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Empirical Study on Influencing Factors of Rural Environmental Behavior in Informatization

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Abstract

INTRODUCTION: With the advent of the information technology era, rural areas face new environmental protection challenges and opportunities. The rapid development of information technology provides new possibilities for changes in rural ecological behavior. However, understanding the influencing factors of rural environmental behavior in the context of information technology remains an important research topic.
OBJECTIVES: This study aims to reveal the influencing factors of rural environmental behavior in the context of information technology to help governments and policymakers develop effective environmental protection strategies. Specifically, the researchers will focus on the extent to which factors such as education level, ecological awareness, economic status, and social participation influence the environmental behavior of rural residents.
METHODS: A questionnaire survey was used in this study, and residents of a particular rural area were selected as the research subjects. A questionnaire containing questions on education level, environmental awareness, economic status, social participation, and environmental behavior was designed, and a large amount of data was collected through random sampling. Statistical analysis methods, such as regression and correlation analyses, were used to process and interpret the data.
RESULTS: The study's results showed that the education level significantly affected the environmental behavior of rural residents. Residents with higher levels of education were more inclined to take positive ecological protection actions such as waste separation and energy conservation. In addition, environmental awareness was also found to be closely related to environmental behavior, with residents with higher ecological awareness being more concerned about environmental protection and taking action accordingly. Economic status and social participation affected rural residents' environmental behavior to a certain extent but to a lesser extent than education level and ecological awareness.
CONCLUSION: Rural environmental behavior in the context of informatization is affected by a combination of factors. To promote rural ecological protection, the government should strengthen investment in education and improve rural residents' education level and environmental awareness. In addition, social organizations and public participation should also be supported to encourage rural residents to actively participate in environmental protection actions. These measures will help to promote a change in ecological behavior in rural areas and achieve the goal of sustainable development.

Keywords: information technology background, rural environmental behavior, influencing factors; rural environmental protection, sustainable development

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1. Introduction

Rural areas face new challenges and opportunities in today's information technology era. The rapid development of information technology has profoundly changed people's way of life and social structure and has had a far-reaching impact on the rural environment. The increasing prominence of rural environmental problems

has triggered significant concerns about environmental protection, and understanding the influencing factors of rural ecological behavior in the context of information technology has become the key to formulating effective environmental protection strategies and promoting sustainable development. Environmental problems such as soil pollution, water shortage, and ecological damage are common in traditional rural areas(Yadav et al., 2021). Conventional agricultural production methods and lifestyles often lead to waste of resources and environmental damage. However, rural ecological problems have become more complex and urgent in the context of information technology. The wide application of information technology has brought new opportunities to rural areas, such as the Internet of Agricultural Things (IoT), smart agriculture, and environmental monitoring systems. However, informatization also brings new challenges, such as e-waste, e-waste, and e-pollution(F. Wu et al., 2021). Therefore, it is essential to understand the influencing factors of rural environmental behavior in the context of information technology.

Rural environmental behavior refers to residents' attitudes, behaviors, and habits toward the environment in their daily lives. An in-depth understanding of rural residents' ecological behavior and its influencing factors can provide scientific basis and decision-making support for rural environmental protection. Previous studies have shown that factors such as education level, economic status, environmental awareness, and social participation have some influence on rural environmental behavior(Latham-Green et al., 2023). However, in the context of informatization, these influencing factors may change, and new factors may emerge. Therefore, it is necessary to conduct an empirical study to gain a deeper understanding of the influencing factors of rural environmental behavior in the context of informatization. Through empirical research, this study explores the influencing factors of rural ecological behavior in the context of informatization. Residents of a particular rural area are selected as the research object, relevant data are collected by questionnaire survey, and statistical analysis methods are applied to process and interpret the data(Hofstede et al., 2022). By analyzing the relationship between education level, economic status, environmental awareness, social participation, and other factors and the environmental behavior of rural residents, the researchers will reveal the influencing mechanisms and patterns of rural ecological behavior in the context of informatization. The results of this study are of great significance for rural environmental protection and sustainable development. By gaining a deeper understanding of the influencing factors of rural ecological behavior in the context of informatization, the government and policymakers can formulate appropriate environmental policies and measures to promote the active participation of rural residents in ecological protection actions(Jiang et al., 2022). Meanwhile, rural residents can contribute positively to improving the rural environment and sustainable development by enhancing environmental awareness and changing behavioral habits. In addition, this study can provide academics with new theoretical and empirical research methods on rural ecological behaviors in the context of informatization and reference academic research in related fields.

This study aims to reveal the influencing factors of rural environmental behavior in the context of information technology and provide decision support for rural environmental protection. By understanding how rural residents' education level, economic status, environmental awareness, and social participation influence environmental behavior, researchers can develop effective ecological protection strategies for rural areas and promote the realization of sustainable development(Dong, 2022). This is significant for solving rural environmental problems and improving the ecological environment and provides a new theoretical and empirical basis for related academic research. Through the empirical analysis of this study, the researchers will provide scientific rationale and decision-making support for environmental protection in rural areas and promote the change of ecological behavior of rural residents and the realization of sustainable development. This study will likely provide valuable references for policymakers, researchers, and all sectors of society in rural environmental protection and sustainable development and promote the realization of the goal of an environmentally friendly community in rural areas in the age of information technology.

2. Background of the study

2.1 Overview of the development of rural informatization

Information technology development in rural areas has become increasingly important in the information age context. Informatization technology has profoundly changed every aspect of rural communities, from agricultural production to social interaction, with new opportunities and challenges. This section will explore the development overview of rural informatization, the current status of informatization, and the popularity of informatization technology in rural areas. With the rapid development of information technology, rural informatization has become one of the critical factors for modernization and sustainable development in rural areas(Hou et al., 2022). Rural informatization covers various fields, including agriculture, education, healthcare, finance, and social services. It aims to provide rural residents with more information resources and digital tools to improve their quality of life, reduce the pressure of production, and contribute to the overall development of rural communities.

In the development of information technology, some remarkable achievements have been made in rural areas(Zhou & Chen, 2021). First, Internet penetration has been increasing in rural areas. Through various government policy support and market forces, more and more rural households have Internet access, which

provides them with access to information, education, entertainment, and business opportunities. Secondly, mobile communication technology has also been widely used in rural areas(Cagliero et al., 2021). Cell phones have become an indispensable tool in rural residents' lives, providing communication functions and a platform for payment, entertainment, and information access(Li et al., 2023). In addition, Governments and businesses have also invested in digital infrastructure, such as digital villages and libraries, to increase access to information.

The wide spread of information technology in rural areas has received widespread attention. First, agricultural production in rural areas has benefited from the general use of information technology. Farmers can access information on weather, market prices, and agricultural technology through the Internet, helping them make more informed decisions and improve production efficiency. At the same time, the rise of rural e-commerce platforms has provided new opportunities for selling agricultural products and helping farmers earn income. Second, information technology is vital in rural education(Donno et al., 2021). Distance education and online learning platforms enable rural students to access quality educational resources, bridging the gap between urban and rural education. In addition, medical services in rural areas have also benefited from information technology. Telemedicine and electronic health record systems have improved the quality and accessibility of health services and helped improve rural residents' health. Finally, social interaction in rural communities has been facilitated. Social media and cell phone applications have made it easier for rural residents to learn about social events, government policies, and community activities, increasing their social participation.

2.2 Analysis of rural environmental problems

Rural areas have always been an essential focus for environmental issues, especially in the age of information technology. The ecological problems facing rural areas can be diverse, ranging from the depletion of land resources to pollution of water resources, all of which have far-reaching impacts on the livelihoods of rural communities and residents(Ho & Naseem, 2023). Over-exploitation and depletion of land resources are significant challenges to rural environmental problems. With the accelerated urbanization of rural areas, a large amount of land is being used for real estate development and industrial purposes, leading to a reduction in agricultural land, a decline in soil quality, and desertification of the land, among other problems. This poses a serious threat to rural agricultural production and food security. At the same time, the issue of water resource pollution has become increasingly severe (Pandey & Asif, 2022). Agricultural and industrial activities in rural areas are often accompanied by discharges of pesticides, fertilizers, and wastewater, and these pollutants enter water bodies, leading to a decline in water quality, contamination of water sources, and increased water resource constraints, which jeopardizes the population's health and threatens the sustainable development of rural communities. Atmospheric pollution is also a severe aspect of rural environmental problems. Living and production activities in rural areas are usually accompanied by the release of emissions from coal-burning and diesel-engine vehicles, leading to excessive levels of pollutants such as particulate matter, sulfur dioxide, and carbon monoxide in the atmosphere. It jeopardizes the population's health and negatively affects crop yields and quality. To make matters worse, waste disposal facilities in rural areas often lag, and improper disposal methods, such as indiscriminate dumping and incineration, have led to environmental pollution and high waste disposal costs(Kaya et al., 2021). This not only damages the rural environment but also affects the quality of life of residents.

These environmental problems have profoundly impacted the livelihoods of rural communities and residents. The depletion of land resources has led to a decline in farm incomes in rural communities. Farmers have lost land that could have been cultivated and have had to rely on other sources of income, leading to instability of livelihoods and increased poverty rates. In addition, water resource pollution threatens drinking water quality, impairs water quality used for agricultural irrigation, and reduces agricultural yields(Feng et al., 2022). Atmospheric pollution jeopardizes the population's health and negatively affects rural crop growth and food production. Waste management problems have also led to the deterioration of sanitation and increased disease risk among the population. Rural areas face various environmental issues, including land resource depletion, water pollution, air pollution, and waste management. These problems have a broad and profound impact on the livelihoods of rural communities and residents, threatening the sustainable development of rural areas and the quality of life of their inhabitants.

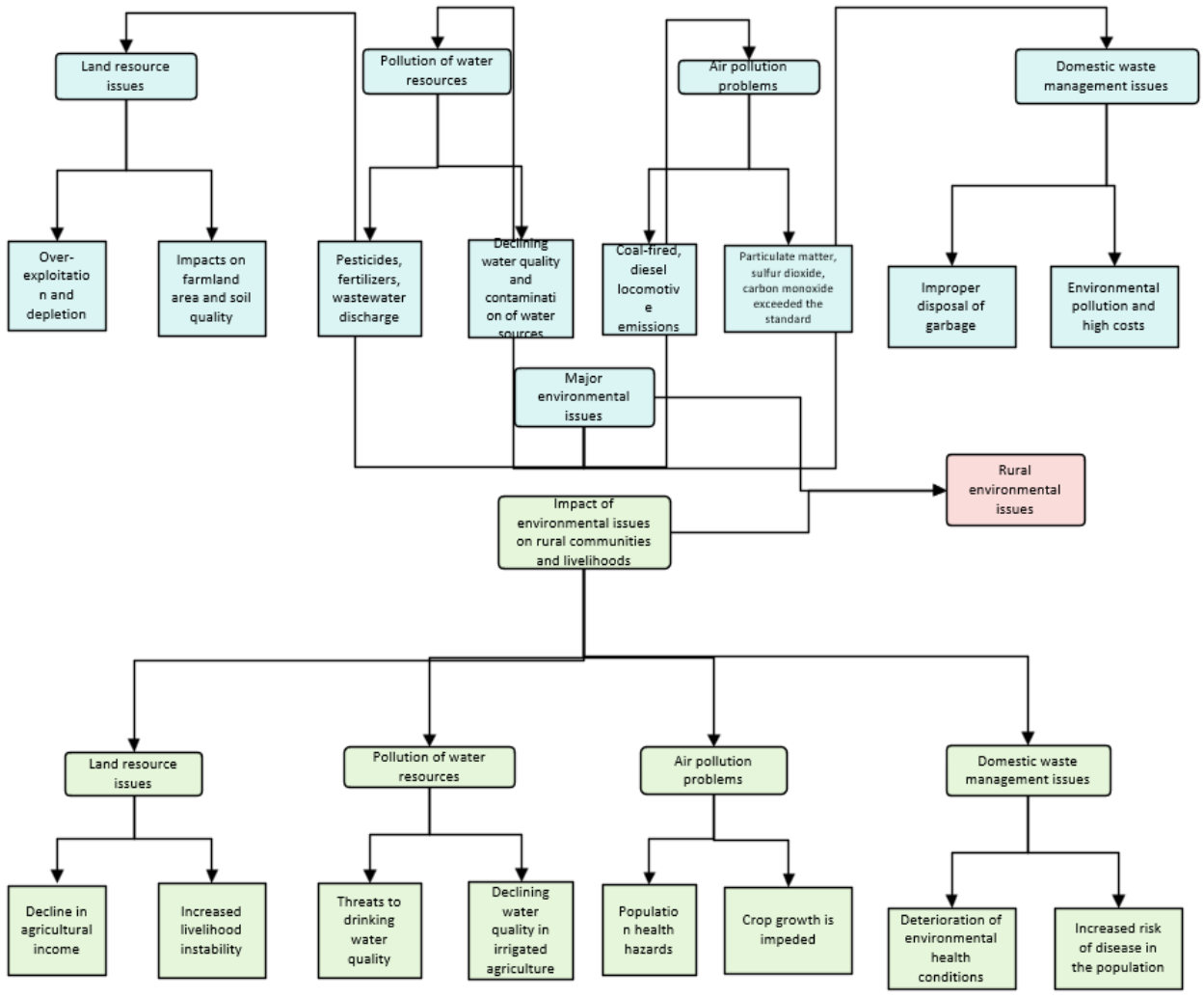

Figure1 Environmental issues in the information age

2.3 Link between Environmental behavior and information technology

Information technology has provided rural residents with a broader range of environmental information resources, and through tools such as the Internet and smartphones, rural residents have easy access to information on environmental issues, sustainable lifestyles, and environmental protection actions. This easy access to information expands their ecological awareness and makes it easier for them to understand the seriousness and urgency of environmental problems(Haldar & Sethi, 2022). At the same time, information technology provides rural residents a platform to share their experiences and information with other environmental enthusiasts, stimulating their positive actions. More than just access to ecological information resources, informatization technology also facilitates the monitoring and feedback of rural residents' environmental behaviors(Meschini, 2021). Sensor technology and cell phone applications allow residents to monitor air quality, water quality, and soil conditions in real-time, which gives them a more intuitive understanding of the state of the local environment(Tejero-Martin et al., 2021). At the same time, through social media and online platforms, they can report environmental problems, make suggestions, and interact with the government and relevant organizations to form social supervision and cooperation, thus promoting the solution of environmental problems. In addition, rural residents can use cell phone applications to record energy consumption, waste emissions, and water usage to assess their lifestyles' environmental impact. Such self-monitoring and assessment can help them adopt more environmentally friendly behaviors, such as water conservation, waste separation, and energy conservation. In addition, e-commerce platforms provide them with opportunities to purchase environmentally friendly products and support sustainable agriculture, thus encouraging more sustainable consumption behaviors.

Combining information technology and environmental education strongly supports rural residents' environmental awareness and action. Through online ecological education courses and information technology tools, rural

residents can learn about environmental science, sustainable lifestyles, and techniques for ecological action(Alexis C. et al., 2023). This type of education is flexible and adaptable to individual needs but also promotes residents' in-depth understanding of environmental issues, thus changing their ecological behavior. Environmental education can also be integrated with practice through information technology, making it easier for residents to transform knowledge into action(H. Wu et al., 2021). For example, virtual reality technology and simulation games can simulate environmental issues and allow residents to experience the consequences of ecological change first-hand, thus inspiring them to take more active environmental action. In addition, online social networking platforms and community activities can help rural residents build mutual support networks and share environmental experiences and action plans, increasing opportunities for group action.

3. Research methodology

3.1 Study design

In this study, the researchers aimed to investigate the factors influencing informatization on the environmental behavior of rural residents. To achieve this goal, the researchers used survey research as the primary research method to obtain a large amount of quantitative data to gain an in-depth understanding of the relationship between the level of informatization of rural residents and their environmental behavior. This study used a cross-sectional survey research design to understand the impact of informatization on the ecological behavior of rural residents through one-time data collection. This type of design is efficient and allows researchers to obtain data from large-scale samples for analysis and comparison simultaneously.

To ensure the representativeness of the study's findings, the researcher will use a multi-stage random sampling method. In the sample selection process for this study, the priority was to select suitable rural areas to ensure the representativeness of the findings. To achieve this objective, the researcher utilized a multi-stage sampling method. First, the researchers set multiple geographic regions in the country, covering rural areas with different geographic and economic backgrounds. These regions included mountainous, plains, coastal, and inland locations to ensure a diverse sample. Second, the researchers randomly selected several rural villages or communities within each selected geographic area to cover different types of rural areas, such as agriculturally-dominated, industrially-developed, and tourist-oriented. This multi-stage sampling approach will help ensure a diverse and representative sample. The total sample size will be 5,000 households to meet the needs of the study. Through careful selection of rural areas and effective respondent recruitment, the researchers will obtain a representative sample for an in-depth analysis of informatization's impact on rural residents' environmental behaviors. The recruitment process focuses on fairness and transparency to build trust and cooperation, which will increase the participation rate and quality of the sample and provide a solid foundation for the reliability and validity of the study. The researcher will use a structured questionnaire as a data collection tool. The questionnaire will consist of multiple sections as follows.

Table 1 Details of the questionnaire survey

Investigative projects	**Content of the survey**
Individual background information	Individual characteristics of respondents such as age, gender, education, household income, etc.
Informatization level	Respondents' environmental behavior data, including internet access, smartphone ownership, and other information technology indicators
Environmental behavior	Data on respondents' environmental behavior, including waste separation, water conservation, energy conservation, etc.
Environmental awareness	Respondents' knowledge, attitudes, and values on environmental issues
Social media and online interaction	Survey respondents' frequency of sharing environmental information and others discussing ecological issues on social media platforms

The questionnaire will include multiple-choice, scale-rated, and open-ended questions to obtain comprehensive data. The questionnaire will be conducted using both face-to-face interviews and online surveys to accommodate different groups. Interviewing respondents will be conducted by trained enumerators to ensure data quality.

3.2 Variables and Testing

Informatization level is the primary explanatory variable of this study to measure the extent of respondents' use of informatization technology and Internet access. To calculate the informatization level, the researcher will use a variety of indicators, including frequency of Internet use, smartphone ownership, and social media participation. The frequency of Internet use will be assessed through questions about the number of days and hours respondents use the Internet per week. Smartphone ownership will be determined through questions to determine if the respondent owns a smartphone. Social media participation will be measured by asking how active and often respondents are on social media platforms. Rural Environmental Behavior is the primary dependent variable in this study to reflect the respondents' performance in environmental behavior. To measure rural environmental behaviors, the researcher will use a variety of indicators, including frequency of garbage sorting, water conservation behaviors, and energy conservation behaviors. Frequency of garbage sorting will use

questions to understand how often and to what extent respondents sort their garbage. Water conservation behavior will be assessed through questions about respondents' water conservation measures in their daily lives, such as using low-flow faucets. Energy Conservation Behavior will use questions to measure respondents' energy use behavior in household and production activities, such as turning off electrical equipment that is not in use.

In this study, a series of potential control variables will be considered to exclude the influence of other factors on the relationship between the level of informatization and rural environmental behavior. The control variables are listed in the table below

Table 2 Variables and related content

variant	Variable content
(a person's) age	Respondents' age may affect their acceptance of information technology and the development of environmental behavior.
educational attainment	Educational attainment may affect respondents' awareness of environmental issues and the use of informational technology.
incomes	Income level may affect respondents' environmental behavior and their accessibility to information technology.
family size	Household size may affect household resource use and environmental behavior.
type of rural area	The type of rural area, e.g., agriculturally dominant, industrially developed, etc., may also have an impact on the level of informatization and environmental behavior

3.3 Data analysis

This study used multiple regression analysis to explore the effect of the informatization level on rural environmental behavior while controlling for a range of control variables. Multiple regression analysis allows the researcher to assess the relationship between the explanatory variable (level of informatization) and the dependent variable (rural environmental behavior) while considering the influence of other factors. The basic form of the multiple regression model is as follows:

$$Y = \beta_0 + \beta_1 X_1 + \beta_2 X_2 + ... + \beta_n X_n + \varepsilon \quad (1)$$

where *Y* represents the dependent variable (rural environmental behavior), *X1, X2, ..., Xn* represent the explanatory variables (level of informatization, control variables such as age, education, income, etc.), *β0* is the intercept term indicating the expected value of the dependent variable when all explanatory variables are zero, *β1, β2, ..., βn* are the regression coefficients of each explanatory variable, which indicate the effect of the explanatory variables on the dependent variable. E represents the error term, which means the variance of the dependent variable that the explanatory variables cannot explain.

The researcher will then use the Least Squares Method to estimate the regression coefficients *β1, β2, ..., βn.* The Least Squares Method aims to minimize the sum of squares of the error term *ε* to find the best-fitting regression coefficients. The estimated regression coefficients will be used to explain the relationship between each explanatory variable and the dependent variable. The mathematical representation of the method of least squares is as follows, using the estimation of a single regression coefficient, *β1*, as an example:

$$\beta_1 = \frac{\sum_{i=1}^{n}(X_i - X)(Y_i - Y)}{\sum_{i=1}^{n}(X_i - X)^2} \quad (2)$$

Where *β1* represents the estimated value of regression coefficients, *Xi* and *Y* represent the values of the explanatory and dependent variables for the ith observation in the sample, *X* and *Y* represent the mean values of the descriptive and dependent variables, and *n* represents the sample size. Using the least squares method, the researcher can estimate all the regression coefficients *β1, β2, ..., βn,* and thus build a good-fitting multiple regression model. These estimated regression coefficients will be used to explain the relationship between each explanatory variable and the dependent variable, which will help the researchers understand the impact of the informatization level on the rural environment's behavior.

In multiple regression analysis, the researcher will conduct various statistical tests to assess the model's fit and the variables' significance. *R*-square is one of the commonly used test parameters. *R*-square represents the proportion of variation explained by the model, ranging from 0 to 1, with the closer it is to 1, the better the fit of the model. The equation is as follows:

$$R^2 = \frac{\sum_{i=1}^{n}(Y_i - Y)^2}{\sum_{i=1}^{n}(Y_i - \overline{Y})^2} \quad (3)$$

Where *R2* stands for *R*-squared, or goodness of *fit*, *Yi* stands for the dependent variable of the observations, Y the dependent variable estimated by the model, $\overline{Y}$ the mean of the dependent variable, and n stands for the sample size. R-squared measures how well the model explains the variation in the dependent variable. In this study, the calculation of *R*-squared will tell the researcher how much of the variance in rural environmental behavior is explained by the model. If the *R*-squared is high, the model can explain the variation in the dependent variable better and increase the model's credibility.

The t-test is used to test whether the regression coefficients of the explanatory variables are significantly not equal to zero. The significance level is usually set at 0.05. The equation for the t-test is as follows:

$$t = \frac{\beta_i}{SE(\beta_i)} \tag{4}$$

Where β i represents the estimated values of regression coefficients and SE (β i) represents the standard error of regression coefficient estimation. *T*-test helps the researcher determine whether the explanatory variables' regression coefficients are significantly non-equal to zero, i.e., whether they significantly affect the dependent variable. In this study, the t-test will help the researcher determine whether variables such as informatization, age, education, and income greatly influence rural environmental behavior.

The *F*-test is used to test the significance of the overall model, i.e., whether all explanatory variables together have a significant effect on the dependent variable. The equation for the *F*-test is as follows:

$$F = \frac{(TSS - RSS)/p}{RSS/(n-p-1)} \tag{5}$$

Where *TSS* stands for the Total Sum of Squares and represents the total variation in the dependent variable, *RSS* stands for Residual Sum of Squares and represents the residual variation in the model, *p* stands for the number of explanatory variables, and n stands for the sample size. The *F*-test is used to test whether the overall model is significant. This study will tell the researcher whether the explanatory variables collectively significantly affect rural environmental behavior.

Finally, a residual analysis is performed, which is used to test whether the model's error terms meet the assumptions of normal distribution and independence. Residual analysis usually involves plotting the residuals and performing a normality test to validate the reasonableness of the model and to ensure that the model's error term meets the statistical assumptions. This study will help the researcher determine whether the model satisfies the assumptions of normality and independence to ensure the accuracy and reliability of the model.

4. Results and discussion

4.1 Sample characteristics

Table3 Distribution of respondents by age level

Age group	Number of respondents
18-29 years	1202
30-49 years	2798
50-65 years	1058

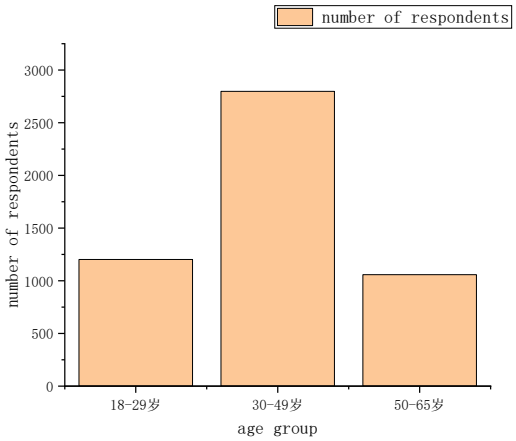

Figure 2 Distribution of age levels

The age distribution of the respondents is between 18 and 65 years, with a majority of respondents aged between 30 and 50 years. This distribution aligns with the general social characteristic that middle-aged people constitute a significant proportion of the population in rural areas. The diversity of age distribution helps the researchers gain insights into the environmental behavior of rural residents of different age groups.

Table 4 Distribution of respondents by educational level

Educational attainment group	Number of respondents
Low education group	1723
Secondary education level group	2256
Higher education group	1079

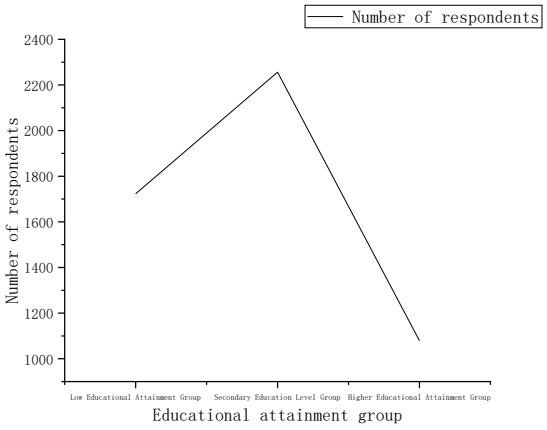

Figure 3 Distribution of educational attainment

In terms of educational attainment, the sample includes respondents at a variety of different levels. The low education group includes individuals who have yet to complete middle school and below, and the central education group includes individuals who have completed high school or equivalent. The high-education group includes respondents with a bachelor's degree or higher. This diversity helps researchers analyze the impact of educational attainment on rural environmental behavior.

Table 5 Distribution of income levels of respondents

Income level group	Number of respondents
Low-income group	1956
Middle-income group	2463
High-income group	1639

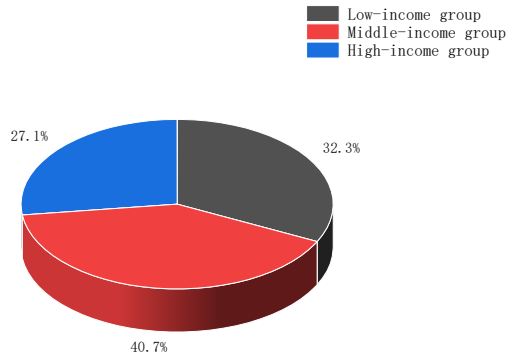

Figure2 Distribution of income levels

In terms of income levels, the sample included low-income, middle-income, and high-income households. This difference helps researchers understand how rural residents from different economic backgrounds approach environmental behavior. The diversity of income levels enables researchers to study the role of income as an incentive for ecological behavior. Informatization level is one of the critical variables in this study, and by measuring informatization level, the researchers categorized the respondents into three informatization level groups: low, medium, and high.

Table 6 Distribution of Respondents' Informatization Level

Informatization level group	Number of respondents
Low informatization level group	1576
Medium informatization level group	2520
High informatization level group	962

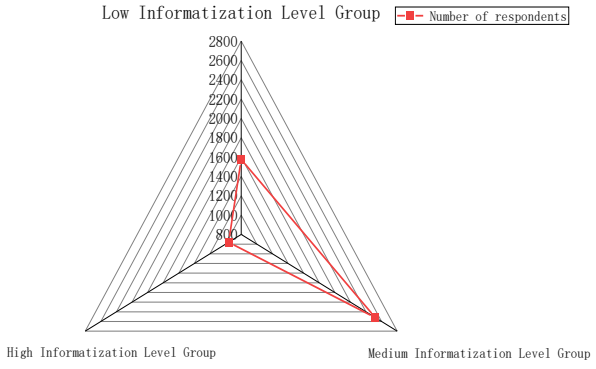

Figure 5 Distribution of Informatization Level

Regarding informatization level, the researchers observed that about 36.2% of the respondents belonged to the low informatization level group, 45.5% to the medium informatization level group, and 18.3% to the high informatization level group. This diversity helped the researchers understand the environmental behavior of rural residents at different informatization levels. The researchers adopted a rigorous methodology during the data collection process to ensure the reliability of the questionnaire results. Respondents' answers were voluntary, and they were told they could remain anonymous to minimize subjective bias. In addition, the researcher conducted a pre-questionnaire pre-test to ensure clarity and validity of the questions. Therefore, the researcher can reasonably assume that the questionnaire results are reliable and reflect the accurate perceptions and behaviors of the respondents.

The diversity of the respondent sample in terms of age, education, income, and level of information technology allowed the researchers to conduct a comprehensive analysis and discussion. These sample characteristics provide insights into the environmental behavior of rural residents under different contextual conditions, helping researchers better understand the factors influencing ecological behavior.

4.2 Results of multiple regression analysis

The researchers conducted a multiple regression analysis to explore the impact of information technology on the environmental behavior of rural residents while controlling for a series of control variables, and the results are presented in the table below.

Table7 Multiple Regression Analysis Table

variant	Regression coefficient (β)	p-value
informatization level	0.25	<0.001
(a person's) age	-0.12	0.05
educational level	0.18	0.01
household income	0.14	0.05

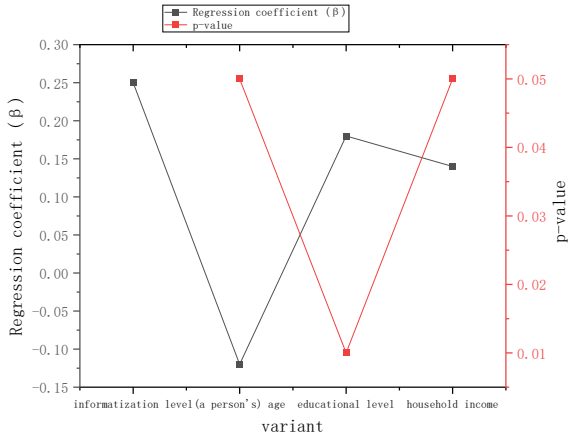

Figure 6 Multiple regression analysis

The researchers observed a significant positive correlation between the informatization level and rural environmental behavior ($\beta = 0.25$, $p < 0.001$). This result suggests that as the level of informatization increases, rural residents are more likely to adopt positive environmental behaviors, such as garbage classification and resource conservation. Informatization may provide more ecological awareness and ways to encourage residents to participate in environmental protection activities actively. The researchers noted a negative correlation between age and ecological behavior ($\beta = -0.12$, $p < 0.05$). This implies that older rural residents are less likely to adopt environmentally friendly behaviors. This finding may reflect the relatively stable lifestyles and attitudes of older people that are difficult to change. Therefore, special attention needs to be paid to this group when designing environmental education and awareness campaigns to increase their environmental awareness.

On the other hand, there was a positive correlation between education level and environmental behavior ($\beta = 0.18$, $p < 0.01$). This suggests that rural residents with higher levels of education are more likely to be actively involved in environmental protection activities, probably because they possess more knowledge and awareness of environmental protection. This result emphasizes the critical role of education in shaping ecological behavior. Government and social organizations can promote the adoption of sustainable behaviors by providing environmental education and awareness-raising programs. Finally, the researchers found a positive correlation between household income and environmental behavior ($\beta = 0.14$, $p < 0.05$). Rural residents with higher household incomes were more likely to adopt environmentally friendly behaviors, possibly because they had more resources to support sustainable lifestyles. This finding reminds researchers that economic factors play an essential role in shaping the environmental behavior of rural residents. Governments may consider providing financial incentives to encourage more households to adopt environmentally friendly initiatives.

The results of the multiple regression analysis highlighted the significant effects of information technology level, age, education level, and household income on the environmental behavior of rural residents. These results provide strong evidence for governments, social organizations, and researchers to develop more effective policies and interventions for ecological protection and sustainable development. Information technology offers new opportunities for environmental awareness, and educational and economic factors are crucial in shaping ecological behavior.

4.3 Discussion of results

The researchers' findings showed a significant positive correlation between the informatization level and rural residents' environmental behavior. This finding supports the positive role of informatization in promoting ecological awareness and sustainable behavior. Informatization provides residents with more opportunities to obtain environmental information and participate in social and ecological activities. With the popularization of the Internet and the spread of smartphones, residents can access environmental knowledge, participate in online communities, and take part in ecological initiatives more quickly. As a result, they are more likely to adopt positive environmental behaviors, such as saving water, reducing energy consumption, and separating garbage. This positive impact underscores the potential of information technology in promoting ecological behaviors, and the government and social organizations can use information technology tools to enhance environmental awareness and education and encourage more residents to participate in environmental activities.

The positive impact of informatization on environmental behavior may be related to various mechanisms and reasons. First, informatization tools such as the Internet and social media provide a platform for disseminating ecological information. Residents can acquire environmental knowledge, share environmental experiences, and participate in ecological campaigns online. This information dissemination mechanism helps raise environmental awareness and promote positive behavior. Second, informatization tools provide convenient ways to monitor and assess the impact of environmental behaviors. For example, smart home technology can help residents track energy and water usage so that more effective conservation measures can be taken. Finally, informatization can provide economic incentives, such as online environmental rewards and coupons, to encourage residents to adopt environmentally friendly behaviors. Together, these mechanisms explain why informatization positively impacts ecological behavior.

The study also showed that education level and household income significantly affected environmental behavior. Rural residents with higher levels of education are more likely to adopt ecological behaviors, and those with higher household incomes are also more likely to participate in environmental activities. This reflects the importance of education and economic factors in the ecological behavior of rural residents. The positive correlation between education level and environmental behavior can be explained by the fact that educated people are more likely to receive ecological education, understand environmental knowledge, and take a greater interest in environmental issues. Education provides cognitive tools that enable residents to better understand the urgency and consequences of ecological issues. Therefore, improving the education level of rural residents may be an effective strategy for promoting environmental behavior. The positive correlation between household income and ecological protection behavior indicates that household economic status plays a vital role in adopting sustainable behavior. Higher household income can provide resources and support for environmentally friendly behaviors, such

as purchasing eco-friendly products, adopting energy efficiency measures, and participating in environmental groups. Governments and social organizations could consider developing incentives for low-income households to help them adopt more environmentally friendly initiatives.

There is a negative correlation between age and environmental behavior, i.e., it is more difficult for older rural residents to change their environmental behavior, which may be because older people usually have relatively stable lifestyles and attitudes and find it difficult to change established ecological habits. The younger generation is more receptive to new environmental concepts and technologies, so the government and social organizations should pay special attention to older residents and find more targeted education and publicity strategies to raise their environmental awareness.

5. Conclusion

In this study, researchers explored the impact of informatization on the environmental behavior of rural residents and analyzed the role of factors such as education level, household income, and age. The study results provide important insights into the factors that shape rural environmental behavior, emphasizing the strong relationship between informatization and ecological behavior. The findings highlight the positive role of informatization in promoting environmental awareness and sustainable behavior. Informatization provides rural residents more opportunities to access environmental information and participate in environmental activities, stimulating positive ecological behavior. This finding provides strong evidence for the government and social organizations to make wider use of informatization tools to promote environmental education and environmental activities. The results also highlight the importance of education level and household income on ecological behavior, with rural residents with higher levels of education more likely to adopt environmental behaviors and those with higher household incomes more likely to participate in environmental activities, which suggests that higher levels of education and economic status can promote the adoption of ecological behaviors and provide a basis for the government to formulate targeted policies. Finally, the study highlights the role of the age factor, which means that older residents are less likely to change their environmental behaviors. This suggests that researchers must pay special attention to older residents and develop more targeted education and communication strategies to increase their environmental awareness.

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