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# Research on the Sustainable Development of Rural Green Economy Based on Data Mining and Technology Integration

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**Abstract:**
This study explores the sustainable development of rural green economy through the lens of data mining and technology integration. By leveraging advanced data analytics and integrating diverse technologies, we aim to uncover patterns, insights, and strategies that can drive the eco-friendly and sustainable growth of rural economies. The research delves into the methodologies of data mining, the synergies of technology integration, and their practical applications in rural settings. The findings underscore the potential of these approaches in enhancing agricultural productivity, optimizing resource allocation, and fostering environmental sustainability in rural areas.

**Keywords:** rural green economy, data mining, technology integration, sustainable development, agricultural productivity, environmental sustainability.

## INTRODUCTION

With the global attention on sustainable development issues continuing to rise, the sustainability of rural development in China has gradually become a focal point for both academia and policymakers. Against the backdrop of the Chinese government's vigorous promotion of the "Rural Revitalization" strategy, ensuring the sustainable development of rural economies is of paramount importance. This study employs data mining techniques to analyze large datasets related to rural economic activities, aiming to identify trends and patterns of sustainable practices and to analyze the impact of green development policies on rural revitalization. The research aims to provide scientific and objective evidence for the precise implementation of policies, thereby promoting positive, effective, and sustainable development in rural areas.

In recent years, numerous scholars have conducted in-depth research on this topic, proposing a series of theoretical and practical methods. Khoshnava et al.[1] focused their research on infrastructure as a pillar of economic growth, advocating for a rethinking of infrastructure strategies and economic prosperity through green capabilities. The study revealed the connection between green infrastructure (GI) and the green economy (GE), such as energy efficiency. It proposed a methodological approach: using the Analytic Network Process (ANP) to prioritize GI criteria and using them as input information for implementing GE in the context of sustainable development; and employing the Adaptive Neuro-Fuzzy Inference System (ANFIS) to implement GE in the context of sustainable development (SD). The results showed that four main GI criteria (i.e., affordability, resource efficiency, energy efficiency, and air quality) accounted for over 80% of effectiveness. Adamowicz et al.[2] aimed to introduce the concept of the green economy and its relationship with other related concepts, assessing its importance for the formation of development policies and the practical resolution of socio-economic issues. Starting from the definitions and principles of the green economy and green growth, the study further explored the indicators of the green economy and green growth, as well as the relationship between these concepts and the sustainable development goals. Both of these studies emphasize the importance of the green economy and sustainable development, but they differ in their research focuses and methods, providing different strategies and tools to achieve this goal.

Chinese scholars have conducted extensive research on rural revitalization and sustainable development, contributing valuable insights and methodologies to the field. Shi et al.[3] provided a new perspective for assessing rural sustainability, overcoming the limitations of previous single-method approaches. Their study, based on the Rural Revitalization Index framework, analyzed the rural development levels of 31 provincial-level administrative regions in China from 2000 to 2020. The results indicated that while the overall development level of rural areas in China has improved, this improvement is not consistent across all regions. Meng et al.[4] focused on farmers'

cooperatives, conducting an in-depth study of the organizational structure and management practices of rural cooperative organizations in China. Their research aimed to enrich the development methods of sustainable rural cooperatives and contribute to the knowledge base of rural revitalization in contemporary China. Cui et al.[5] conducted research on rural revitalization based on the protection and inheritance of local intangible cultural heritage (ICH). Their study profoundly explored the role of ICH in rural revitalization from three levels: government, universities, and villages, and provided sustainable development strategies for integrating ICH into rural revitalization. Cai et al.[6] used the Scopus database and bibliometric analysis methods to analyze the latest progress of papers related to rural revitalization and sustainable development from 1995 to 2023. The study found that the popularity and acceptance of research on these topics have significantly increased since 2018, with Chinese scholars leading the field in the number of published research papers.

Sanming, as an important practice area of China's ecological civilization thought, serves as the ecological barrier of Fujian Province. Over the years, the region has leveraged its ecological advantages, implemented the concept of green development, and coordinated ecological environmental protection with rural revitalization. It has carried out relevant actions to enhance the "aesthetic value" of the ecology and to explore the "economic value," creating a typical demonstration of rural green development. This study employs an empirical approach, conducting field research in five rural revitalization demonstration villages in Sanming City, Fujian Province. Through questionnaires and in-depth interviews, the study aims to understand the implementation of the rural revitalization strategy at the grassroots level and the villagers' comprehension and recognition of the policies. This approach allows for an understanding of the main practices and existing problems in grassroots rural revitalization, providing references for the Chinese government to further implement relevant policies in the future.

This study selects Sanming City in Fujian Province, an important practice area of China's ecological civilization thought, as a representative region. It particularly focuses on the participation and sense of identification of villagers in the process of rural revitalization. Starting from a grassroots perspective, the study extracts universally significant experience models and existing problems, aiming to provide a scientific and objective reference for the Chinese government to further implement the rural revitalization strategy. This contributes to the precise policy-making and effective implementation of policies

## SUBJECTS AND METHODS

### General Information

This survey selected five villages as the research objects, namely Shuiji Village, Lingxia Village, and Chongji Village in Taining County, Changkou Village in Jianglexian County, and Yubang Village in Shaxian District. These villages have achieved remarkable results in protecting natural resources and improving the ecological environment, and have embarked on a path of characteristic development.

**Shuiji Village, Taining County:** Shuiji Village in Taining County comprises 4 natural villages and 4 villagers' groups, with a registered population of 584 people. Located by the shores of Dajin Lake, it was once a provincial-level impoverished village. In recent years, leveraging its aquatic resources and geographical advantages, the village has explored a "association + company + farmer" tourism poverty alleviation model, participating in various industries related to the Jinhua Scenic Area. This has led to tourism-assisted agriculture, revitalization, and enrichment, earning the village multiple honors. In 2019, the village collective income reached 2.88 million yuan, with an average disposable income per capita of 21,000 yuan.

**Lingxia Village, Taining County:** Lingxia Village in Taining County includes 4 natural villages and 8 villagers' groups, with a registered population of 1,188 people. As a key revolutionary base village, it preserves historical sites such as the former site of the Soviet government. Under the impetus of the rural revitalization strategy, the village continues the spirit of the Soviet area, promoting the development of red resources, cultural dissemination, and story inheritance. It has developed red tourism, ecological farming, and rural cultural construction, creating ecological agricultural product brands. In 2021, it was recommended as a "Fujian Province Rural Revitalization Study and Education Sites."

**Chongji Village, Taining County:** Chongji Village in Taining County consists of 8 natural villages and 16 villagers' groups, with a registered population of 1,603 people. Located in the southern part of Shangqing

Township, it has convenient transportation and a significant geographical advantage. The main industries are a combination of culture and tourism. Relying on the operation of tourism professional cooperatives, the village has developed multiple projects and has been listed as one of the second batch of "National Key Tourism Villages." Due to the impact of the pandemic, the tourism industry has been sluggish, leading many villagers to seek work elsewhere. The remaining village population is over 200 people, with a shortage of young and able-bodied labor, which constrains the sustainable economic development.

**Changkou Village, Jianglexian County:** Changkou Village in Jianglexian County comprises 3 natural villages and 7 villagers' groups, with a registered population of 1,242 people. Located in the southeastern foothills of the Wuyi Mountains and in the middle and lower reaches of the Jinxi River, a tributary of the Min River, the village has a forest coverage rate of 92% and is rich in ecological resources. As the birthplace and practice site of the "Two Mountains" theory, the village adheres to the simultaneous development of protection and exploitation of village collective economy. Through various methods to activate resources, it has carried out cooperative operation and joint development, exploring relevant development paths. In 2021, the village collective income reached 1.45 million yuan, with an average disposable income per capita of 29,000 yuan.

**Yubang Village, Shaxian District:** Yubang Village in Shaxian District includes 5 natural villages and 7 villagers' groups, with a registered population of 1,112 people, of which 670 people are engaged in the snack business outside the village, accounting for 60%. As the "first village of Shaxian snacks," almost every household is involved in the snack industry. Leveraging its brand advantage, the village focuses on industrial integration, extending and creating characteristic planting bases for Shaxian snack raw materials, and launching interactive experience projects. It has improved the "three-governance integration" of rural governance, optimized characteristic rural tourism, and received multiple honors.

Table 1. Measurement variables of the scale

| Variable Type | Latent Variable | Observable Variable |
|---|---|---|
| Exogenous Latent Variable | a1 Demographic Characteristics | a11 Gender |
| | | a12 Age |
| | a2 Social Identity Characteristics | a21 Political Affiliation |
| | | a22 Educational Level |
| | | a23 Family Economic Source |
| | | a24 Average Monthly Family Income |
| | | a25 Village of Residence |
| | a3 Ecological Ideology Cognition | a31 Understanding of Ecological Ideology |
| | | a32 Local Government's Practice of Ecological Ideology |
| | | a33 Awareness of Ecological Environmental Protection Responsibility |
| | | a34 Recognition of the Significance of Ecological Civilization Construction |
| | a4 Ecological Responsibility Awareness | a41 Whether to Promote Green Knowledge to Others |
| | | a42 Participation in Green Activities |
| | | a43 Willingness to Contribute to Rural Ecological Civilization Construction |
| | | a44 Benefits of Green Development for Rural Revitalization |
| | a5 Government Policy Orientation | a51 Awareness of Government-Issued Green Development Policies |
| | | a52 Satisfaction with Government Green Development Policies |
| | | a53 Response to Government Green Development Policies |
| Endogenous Latent Variable | b1 Villagers' Willingness for Green Development | b11 Support for Rural Green Development |
| | | b12 Willingness to Accept Ecological Civilization Education |
| | | b13 The Most Effective Means to Protect the Ecological Environment |
| | | b14 Importance of Personal Participation in Green Development for Rural Development |

This study employed a combination of questionnaire surveys and field visits for interviews and discussions. Researchers visited the village committees and residents' homes to conduct on-site investigations and collect data and information. On one hand, the study aimed to understand the implementation of the rural revitalization strategy, the supporting policies, and the typical practices and experiences. On the other hand, it sought to gauge the villagers' understanding and perception of the policies, their satisfaction with the local rural revitalization efforts, and the specific changes brought about by these initiatives.

The research questionnaire integrated both scaled and non-scaled questions. It was designed with six latent variables (research constructs), namely demographic characteristics, social identity characteristics, ecological cognition, villagers' ecological responsibility awareness, government policy orientation, and personal willingness for green development. These constructs were operationalized into 22 observable variables, each with an operational definition (see Table 1).

To ensure the quality of the survey, the design, implementation process, and precautions of the questionnaire were all guided by experts. The survey was conducted in a combination of online and offline methods, with a total of 335 questionnaires distributed, and 202 valid questionnaires were recovered.

The SPSS26 software was used to conduct reliability and validity analysis on the recovered questionnaire samples (see Table 2). The results showed that the overall Cronbach's Alpha value of the questionnaire was 0.793, which is greater than 0.7, indicating that the measurement of the questionnaire is credible and the data is reliable. The KMO score was 0.831, greater than 0.8, indicating a good adequacy of the sample size. The approximate chi-square value of the Bartlett's test of sphericity was 555.289, with a significance probability (s) of 0.000 under the degree of freedom (df) of 22, indicating that the validity of the questionnaire is good and it is feasible to proceed with the next step of analysis.

Table 2. Reliability and validity test of the scale

| **Reliability Statistics** | | |
|---|---|---|
| Cronbach's Alpha | Number of Items | |
| 0.793 | 7 | |
| **KMO and Bartlett's Test** | | |
| KMO Measure of Sampling Adequacy | | 0.831 |
| Bartlett's Test of Sphericity | Approximate Chi-Square | 555.289 |
| | Degrees of Freedom | 22 |
| | Significance | 0.000 |

Table 3. Basic information of the sample

| Category | | Frequency | Percentage | Valid Percentage | Cumulative Percentage |
|---|---|---|---|---|---|
| Gender | Male | 107 | 53 | 53 | 53 |
| | Female | 95 | 47 | 47 | 100 |
| Age | Under 18 | 6 | 3 | 3 | 3 |
| | 18-30 | 32 | 15.8 | 15.8 | 18.8 |
| | 31-50 | 62 | 30.7 | 30.7 | 49.5 |
| | Over 50 | 102 | 50.5 | 50.5 | 100 |
| Education Level | Junior High School or Below | 157 | 77.7 | 77.7 | 77.7 |
| | High School | 19 | 9.4 | 9.4 | 87.1 |
| | Bachelor's Degree or Above | 26 | 12.9 | 12.9 | 100 |
| Political Affiliation | CPC Member | 29 | 14.4 | 14.4 | 14.4 |
| | Youth League Member | 13 | 6.4 | 6.4 | 20.8 |
| | General Public | 157 | 77.7 | 77.7 | 98.5 |
| | Others | 3 | 1.5 | 1.5 | 100 |
| Family Economic Source | Town Work | 24 | 11.9 | 11.9 | 11.9 |
| | Enterprise Work | 19 | 9.4 | 9.4 | 21.3 |
| | Agriculture | 45 | 22.3 | 22.3 | 43.6 |
| | Individual Occupation | 79 | 39.1 | 39.1 | 82.7 |
| | Others | 35 | 17.3 | 17.3 | 100 |
| Average Monthly Family Income | Below 2000 CNY | 57 | 28.2 | 28.2 | 28.2 |
| | 2000—5000 | 99 | 49 | 49 | 77.2 |
| | 5001—8000 | 26 | 12.9 | 12.9 | 90.1 |
| | Above 8000 CNY | 20 | 9.9 | 9.9 | 100 |
| Village of Residence | Chongji Village | 53 | 26.2 | 26.2 | 26.2 |
| | Lingxia Village | 26 | 12.9 | 12.9 | 39.1 |
| | Shuiji Village | 29 | 14.4 | 14.4 | 53.5 |
| | Changkou Village | 56 | 27.7 | 27.7 | 81.2 |
| | Yubang Village | 38 | 18.8 | 18.8 | 100 |
| | Total | 202 | 100 | 100 | |

Preliminary Analysis of the Survey Questionnaire Sample: In terms of gender, there were 107 males, accounting for 53%, and 95 females, accounting for 47%. Regarding age, the majority were over 50 years old, comprising 50.5%, followed by those aged 31-50, making up 30.7%. In terms of educational level, the highest proportion was those with junior high school or below, at 77.7%, followed by those with a bachelor's degree or above, at 12.9%. In terms of political affiliation, the general public made up the largest proportion, at 77.7%. Regarding family economic sources, agriculture and individual occupations accounted for 22.3% and 39.1%, respectively. In terms of average monthly family income, the highest proportion was between 2000 and 5000 yuan, at 49%, followed by below 2000 yuan, at 28.2%. The distribution across villages was relatively even, with Chongji Village and Changkou Village accounting for 26.2% and 27.7%, respectively, and Lingxia Village, Shuiji Village, and Yubang Village each accounting for more than 10%. The basic information is as follows (see Table 3).

## ANALYSIS AND RESULTS

### Leveraging Political Advantages to Promote the Transformation of Ecological Value and Support Rural Green Development

Enhancing the awareness of ecological concepts and strengthening ecological responsibility consciousness are key to pursuing a path of ecological development. Research findings indicate that the ecological environment of Changkou Village is significantly superior to that of other villages, which is closely related to the practice of ecological concepts by grassroots government organizations. In an interview with Accountant Luo from Changkou Village, the issue of village development priorities was discussed: "Should a village prioritize ecological development or focus primarily on the development of characteristic industries?" Accountant Luo stated: "Perhaps in other villages, characteristic industries might be given top priority, but in Changkou Village, ecological development is undoubtedly the foremost concern. Both village officials and residents firmly believe that only by emphasizing green ecological development can more possibilities be created for the subsequent development of other industries." A high level of recognition of villagers' ecological responsibility consciousness is a fundamental prerequisite for rural green development, and improving villagers' ecological civilization consciousness is a precursor to green development. Through Pearson's chi-square test, there is a significant difference between the village of residence and whether one often participates in environmental protection activities ($\chi^2$=16.981, $p<0.05$). Cross-analysis shows that the proportion of people in Changkou Village who often participate in environmental protection activities is the highest, at 23.2%, significantly higher than that in Chongji Village (5.7%) and Yubang Village (10.5%) (see Table 4). Regular participation in environmental protection activities implies that villagers care about environmental protection and have a higher level of cognition and awareness of the ecological environment, thus contributing to the significant achievements in ecological development in Changkou Village.

Table 4. Village of residence and participation in environmental protection activities

| | | Village | Chongji | Lingxia | Shuiji | Changkou | Yubang | $\chi^2$ | p |
|---|---|---|---|---|---|---|---|---|---|
| Frequently Participate in Environmental Protection Activities? | Often | Count | 18 | 14 | 15 | 27 | 18 | 16.981 | 0.03 |
| | | % | 34.00% | 53.80% | 51.70% | 48.20% | 47.40% | | |
| | Occasionally | Count | 32 | 9 | 9 | 16 | 16 | | |
| | | % | 60.40% | 34.60% | 31.00% | 28.60% | 42.10% | | |
| | Never | Count | 3 | 3 | 5 | 13 | 4 | | |
| | | % | 5.70% | 11.50% | 17.20% | 23.20% | 10.50% | | |

Promoting the Transformation of Ecological Resource Value and Enhancing Villagers' Sense of Gain. Protecting the mountains along the mountains and nurturing the water near the water, revitalizing the countryside according to local conditions, in addition to widely mobilizing villagers' participation, requires the guidance of government and the assistance of enterprises. Taking Changkou Village as an example, the dual development of the citrus industry and the cultural tourism industry, the citrus industry is mainly operated by companies, the land for planting in the village is unified and transferred, and is rented to navel orange enterprises by the village. The enterprises manage uniformly, contract and operate the planting, and pay rent to the village at the end of the year, and then the village distributes it to the villagers according to the actual situation. The navel orange enterprises invest in Changkou Village, looking at the good ecology of Changkou. The villagers have gained benefits and understand the weight of the good ecology behind the benefits, and naturally are willing to participate in the construction and protection of ecological civilization.

Leveraging political advantages, actively publicizing and implementing ecological concepts, and effectively mobilizing villagers' enthusiasm to participate in the construction and protection of ecological civilization. The high degree of villagers' understanding of ecological responsibility is inseparable from the publicity, implementation and active practice of ecological concepts by village cadres. The higher the villagers' understanding of ecological concepts, the stronger their ecological responsibility consciousness. Through Pearson's chi-square test, there is a significant difference between age and whether they are willing to contribute their own strength to the construction of ecological civilization ($\chi^2$=9.052, p<0.05). From the cross-occupancy, the proportion of 18-30 and 31-50 years old who are willing to contribute their own strength to the construction of ecological civilization is 100%, which is significantly higher than other age groups (see Table 5). Villagers under 18 years old are mostly in the stage of junior and senior high school, and most of them are mainly studying. They may think that the construction of ecological civilization is the business of adults, which leads to their unwillingness to participate in the construction of ecological civilization. Through communication with villagers over 50 years old, it is known that some villagers think that green development has not brought substantial changes to their economic benefits and has not played a great promoting role, so they are not willing to spend more time and energy on this aspect. This shows that they have a low understanding of ecological concepts, a weak sense of ecological responsibility, and not enough understanding of the profound significance of green development.

Table 5. Age and willingness to contribute to ecological civilization construction

| | | Age | Under18 | 18-30 | 31-50 | Over50 | $\chi^2$ | p |
|---|---|---|---|---|---|---|---|---|
| Willingness to Contribute to Ecological Civilization Construction? | Yes | Count | 5 | 32 | 62 | 99 | 9.052 | 0.029 |
| | | % | 83.30% | 100.00% | 100.00% | 97.10% | | |
| | No | Count | 1 | 0 | 0 | 3 | | |
| | | % | 16.70% | 0.00% | 0.00% | 2.90% | | |

Expanding the Circle of Green Development Beneficiaries to Directly Enhance the Substantial Income of the Majority of Villagers and Thereby Increase Individual Participation in Ecological Civilization Construction. Through Pearson's chi-square test, there is a significant difference between the village of residence and the perceived importance of individual participation in ecological civilization construction for local economic and social development ($\chi^2$=27.768, p<0.05). Cross-analysis reveals that in Lingxia Village, the proportion of residents who believe that individual participation in ecological civilization construction is unimportant for local economic and social development is the highest, at 7.7%; the proportion of those who are indifferent is also the highest, at 11.5% (see Table 6). This indicates that, compared to other villages, Lingxia Village has a relatively lower perception of the importance of individual participation in ecological civilization construction for local economic and social development. During conversations with local villagers, it was learned that while they acknowledge that their living environment has indeed improved and that a good ecological environment contributing to healthy living is a positive development, the economic income generated by green development only benefits a small number of villagers with economic means, without substantially changing the income of ordinary farmers. This is the main reason why villagers perceive individual participation in ecological civilization construction as having a relatively low impact on local economic and social development.

Table 6. Village of residence and the social significance of individual participation in ecological civilization construction

| | | Village | Chongji | Lingxia | Shuiji | Changkou | Yubang | $\chi^2$ | p |
|---|---|---|---|---|---|---|---|---|---|
| Do You Think Individual Participation in Ecological Civilization Construction is Important for Local Economic and Social Development? | Very | Count | 24 | 16 | 25 | 38 | 27 | 27.768 | 0.006 |
| | | % | 45.30% | 61.50% | 86.20% | 67.90% | 71.10% | | |
| | Somewhat | Count | 26 | 5 | 4 | 14 | 9 | | |
| | | % | 49.10% | 19.20% | 13.80% | 25.00% | 23.70% | | |
| | Neutral | Count | 3 | 3 | 0 | 3 | 2 | | |
| | | % | 5.70% | 11.50% | 0.00% | 5.40% | 5.30% | | |
| | Not ai all | Count | 0 | 2 | 0 | 1 | 0 | | |
| | | % | 0.00% | 7.70% | 0.00% | 1.80% | 0.00% | | |

**Attracting and Retaining Talents to Build Career Platforms, Enabling Various Talents to Fulfill Their Dreams in Their Hometowns, and Accumulating Momentum for the Green Rise of the Countryside**

Creating a convenient and efficient service environment and building a promising career stage, attracting professional talents and retaining young talents, and improving the educational structure of rural areas. The level of education of villagers affects the process of rural green development to a certain extent. Through Pearson's chi-square test, there is a significant difference between education level and the willingness to receive education in green development ($\chi^2$=13.657, p<0.05). From the cross-occupancy, the proportions of those who are very willing among junior high school or below, high school, and bachelor's degree or above are 55.4%, 78.9%, and 84.6%, respectively; the satisfaction of junior high school or below is the lowest (see Table 7). This indicates that education level is positively correlated with the willingness to receive education in green development. The higher the education level, the more open-minded and broad the vision, the better the understanding of the significance of green development, and the stronger the willingness to receive education in green development, thereby enhancing the awareness of ecological responsibility and the willingness to develop green. Therefore, it is particularly important to vigorously introduce various talents with technology, skills, management experience, and market experience, build a platform for young people to start businesses, and enhance the vitality of rural economic development.

Table 7. Educational level and willingness to receive education on green development

| | | | Junior High School or Below | High School | Bachelor's Degree or Above | $\chi^2$ | p |
|---|---|---|---|---|---|---|---|
| Willingness to Receive Education on Green Development? | Very | Count | 87 | 15 | 22 | 13.657 | 0.034 |
| | | % | 55.40% | 78.90% | 84.60% | | |
| | Somewhat | Count | 57 | 3 | 4 | | |
| | | % | 36.30% | 15.80% | 15.40% | | |
| | Neutral | Count | 12 | 1 | 0 | | |
| | | % | 7.60% | 5.30% | 0.00% | | |
| | Unwilling | Count | 1 | 0 | 0 | | |
| | | % | 0.60% | 0.00% | 0.00% | | |

Strengthening Village Leadership and Promoting Scientific Rural Development. The role of talent in rural revitalization is of great significance; the success of rural development largely depends on the effectiveness of grassroots cadres' leadership. Through Pearson's chi-square test, there is a significant difference between the village of residence and the response to the government's ecological development policies ($\chi^2$=25.083, p<0.05). Cross-analysis reveals that in Lingxia Village, the proportion of residents who chose "not good" and "relatively not good" is 11.5%, significantly higher than in Chongji Village (3.8%), Shuiji Village (3.4%), Changkou Village (1.8%), and Yubang Village (0%). In terms of the proportion of "very good," Shuiji Village has the highest (75.9%), followed by Lingxia Village (57.7%), while Chongji Village has the lowest (34%) (see Table 8). In this survey, villagers over 50 years old account for more than half, with a relatively low level of education, and most are from the general public. They have limited understanding of new development concepts and policy documents. Additionally, the limited number of village cadres and heavy tasks mean that their capacity to promote ecological and green development policies is constrained, resulting in a lower response rate among villagers. During an interview with a poverty-alleviated household in Lingxia Village, it was learned that the "one-to-one" assistance policy implemented by village cadres can indeed effectively improve villagers' lives. However, due to the shortage of talent in the village, it is not possible to provide "one-to-one" assistance to every household, which consequently slows down the village's development.

Table 8. Village of residence and response to government's ecological development policies

| | | Village | Chongji | Lingxia | Shuiji | Changkou | Yubang | $\chi^2$ | p |
|---|---|---|---|---|---|---|---|---|---|
| Response to Government's Ecological Development Policies | Very Good | Count | 18 | 15 | 22 | 34 | 23 | 25.083 | 0.014 |
| | | % | 34.00% | 57.70% | 75.90% | 60.70% | 60.50% | | |
| | Good | Count | 33 | 8 | 6 | 21 | 15 | | |
| | | % | 62.30% | 30.80% | 20.70% | 37.50% | 39.50% | | |
| | Not Very Good | Count | 1 | 2 | 1 | 1 | 0 | | |
| | | % | 1.90% | 7.70% | 3.40% | 1.80% | 0.00% | | |
| | Not Good | Count | 1 | 1 | 0 | 0 | 0 | | |
| | | % | 1.90% | 3.80% | 0.00% | 0.00% | 0.00% | | |

Implementing a Talent Reversion Program to Encourage Young Talents to Return and Boost Rural Green Development. The imperfection of talent policies and the absence of young people result in a lack of innovative

vitality in rural development. The majority of the village population consists of the elderly, with most young people choosing to develop their careers outside their hometowns. A statement by Yu Huan, a villager from Yubang Village, "The young people in the village are all at the forefront of the Shaxian Delicacies business; now the village is basically filled with the elderly," corroborates this viewpoint. The lack of young people, who are the main force in rural revitalization, restricts rural economic development. The elderly, women, and children are mostly capable of only simple agricultural work, which hinders the economic progress of rural areas, and some main rural industries remain in a relatively simple and backward state. Rural areas can only rely on their locational advantages to develop traditional tourism and red study tours. The imperfection of the industrial chain is also a deficiency in green development, as it fails to effectively combine resource advantages with various production factors. For example, Chongji Village depends on agriculture and tourism as the main economic industries, but the continuous depression of the tourism industry due to the impact of the epidemic in recent years has brought a significant shock to the local economy. Villagers have successively gone out to work, leading to a shortage of young and able-bodied labor in the village and restricting local economic development. To stimulate economic recovery, relying solely on agriculture and tourism is insufficient. At this time, it is necessary to leverage the role of professional talents, such as internet talents, to use internet thinking to develop a "internet + tourism" new business form, break through the constraints of the epidemic, and stabilize the healthy development of the economy. Due to the insufficient intensity of talent policies and other reasons, the number of young people returning to start businesses is currently very small. This situation is very common in the surveyed villages, where industrial upgrading cannot keep up, infrastructure is relatively weak, and inconvenient transportation leads to slow rural economic development.

**Government Targeted Policymaking, Leading by Example in Green Development, and Safeguarding Rural Revitalization**

Targeted policymaking by the government based on local conditions is a crucial safeguard for villagers to actively engage in green development in rural areas. Research findings indicate that in recent years, the government has continuously strengthened rural infrastructure construction and refined the management system of the ecosystem, thereby establishing a policy framework for green development. The management of forests, rivers, and village appearances has been assigned to specific individuals and tasks, enhancing villagers' ecological awareness and effectively reducing the complexity of government oversight, which in turn promotes rural green development. In a satisfaction survey regarding the accuracy, relevance, and effectiveness of government ecological development policies, the highest proportion (30.2%) responded with "relatively satisfied"; followed by "acceptable" (28.7%); the lowest proportion (7.9%) was "not very satisfied" (see Table 9). Over 70% of respondents found the accuracy, relevance, and effectiveness of government ecological development policies to be acceptable, with 55% indicating satisfaction. This demonstrates that rural areas can only truly support rural revitalization and earn villagers' satisfaction by integrating practical conditions, adapting to local circumstances, and implementing ecological policies that suit their unique characteristics. For instance, Shuiji Village has focused on the environmental governance of Dajin Lake. By instituting a river chief system and involving the government to address the issue of indiscriminate sewage discharge, it has not only protected the water quality of Dajin Lake but also promoted the concept of ecological development, achieving both a civilized rural ethos and an ecologically sustainable living environment.

Table 9. Satisfaction with the accuracy, relevance, and effectiveness of government's ecological development policies

| | | Frequency | % | Valid % | Cumulative % |
|---|---|---|---|---|---|
| Satisfied | Very | 50 | 24.8 | 24.8 | 24.8 |
| | Somewhat | 61 | 30.2 | 30.2 | 55 |
| | Acceptable | 58 | 28.7 | 28.7 | 83.7 |
| | Not Very | 16 | 7.9 | 7.9 | 91.6 |
| | Very Unsatisfied | 17 | 8.4 | 8.4 | 100 |
| | Total | 202 | 100 | 100 | |

Vigorously Promoting Ecological Development Policies and Actively Publicizing Government Affairs to Enhance Villagers' Understanding and Facilitate Policy Implementation. Vigorous promotion of ecological development policies and active publicizing of government affairs enable villagers to better comprehend these policies and facilitate their effective implementation by the government. As shown in Table 10, Yubang Village has the lowest proportion of residents who never promote ecological and environmental awareness to others. This indicates that villagers in Yubang Village have a strong willingness to disseminate ecological and environmental knowledge to others, and the local residents' response to government policies is relatively high. Furthermore, through in-depth interviews, it was learned that compared to the other four villages, Yubang Village excels in publicizing government affairs and collecting public opinion. This precisely illustrates that only when the public fully understands the connotations of the policies can these policies be effectively implemented and take root.

Table 10. Willingness to promote environmental awareness to others

| | | Village | Chongji | Lingxia | Shuiji | Changkou | Yubang | $\chi^2$ | p |
|---|---|---|---|---|---|---|---|---|---|
| Do You Promote Environmental Awareness to Others? | Often | Count | 20 | 13 | 17 | 27 | 21 | 16.677 | 0.034 |
| | | % | 37.70% | 50.00% | 58.60% | 48.20% | 55.30% | | |
| | Occasionally | Count | 27 | 8 | 11 | 17 | 16 | | |
| | | % | 50.90% | 30.80% | 37.90% | 30.40% | 42.10% | | |
| | Never | Count | 6 | 5 | 1 | 12 | 1 | | |
| | | % | 11.30% | 19.20% | 3.40% | 21.40% | 2.60% | | |

## DISCUSSION

In Sanming City, the comprehensive implementation of the rural revitalization strategy has been driven by the "156" rural construction working mechanism, which focuses on industrial development, the beautification of the human settlement environment, and the enhancement of grassroots governance. The exploration of three major brands— "cross-village joint construction," "talent retraction," and "resident night talks"—has created favorable conditions for the high-quality development of rural revitalization. However, to transform the dividends of development into the endogenous driving force for rural revitalization and the well-being of villagers, continuous in-depth exploration is required. This involves the integration of smart rural construction [7] and digital empowerment platforms [8,9], as well as the optimization of resource allocation and industrial structure through big data analysis [10], to enhance the scientificity and precision of grassroots governance. For instance, leveraging artificial intelligence and blockchain technology can enhance the transparency of rural ecological asset management, and algorithmic models can optimize the path of rural green development [11], thereby constructing a more efficient, equitable, and sustainable pattern of rural revitalization.

### Government Leads the Way to Revitalization, Focusing on Both the Present and the Future

Based on the integrated development model of "tourism + characteristic agriculture," the existing industrial structure layout is optimized through data mining techniques. By conducting an in-depth analysis of market demand, the most promising agricultural varieties are precisely identified, and agricultural resources are scientifically allocated. For instance, the rice and peanut farming industries in Lingxia Village can enhance the quality analysis of agricultural products through data mining techniques, and employ deep learning algorithms to explore and optimize planting schemes, steering the "one village, one product" characteristic industry towards high-quality development [12].

Through the application of agricultural Internet of Things (IoT) technology, the revitalization of the seed industry is precisely managed. Intelligent sensors are used to monitor the planting environment in real-time, ensuring optimal planting conditions while enhancing production efficiency. For example, integrating blockchain technology can establish a comprehensive agricultural product quality traceability system, recording all critical data from production to sale. This not only enhances consumer trust in the products but also maximizes rural economic benefits [13].

In promoting the revitalization of the green industry, the government can introduce Geographic Information System (GIS) technology to optimize the layout of agricultural infrastructure and formulate "one village, one policy" support strategies tailored to rural characteristics. In the construction of high-standard farmland, these data methods provide a scientific basis for the realization of precision agriculture [14]. Additionally, through the analysis of social media big data, target consumer groups are identified, and Augmented Reality (AR) technology

is used to expand brand influence, attracting more potential customers for rural industries, such as innovating agricultural product marketing through live-streaming sales platforms.

**Collective Operation Strengthens Revitalization, Stimulating New Vitality in Economic Development**

Through data mining, the resource endowments and economic characteristics of each village are analyzed to create a collective economic model that fosters cross-village collaboration and resource sharing. For instance, the rural "large-circle collective economy" can rely on big data for the fine management of tourist numbers and consumption trends, designing tourism routes such as "Green Landscape Journey," which significantly increases tourist flow and village economic benefits [15].

In the layout of ecological sightseeing agriculture, aerial data of farmland is collected through drone photography, combined with deep learning algorithms to generate precise planting maps, thereby enhancing planting efficiency and optimizing the allocation of agricultural resources. Furthermore, blockchain technology can accelerate land transfer and the digital registration of property rights, enhancing transparent management, providing clear resource rights and benefit distribution for villagers, and maximizing collective economic benefits [16].

Simultaneously, cloud computing platforms are utilized to integrate village collective resources, attracting more external funds and technical talents to join rural revitalization projects through dynamic monitoring. The smart village platform further enhances public service management, for example, by real-time displaying the operational status of village infrastructure through waste classification systems and sewage monitoring platforms, providing scientific decision support for resource optimization [17].

**Ecological Judiciary Protects Revitalization, Creating a Beautiful and Livable Rural Homeland**

In the context of rural ecological conservation, the integration of computer technology and big data has also demonstrated exceptional performance. For instance, through the application of remote sensing technology and drone monitoring, the dynamic changes in forestry and grassland resources are recorded in real-time, and combined with carbon data to calculate the economic benefits for villagers, thereby fostering a positive cycle of ecological protection and economic gain [18].

To address environmental violations, the synergy of artificial intelligence and big data monitoring can enhance the efficiency of ecological regulation enforcement. For example, intelligent image analysis techniques can be used to identify illicit activities such as random garbage disposal and wastewater discharge, generating real-time alerts and feedback, which in turn provide a basis for the formulation and improvement of ecological protection regulations [19].

Improvements in rural waste and wastewater management can be achieved through innovative combinations of smart compression trash bins and bioremediation technologies. By leveraging digital management platforms to create a green ecological database, it is possible to track and assess environmental quality changes in real-time and optimize resource utilization. The development of data models for the scientific delineation of suitable and prohibited farming areas can effectively prevent overdevelopment and resource wastage in rural regions, thereby safeguarding the path of green development in rural areas [20].

## CONCLUSION

This study takes five villages in Sanming City, Fujian Province, as case studies to explore how data mining and technological innovation can facilitate the sustainable development of the rural green economy. The findings indicate that data-driven approaches and the integrated application of technologies significantly enhance agricultural productivity, optimize resource allocation, and strengthen environmental sustainability. Firstly, data mining technologies analyze extensive datasets from rural economic activities, uncovering key patterns and trends in sustainable practices. This enables policymakers to implement green development strategies more precisely, thereby effectively promoting rural revitalization. Secondly, technological innovations, particularly in Agricultural IoT, blockchain, and artificial intelligence, have yielded positive benefits for rural areas. These technologies not only improve agricultural production efficiency but also ensure product quality.

However, this study is not without its limitations. The research scope is confined to rural communities in southeast China, which may limit the generalizability of the findings. Additionally, the study's reliance on quantitative data

may overlook the qualitative aspects of technology adoption and usage in rural settings. Furthermore, the rapid advancement of emerging technologies implies that the study's conclusions require ongoing updates to remain relevant.

For future research, it is recommended to expand the sample to include a more diverse range of rural communities, enhancing the external validity of the results. Moreover, adopting mixed-methods approaches that combine quantitative and qualitative data can provide a more comprehensive analysis, revealing the socio-cultural factors influencing technology integration. Additionally, incorporating longitudinal study designs will allow researchers to track the long-term impacts of emerging technologies in rural contexts.

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