable-Basic Information of Villagers. The control variables in this paper include whether they have purchased social insurance, whether they have access to broadband networks, and villagers’ consumption concepts.
Among them, whether they have purchased social insurance (Insurance Condition) is used to control the impact of whether you have paid social insurance fees on the consumption upgrade. If they pay social insurance fees, it will inevitably lead to a decrease in income, which may affect consumption upgrades; whether to access broadband networks (Broadband) is used to control the impact of Internet use on villagers’ consumption upgrade; the consumption concept is used to control the impact of different consumption concepts on villagers’ consumption upgrade.

3.2.2. Independent-Digital Rural Dimension. Digital village is the application of networking, informatization, and digitization in agricultural and rural economic and social development. It is also a process of modernization and transformation of agricultural and rural areas that is endogenous to the improvement of farmers’ modern information skills. In view of this, this paper refers to the summary of the digital village by Zeng et al. [16]; and investigates the digital village from the following three dimensions: (1) Policy understanding: whether residents pay attention to the local digital village policy; (2) Policy participation: whether villagers participate in the construction of digital villages and whether to promote digital village policies; (3) Policy influence: whether villagers are affected by digital village policies.

3.2.3. Dependent Variable-Consumption Upgrade Dimension. Consumption upgrade is usually manifested in the improvement of consumption level, the improvement of consumption quality, the strengthening of consumer interest protection, and the structural upgrade and level improvement of various consumption expenditures in the total consumption expenditure. Referring to the processing method of Kong and Li [17]; this paper investigates the consumption upgrade from the two dimensions of rural residents’ consumption habits (Habit) and rural residents’ consumption structure (Structure). Consumption structure refers to the proportion of various consumption expenditures in total expenditures. The consumption structure of rural residents is embodied in the proportion of rural residents’ expenditure in basic consumption and high-end consumption [18]. With the continuous increase of income and the change of consumption concept, rural residents tend to pursue higher-quality consumption, and the level of their consumption structure has gradually improved. Consumption habit refers to a behavioral manifestation of the consumer’s stable consumption preference for a certain consumer object formed in the process of long-term consumption practice by the main consumer. The consumption habits of rural residents are embodied in the characteristics of villagers buying products, receiving services, and changes in consumption patterns [19].

3.2.4. Intermediation Variable-Information Literacy Dimension. This paper mainly refers to the classification of information literacy by Yan et al. [20] and measures the information literacy level of rural residents from the following two indicators: (1) Information ability (Skill), which is divided into information acquisition ability, information understanding ability, and Information sharing ability which is embodied in the use of computer networks, office software and mobile payment by rural residents; (2) Information awareness (Recognition), which is specifically divided into two aspects: information value awareness and information demand awareness.

3.2.5. Mediation Variable-Income Level Dimension. Villagers’ consumption expenditure is closely related to their disposable income. The current income increase will promote the basic consumption and restrain the consumption of high-end goods; persistent income increase will restrain the consumption of basic goods and promote the consumption of high-grade goods [21]. Referring to the handling method of Wei and Venayagamoorthy [21]; this paper examines the income level from the following two dimensions: (1) wage income (Wage), which is reflected in the impact of the increase in villager wage income on consumption upgrading; (2) nonwage income, including operating income (operating), property income (property), and transfer income (transfer), is embodied in the impact of the growth of villagers’ nonwage income on consumption upgrades.

3.3. Model Building

3.3.1. The Multiple Linear Regression Model of the Digital Village to Promote Rural Residents’ Consumption Upgrade. Based on the consideration of literature and field research, this paper decides to first use the multiple linear regression model to explore the effect of the digital village and its subdimensions on the consumption upgrade of rural residents. The specific regression equation constructed in this paper is as follows:

\[
\begin{align*}
C_{\text{Structure}} &= \alpha_1 D_{\text{Village}} + \sum_{\sigma=2}^{n} \text{Control} \cdot \alpha_{\sigma} + \beta, \\
C_{\text{Habit}} &= \gamma_1 D_{\text{Village}} + \sum_{\sigma=2}^{n} \text{Control} \cdot \gamma_{\sigma} + \delta,
\end{align*}
\]

where \(C_{\text{Structure}}\) is the consumption structure, \(C_{\text{Habit}}\) is the consumption habit, \(D_{\text{Village}}\) is the digital countryside, and Control is the control variable.

3.3.2. The Mediating Effect Model of Digital Villages to Promoting Rural Residents’ Consumption Upgrade. This paper takes the rural residents’ income as the intermediary variable and divides the income into five categories: wage income level, transfer income level, property income level, operating income level, and total income level. This paper uses the Bootstrap method [1] to test the intermediary role of the income level in the impact of digital rural areas on the consumption upgrading of rural residents.
Meanwhile, in order to ensure the robustness of the test results of parallel mediation effects, process is used to construct a custom path model.

3.3.3. Structural Equation Model of Digital Village to Promote Rural Residents’ Consumption Upgrade. In this paper, confirmatory factor analysis was carried out on 4 latent variables and 15 observed variables. The structural validity test is shown in Table 1. All model fitting indicators meet the standards.

It can be seen from Table 2 that the factor loads of all latent variables in the model are all greater than 0.7, indicating that each latent variable has a good representativeness for the topic to which it belongs. In addition, the average variance variation AVE of each latent variable is greater than 0.5, and the combined reliability CR is greater than 0.75, indicating that the convergent validity is ideal.

4. Results and Analysis

4.1. Descriptive Statistical Analysis. Based on 1034 valid samples, this paper conducts a descriptive analysis from the perspective of demographic characteristics. In terms of gender, in order to avoid the specific situation of the respondents in the questionnaire, during the investigation process, we avoided crowds in gathering places and tried our best to choose people who walked freely and store fronts along the street for the investigation. The final descriptive statistics of basic information are shown in Table 3.

4.2. Regression Outcome Analysis. This paper uses SPSS23.0 to establish a multiple regression model and introduces independent variables, dependent variables, and control variables for analysis. The results obtained are shown in Table 4:

Therefore, the table above can obtain

\[
C_{\text{Structure}} = 0.696 \cdot D_{\text{Village}} + \sum_{\alpha=2}^{n} \text{Control} \cdot \alpha_{\alpha} + 1.295,
\]

\[
C_{\text{Habit}} = 0.696 \cdot D_{\text{Village}} + \sum_{\gamma=2}^{n} \text{Control} \cdot \gamma_{\gamma} + 1.635.
\]

(2)

That is, after controlling for the interference of all control variables such as gender, age, occupation, education level, health status, insurance status, annual income, family size, household broadband access, and location, digital villages can significantly promote rural residents’ consumption structural upgrade (\(=0.696, \; p < 0.001\)) and it can also significantly improve the consumption habits of rural residents (\(=0.654, \; p < 0.001\)).

4.3. Heterogeneity Analysis

4.3.1. Grouped by Region. The impact of the digital village on rural residents’ consumption upgrading may be different in different pilot areas, which may be reflected in the difference in the actual implementation of this policy in different regions. Based on this, this paper divides all data into four categories according to different pilot areas. The results of the regression models in different regions are shown in Tables 5 and 6:

As can be seen from the table, digital villages have a significant effect on promoting the consumption upgrading of rural residents in different pilot areas. Specifically, on the one hand, the digital countryside promoted the upgrading of rural residents the most (\(p < 0.01\)), Pinghu County second (\(p < 0.01\)), Cixi City third (\(p < 0.01\)), Deqing County smallest (\(p < 0.01\)); on the other hand, the digital countryside on the Pinghu County pilot rural residents consumption habits change (\(p < 0.01\)), Cixi City second (\(p < 0.01\)), Deqing County third (\(p < 0.01\)), and Linan District the smallest (\(p < 0.01\)).

\[\alpha_1 = 0.75\alpha_1 = 0.72\alpha_1 = 0.68\beta_1 = 0.59\beta_1 = 0.71\alpha_1 = 0.68\alpha_1 = 0.59\alpha_1 = 0.37\]

4.3.2. Grouped by Age. There are great differences in the acceptance of digital technology by different age groups. This paper divides the surveyed rural residents into young people (under 40 years old, excluding 40 years old) and middle-aged and elderly people (over 40 years old). The regression results are shown in Tables 7 and 8:

As can be seen from the above table, the digital countryside can significantly promote the upgrading of the consumption structure of rural residents of all ages and also have a significant positive impact on the change of rural residents’ consumption habits. Among them, the positive effect of the digital countryside on the consumption upgrading of groups under 40 is greater than that on groups aged 40 and over.

4.3.3. Grouped by Gender. There are great differences in the consumption concepts among the different genders, which may also lead to the differences in the consumption structure and consumption habits of the different gender groups in the digital villages. Based on this, all the subjects were divided into men and women for separate regression analysis, and the results are shown in Tables 9 and 10:

As can be seen from the above table, digital villages can have a significant impact on the consumption structure and consumption habits of different gender groups, and the promotion of the consumption structure of male groups is greater than that of women.

4.4. Mediating Effect Test Results. It can be seen from Table 11 that the confidence interval of Bootstrap test for wage income level, property income level, and total income level does not contain 0. At a 95% confidence level, the confidence interval of Bootstrap test for both transfer income level and operational income level is 0. Therefore, the wage income level, property income level, and total income level of rural residents are the transmission path of digital rural policy to promote the upgrading of rural residents’ consumption structure.
Table 1: Structural validity test table.

| Metric      | $X^2/df$ | GFI  | RMSEA | CFI   | NFI   | NNFI   |
|-------------|----------|------|-------|-------|-------|--------|
| Value       | 2.14     | 0.91 | 0.08  | 0.93  | 0.94  | 0.95   |
| Standard    | <3       | >0.9 | <0.10 | >0.9  | >0.9  | >0.9   |
| Fitting results | Ideal  | Ideal| Ideal | Ideal | Ideal | Ideal  |

Table 2: Results of observed variables.

| Variables                  | $M$ (SD)     | $\beta$      | AVE | CR  |
|----------------------------|--------------|---------------|-----|-----|
| Digital village            |              |               |     |     |
| Understanding              | 2.86 (0.65)  | 0.73***       | 0.63| 0.84|
| Participation              | 2.75 (0.74)  | 0.84***       |     |     |
| Influence                  | 3.55 (0.66)  | 0.81***       |     |     |
| Information literacy       |              |               |     |     |
| Skill                      | 4.00 (0.93)  | 0.84***       | 0.55| 0.83|
| Recognition                | 4.07 (0.72)  | 0.77***       |     |     |
| Consumption structure      |              |               |     |     |
| Q3_1                       | 3.50 (0.77)  | 0.78***       | 0.61| 0.86|
| Q3_2                       | 3.32 (0.84)  | 0.82***       |     |     |
| Q3_3                       | 3.53 (0.79)  | 0.75***       |     |     |
| Q3_4                       | 3.35 (0.75)  | 0.76***       |     |     |
| Consumption habit          |              |               |     |     |
| Q3_5                       | 3.55 (0.85)  | 0.68***       | 0.56| 0.84|
| Q3_6                       | 3.42 (0.87)  | 0.84***       |     |     |
| Q3_7                       | 3.57 (0.89)  | 0.75***       |     |     |
| Q3_8                       | 4.00 (0.93)  | 0.72***       |     |     |

Table 3: Descriptive statistics of basic information.

| Elementary item          | Content                     | Frequency | Percentage (%) |
|--------------------------|-----------------------------|-----------|----------------|
| Gender                   | Man                         | 576       | 55.71          |
|                          | Woman                       | 458       | 44.29          |
| Age                      | <40 years old               | 665       | 64.31          |
|                          | ≥40 years old               | 369       | 35.69          |
| Completely uneducated    |                             | 5         | 0.48           |
| Primary school           |                             | 69        | 6.67           |
| Junior middle school     |                             | 278       | 26.89          |
| Education background     | High school (vocational high school, high technology) | 343 | 33.17 |
|                          | Special school              | 45        | 4.36           |
|                          | Junior college              | 178       | 17.21          |
|                          | Bachelor degree or above    | 116       | 11.22          |
| Insurance status         | Have bought                 | 810       | 78.34          |
|                          | Did not buy                 | 224       | 21.66          |
| Family size              | 1                           | 8         | 0.78           |
|                          | 1–3                         | 215       | 20.79          |
|                          | 3–5                         | 699       | 67.60          |
|                          | More than 5                 | 112       | 10.83          |
| Broadband                | Yes                         | 978       | 94.58          |
|                          | No                          | 56        | 5.42           |
| Annual income            | Below 6w                    | 88        | 8.51           |
|                          | 6w–9.6w                     | 304       | 29.40          |
|                          | 9.6w–13.2w                  | 359       | 34.72          |
|                          | 13.2w–16.8w                 | 176       | 17.02          |
|                          | Above 16.8w                 | 107       | 10.35          |
| Area                     | Lin’an district, Hangzhou   | 398       | 38.49          |
|                          | Cixi city, Ningbo city      | 324       | 31.34          |
|                          | Pinghu city, Jiaxing city   | 157       | 15.18          |
|                          | Deqing county, Huzhou city  | 155       | 14.99          |
Table 4: Results of the multiple regression analysis.

| Dependent variable: C_Structure | Dependent variable: C_Habit |
|--------------------------------|-----------------------------|
| Constant                       | \( \beta \)                 | Constant                       | \( \delta \)                 |
|                                | 1.295 (0.183)               |                                | 1.635 (0.217)                |
| Independent variable           | D_Village                   | Independent variable           | D_Village                   |
|                                | 0.696*** (0.057)            |                                | 0.654*** (0.068)            |
| Controlled variable            | YES                         | Controlled variable            | YES                         |
|                                | R²                           |                                |                             |
|                                | 0.52                         |                                |                             |
|                                | F                             |                                |                             |
|                                | 148.47***                    |                                |                             |
| Note: due to space limitation, all control variables are not listed in the regression results, the same below. |

Table 5: Regression analysis of consumption structure upgrading of rural residents in different regions.

| Lin'an district | Cixi city |
|-----------------|-----------|
| Independent variable | D_Village | Independent variable | D_Village |
|                  | 0.75*** (0.11) |                  | 0.68*** (0.04) |
| Controlled variable | YES | Controlled variable | YES |
|                  | R² | F                   |     |
|                  | 0.45 | 45.53*** |     |
| Pinghu city | Deqing county |
| Independent variable | D_Village | Independent variable | D_Village |
|                  | 0.72*** (0.07) |                  | 0.59*** (0.11) |
| Controlled variable | YES | Controlled variable | YES |
|                  | R² | F                   |     |
|                  | 0.60 | 104.12*** |     |

Table 6: Regression analysis table of the improved consumption habits of rural residents in different regions.

| Lin'an district | Cixi city |
|-----------------|-----------|
| Independent variable | D_Village | Independent variable | D_Village |
|                  | 0.37*** (0.11) |                  | 0.68*** (0.04) |
| Controlled variable | YES | Controlled variable | YES |
|                  | R² | F                   |     |
|                  | 0.18 | 5.08*** |     |
| Pinghu city | Deqing county |
| Independent variable | D_Village | Independent variable | D_Village |
|                  | 0.71*** (0.06) |                  | 0.59*** (0.11) |
| Controlled variable | YES | Controlled variable | YES |
|                  | R² | F                   |     |
|                  | 0.57 | 91.60*** |     |

Table 7: Regression analysis table of consumption structure upgrading among rural residents of different ages.

| Age | <40 | ≥40 |
|-----|-----|-----|
| Independent variable | D_Village | D_Village |
|                  | 0.732*** (0.07) | 0.575*** (0.09) |
| Controlled variable | YES | YES |
|                  | R² | F                   |     |
|                  | 0.55 | 99.89*** |     |

Table 8: Regression analysis table of the improved consumption habits of rural residents of different ages.

| Age | <40 | ≥40 |
|-----|-----|-----|
| Independent variable | D_Village | D_Village |
|                  | 0.846*** (0.09) | 0.172*** (0.11) |
| Controlled variable | YES | YES |
|                  | R² | F                   |     |
|                  | 0.34 | 40.72*** |     |
As shown in Table 12, the mediating effect of total income level is significant. Therefore, the wage income level, property income level, and total income level of rural residents are the transmission path of digital rural policies to promote the improvement of rural residents' consumption habits.

4.5. Empirical Analysis Results. Figure 1 shows the standardized path coefficient and mediating effect test of “Digital countryside-Information literacy-Consumption upgrade” in this paper. As can be seen from the figure, the standardized path coefficient of information literacy in the digital countryside is 0.75, the standardized path coefficient of
information literacy on consumption structure is 0.69, while the standardized path coefficient of digital villages is 0.42, then the path coefficient of information literacy that indirectly affects the consumption structure is 0.52. The standardized path coefficient of consumption habits in digital villages is 0.59, and the standardized path coefficient of information literacy on consumption habits is 0.71, so the path coefficient of digital rural information literacy that indirectly affects consumption habits is 0.53.

5. Main Conclusions and Policy Recommendations

Through descriptive statistics, it is preliminarily found that there is a positive transmission relationship between digital countryside and consumption upgrading. Four types of character portraits are depicted using hierarchical clustering analysis, forming a more comprehensive understanding of the sample characteristics; in terms of the quantitative analysis, in this paper, the integrated use of multiple linear regression, the intermediary effect model, and structural equation model type solid conclusions: First, information literacy is the intermediary of the digital village to promote the rural residents’ consumption upgrade path, still exist in the current rural information access to a single, villagers low demand, such as the weak part of the villagers’ autonomous learning ability. Second, the digital countryside can promote the consumption upgrading of rural residents through the intermediary path of “rural residents’ income.” As the majority of farmers’ income, operational income becomes the main factor influencing the consumption upgrading effect of rural residents in the digital countryside. Third, the mediating effect of “transfer income” in rural residents’ income is not significant. Most rural residents do not have transfer income and have no influence on consumption. Some rural residents with transfer income are not clear about subsidy standards and regulations. Fourthly, digital countryside plays a more significant role in the consumption upgrading of young people in rural areas, but not in the transformation of consumption habits of middle-aged and old people.

Based on this, this paper puts forward the following policy recommendations: first, promote the process of rural infrastructure construction and improve the information literacy of rural residents by comprehensively covering the project of bringing information into villages and households, stimulating farmers’ demand for information learning and strengthening rural residents’ independent learning ability; second, by encouraging farmers to start their own businesses, training rural e-commerce innovation talents and focusing on the mining of rural local characteristic resources to improve the construction of rural e-commerce system, and further stimulate farmers’ operating income potential; third, by unifying the standard of comprehensive income
subsidies, improving the regulations on special agricultural subsidies, and effectively increasing financial support for agriculture, we should improve the system of transfer payments to support agriculture and boost the consumer confidence of rural residents. Fourthly, by improving rural residents' participation in government affairs, implementing information popularization and propaganda, and increasing the training and guidance for the elderly and other key groups, the differences in access to information can be narrowed.

Data Availability

The dataset can be accessed upon request.

Conflicts of Interest

The authors declare that they have no conflicts of interest.

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