
Evaluation Model of Rural Environmental Sustainable Development Capability Under the Background of Rural Revitalization

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Abstract

Sustainable development cannot be achieved in a society with substantial inequalities in development between rural and urban regions. Sustainability in terms of environmental and human well-being can be attained by applying ecological livability. Agriculture, rural areas, and farmers are crucial for developing countries and their populations. Literature on rural innovation is becoming more neglected as the need for rural regeneration develops. This paper suggests structural equation modeling based on sustainable rural development (SEM-SRD) to build an SRD index system with a universal value based on the interplay between ecological livability and SRD. There are two aspects to sustainable rural development (SRD): ecological sustainability and living sustainability in rural areas. Any country can use a comprehensive quantitative tool to assess its SRD status using the SRD index method. When it comes to environmental sustainability and garbage disposal, the former is green, and the latter is social. With the SRD index method, any nation can utilize a comprehensive quantitative tool to evaluate its SRD status. New perspectives for achieving rural revitalization, antipoverty, and global sustainable development can be gained through the rural innovation system suggested in this paper, which directly adds to the literature in this

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field. Research shows that agricultural eco-efficiency is substantially greater than rural economic growth, which has a considerable impact on overall rural development, as shown by the findings. For a long time, there has been a huge disparity in the economic growth of different regions of the country. The efficiency of rural development continues to increase with time. The experimental result of the suggested method enhances the inadequate management of RES development, rural development ratio, stability ratio, productivity ratio, and loss of growth in the rural area. Rural areas play an important role in the sustainable development of global society, and therefore, their preservation is necessary.

Keywords: Structural equation, modeling, sustainable development, rural environmental, rural revitalization.

1 Introduction of Sustainable Rural Development

The rural environment is a complex system where visible subnational and worldwide development disparities exist [1]. Due to such rural variation and the partial absence of comparable indicators, establishing goals and indicators that answer national and international demands are challenging for methodological analysis [2, 3]. The unifying aim should simplify harmonizing policies and strategies, which is not always the reality [4]. Due to industrialisation and globalisation, different rural regions have been created worldwide [5]. Some rural areas succeed economically and socially, while others are in a downward spiral of decline due to rural tourist marketing and counter-urbanization stimulation [6]. Urbanization will inevitably accompany the demise of rural areas worldwide [7]. According to the World Commission on Environment and Development, sustainable development does not undermine the capacity of future generations to satisfy their requirements [8, 9]. As the need for rural regeneration grows, the literature on rural innovation is overlooked. SEM-SRD (SEM-SRD) is proposed in this paper to build an SRD index system with a universal value based on the interplay between ecological livability and sustainable rural development (SRD).

The notion considers the future for sustainable development's genuine value [10]. Our long-term knowledge of future generations, on the other hand, can be constrained [11]. Sustainable development is riddled with doubts. Other than certain fundamental biological demands, the development preferences of future generations are unknown and unpredictable [12]. A sustainable future can only be reached if current development pays

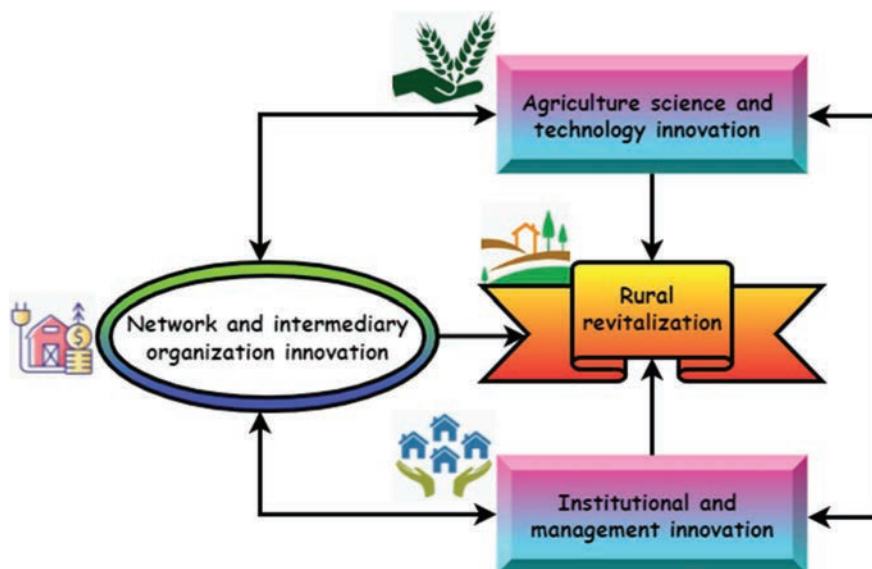


Figure 1 Rural innovation system fundamental structure model.

attention to protecting the development potential of future generations [13]. Ecological sustainability and living sustainability have been separated in earlier research [14]. However, most of this research concentrated on urban sustainability, while rural sustainability studies have been lacking [15].

Rural regions are often the most populous in developing nations [16]. Rural regions accounted for more than 94 % in 2018, the biggest developing country [17]. There are so many rural places that it's important to look at their long-term viability [18]. In emerging nations, globalisation, industrialization, and urbanization have shifted the rural spatial paradigm [19]. These developments have posed a threat to the long-term viability of rural communities and the natural environment [20].

Figure 1 shows the rural innovation system fundamental structure, model. The rural innovation system facilitates the free flow of development resources in rural communities through intermediaries and networks, such as the Internet. Technology transfer from the urban modernization system helps the rural innovation system grow more sustainably while generating more economic benefits. Rural innovation generates infrastructure, financial systems, and cultural settings by re-evaluating and optimizing innovation policies. The rural innovation system is open to new ideas. In rural development, science and technology can be increased by reducing the complexity of policy

decision-making and disseminating it. This action will result in long-term benefits for the agricultural business, the environment, and rural residents. Urban modernization systems can help rural innovation systems grow more sustainably and generate more economic benefits through technology transfer. Rural innovation creates infrastructure, financial systems, and cultural contexts for the region by re-evaluating and optimising innovation policies. Openness to new ideas is a hallmark of rural innovation systems. Decision-making processes can be simplified so that more people can access and benefit from rural development research.

Science, technology, politics, systems, and networks all have a role in innovation, which is seldom the product of a single component or input. Developing agricultural technology, institutions, management, local networks, and intermediary platforms is essential to rural rejuvenation via comprehensive innovation strategies. Countries can use three-dimensional process models to build a close-loop rural innovation system, which can help alleviate poverty while increasing rural and national innovation potential. Long-term rural revitalization depends on innovation in science and technology in rural communities and cities, and metropolitan areas.

Agriculture science and technology innovation is a key component of the national innovation system, an important engine of rural economic growth, and basic support for agricultural modernization, as shown by agricultural growth. Endogenous growth can be achieved if rural innovation is accelerated. Additionally, a national agricultural technology innovation system, a commercial innovation system, and organizations help farmers use agricultural technologies.

- Agricultural technology innovation ecosystems offer technical and non-technical information to boost agricultural productivity.

As a consequence of a lack of attention to environmental preservation while seeking economic expansion, many developing nations have found themselves in a position where pollution must be cleaned up. Environmental contamination in rural regions increases due to a lack of environmental preservation initiatives in metropolitan areas. Growth in GDP is the essential statistic to measure local government success under a system of governance. To help policymakers design rural improvement policies, reduce regional disparities, and promote long-term rural growth, SEM-SRD has been promoted.

The rest of the SEM-SRD research can be organized similarly. Section 2 describes the literature research. Briefly describe in Section 3 the new ideas

that have been presented about and used in this paper. Section 4 details the findings and conclusions based on the data. Lastly, in Section 5, the SEM-SRD comes close with a thorough analysis of the findings.

2 Related Work

The three fundamental pillars of the sustainable development idea had the environment, the economy, and society. New pillars have been added to this notion throughout time. According to this study, the primary purpose was to assess the usefulness of geographic information systems (GIS) in rural regions for implementing sustainable development principles [21]. GIS technologies enable models that represent the current and projected changes in geography logically and organized. It's a great aid in the sustainable development of rural communities. It's necessary to consider many factors relating to rural development and policies such as population, economy, environment, and social well-being. According to the qualitative Delphi methodology (QDM), the panel was asked to choose a set of relevant and agreed-upon indicators [22]. As a result, welfare spending has been proven to be one of the most important factors in rural development, contrary to conventional statistics that only include demographic and economic data.

Food security and rural development were considerably aided by indigenous village poultry (IVPs). Consequently, IVPs cover incidentals, economically promote equality, and promote the livelihood of underprivileged populations. IVPs play an important role in the environment because of their ability to live and multiply without a lot of care [23]. Knowledge, wisdom, and experience from IVP production can be combined with cost-effective treatments to enhance management and nutrition, disease control, or genetics for the benefit of subsistence farmers and their families, allowing them to achieve sustainable and long-term production. Democratic values are promoted through social innovation, especially in rural locations where biophysical and market restrictions and public financing deficits are common. This work utilizes two large sets of empirical data to discover divergent development pathways (DDPs) for social innovation [24]. The essay gives a better knowledge of how social innovation starts and evolves and how to capture processes and subsequent changes in marginalized rural regions so that such locations' variety can be turned into strengths.

The theoretical and practical linkages between bottom-up efforts and top-down structures were complicated in executing regional development plans and programs. To better understand how top-down and bottom-up forces

work together to promote sustainable rural development, they established an analytical framework that incorporates notions such as transformational social innovation, adaptive governance, and bridge institutions [25]. They used an analytical approach to understand better how a social innovation program impacted rural development. The existing model issues have been overcome with the SEM-SRD (structural equation modeling based on sustainable rural development). Inadequate RES development management, rural development ratios, stability ratios, productivity ratios, and rural growth loss can all be improved with this study, and it has been suggested. This study has been suggested.

The structural equation modeling based on sustainable rural development (SEM-SRD) has overcome the existing model issues. This study has been suggested to increase the inadequate management of RES development, rural development ratio, stability ratio, productivity ratio, and loss of growth in the rural area.

3 Proposed Method: Structural Equation Modeling Based on Sustainable Rural Development

In the traditional rural regions, the economics, society, and environment are all intertwined, and agriculture is the primary source of human livelihood. On the other hand, rural regions are being pushed ahead by the fast industrialization and urbanization that comes with marketization. Rural functions that support human activities are continually developing due to social and economic development and the enrichment of human requirements. Rural functions are changing due to a substantial shift in the rural environment.

Figure 2 shows the design of rural revitalization. The assessment of rural development is predicated on forming an index system. Evaluative outcomes' objectivity, authenticity, and scientific rigour are strongly impacted by the chosen and determined indicators. The selection of an evaluation index and the creation of an assessment model are the two most important steps in designing an index system. An index system is used to evaluate rural development. The chosen and determined indicators significantly impact the evaluation results' objectivity, authenticity, and scientific rigour. An index system's most critical steps are selecting evaluation indicators and developing an assessment model. The rejuvenation of industry, talent, culture, environment, and organization is part of rural revitalization, known as five in one. It is linked by the fact that each of its components complements the others. The resuscitation of talent is essential to achieving industrial regeneration. There

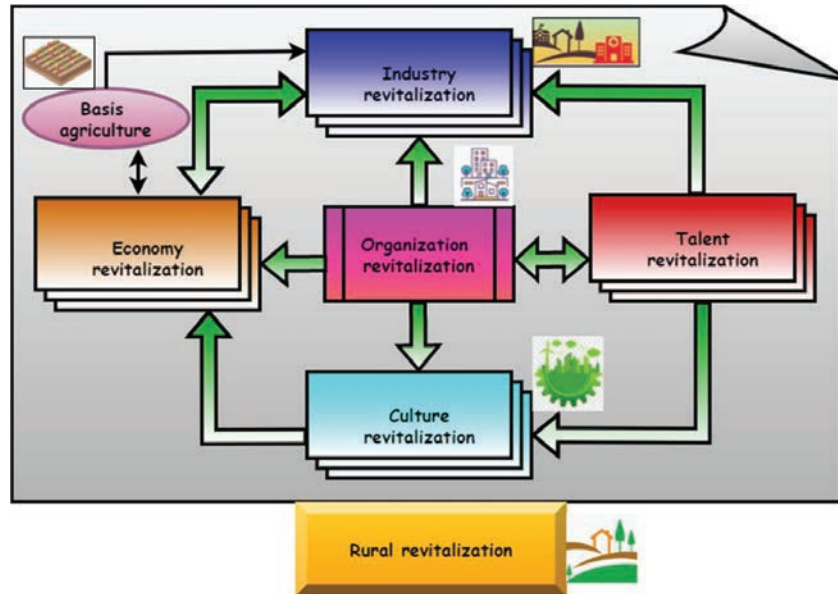


Figure 2 Design of rural revitalization.

is no more industrial growth if they don't have the right people. To ensure the long-term viability of rural regions, they must avoid destroying the natural environment. As they work to build rural regions, they should make full use of groups that help residents gain important cultural information so that everyone can participate in rural development and ultimately benefit from it together. The rural development index system is a multi-factor and multi-level method of assessment. Protective measures are in place to ensure that property is transferred and owned following the land's use rather than the ownership. For peasants, land consolidation and increased peasant assets' value are essential steps toward expanding their property rights. Innovation in rural land systems is the key to rural land consolidation's breakthrough.

Five factors are combined into a single framework to accurately represent today's farmland environment. The key to rural revival is increasing the number and quality of talented people ready to go to rural regions to satisfy the demands of rural rejuvenation. Since no two rural regions are the same geography, population, and economic and social conditions, it is necessary to use adaptable methodologies when developing indicators for rural areas.

The Lagrange multiplier technique has been used to calculate the total weights. The functional index for each function is calculated using weighted

summation X_{kl} is given as

$$X_{kl} = \frac{Z_{kl} + \rho_l}{\sigma_l} + c_k \quad (1)$$

The total weights have been calculated using the Lagrange multiplier method. Weighted summation is used to calculate each function's functional index. The original data value of the unit's index and standard deviation means can calculate a dimensionless score, as shown in Equations (1) and (2).

As shown in Equation (1), a dimensionless $c_k a$ score can be calculated using the original data Z_{kl} value of the index of the unit as well as standard deviation ρ_l mean. Combining five factors into a single framework is an accurate representation of today's farmland environment. Increase the number and quality of talented people willing to relocate to rural areas to meet the needs of rural revitalization. It is necessary to use adaptable methodologies when developing indicators for rural areas because no two rural regions have the same geography, population, and economic and social conditions.

In the context of entropy weighting Z'_{kl} , this is defined as

$$Z'_{kl} = \frac{Z_{kl} + \min(Z_k)}{\max(Z_k) + \min(Z_k)} + X_{kl} \quad (2)$$

As shown in Equation (2), where Z_k is the evaluation index's standardized value and k th indicator's minimum and maximum values.

Computed weight based on minimal relative information entropy d_k for the whole value is defined as,

$$d_k = 1 + \sum_{k=1}^m x_{kl} - \sum_{j=1}^n e_j \quad (3)$$

As shown in Equation (3), the weights k and l are derived using the entropy approach and x_{kl} indicates the analytic hierarchy process and e_j is the weight that accounts for everything else. Many alternative indicators can be developed, especially in rural areas where data are scarce. An index system and environmental indicators have been implemented in Equation (3) to compute weight based on minimal relative entropy to demonstrate the impact of agricultural expansion on the environment and rural quality of life.

Various alternative indicators can be devised, particularly in rural areas where the data are difficult to obtain. An assessment index system and environmental indicators have been introduced to demonstrate how agricultural expansion affects the environment and rural quality of life.

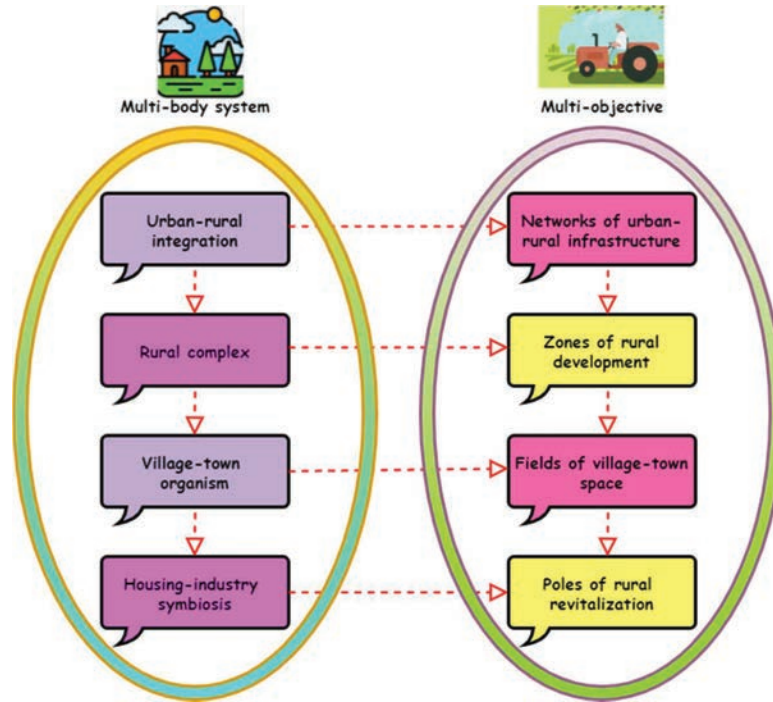


Figure 3 Goal of rural revitalization.

Urban-rural integration networks are reestablished by constructing development zones, fields of village-town space, and rural revival poles. As a result of this approach, rural systems are being reorganized geographically, industrially, and organizationally. Introducing the field of human-earth science, a new area of research that aims to understand better how humans interact with their natural surroundings. Figure 3 shows the goal of rural revitalization. Rural-urban integration is essential when dealing with major societal concerns and reconciling urban and rural divides. Rural rejuvenation and urban integration are intertwined in a complex system of urban-rural integration and village-town organisms, and housing-industry cooperation. It is usual for rural revitalization programs to concentrate on the county, the town, and individual farms or companies and emphasize the rebirth of rural areas as a multi-body system. Rural development zones, fields of village-town space, and rural revival poles are constructed to reestablish urban-rural integration networks. This strategy to support the emergence of polarisation in agriculture reshapes rural systems geographically, industrially, and

organizationally. Human-earth science is a new branch of study that better complements the relationship between people and the natural environment.

Rural rejuvenation and urban-rural ties can be evaluated from the perspective of the human-earth system. A recent study considers the intertwined structure of urban and rural systems when analyzing rural development. Integration of urban and rural communities ensures that urban and rural areas have equal opportunities. In rural rehabilitation, urban-rural integration can be accomplished by combining man, land, and industry. The urban-rural regional system's population structure, industrial structure, land use, and geographical shape are influenced by the transfer of factors, strategy change, and mechanism conversion. That's why urban and rural residents should have the same rights regarding land use. Increased rural vitality and competitiveness are essential, as is a systematic approach to urban-rural integration underpinned by the four revitalization strategies.

A rural function's R index value is characterized as having the value is stated as,

$$R = U_i \times D_{ik} + \frac{c_i}{\sum_{i=1}^m c_i} \quad (4)$$

As shown in Equation (4), U_i denotes the unit's index value, the average value D_{ik} of function across all units, and the standard deviation c_i of function across all units.

Rural development efficiency μ_r can be measured using the convergence method is defined as,

$$\mu_r = \left\{ (R + 1)^2 \sum_{i=1}^m \left(K_i(r) + \left(R \sum_{i=1}^m K_i(r) \right) \right)^2 \right\}^{\frac{1}{2}} \quad (5)$$

As shown in Equation (5), there are R regions in the economy, and $K_i(r)$ is the rural development efficiency value for each district in the r period.

Local socio-economic and industrial structures shape regional human-earth interaction systems. Urbanization has taken away the rights and interests of farmers. Hence it is proposed that the rights that embody relationships between people and the land be equal in urban and rural regions. The four-revitalization strategy to rural revitalization must be fully implemented, increasing rural vitality and competitiveness and a systematic approach to urban-rural integration.

Figure 4 shows the road plan for rural revitalization through consolidating farmland. Land consolidation has a five-guarantee function in encouraging

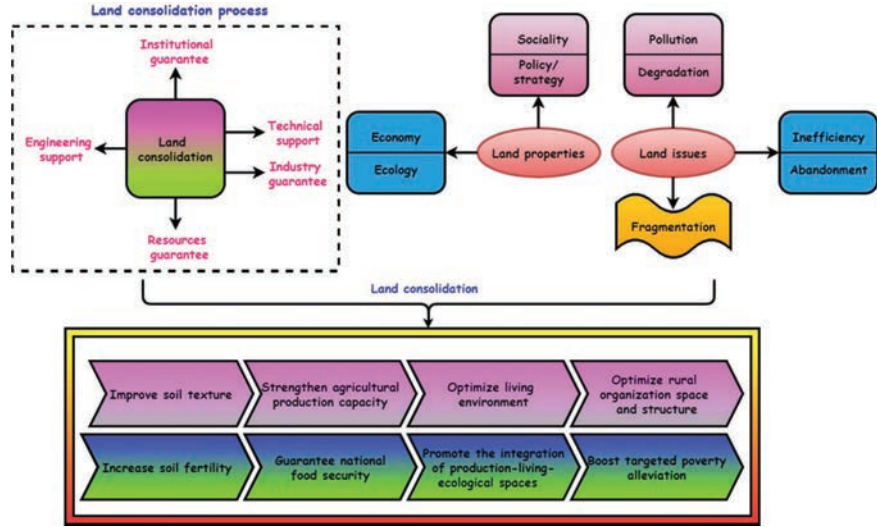


Figure 4 Road plan for rural revitalization through consolidating farmland.

rural revival, based on the aims and advantages it generates: Consistency of resources high-quality agricultural building is a key component of land consolidation. With the help of land consolidation and other projects and methods, land resources can be merged, increasing the amount and quality of farmed land while ensuring food safety. Consolidation of unused or degraded land can be achieved by a systematic engineered building activity using engineering, technological, biological, and other approaches. Potentially boosting land-use efficiency and strengthening the integration of production and residential areas. Land consolidation can encourage rural revival because of its five-guarantee function: Land consolidation necessitates a stable supply of resources and high-quality agricultural buildings. It is possible to merge land resources through land consolidation and other projects, increasing the amount and quality of farmland while ensuring food safety. However, this effort is more than simply technical for peasant households. Technical assistance for land consolidation includes deploying uncrewed aerial vehicles (UAVs), remote sensing methods, and scientific decision-making for rural revitalization. The industry ensures the multifunctionality of agriculture.

It is possible to examine the long-term convergence of sigmas further $RD_{K(ir)}$ by using the following formula,

$$RD_{K(ir)} = e - \rho \times s + w_{kl} \tag{6}$$

As shown in Equation (6), e is the mean difference of regional rural development efficiency, which includes farming eco-efficiency ρ and rural economic efficiency, in rural areas and s is a random disturbance term that w_{kl} is a constant term. Protective measures are in place to ensure that property is transferred and owned following the land's use rather than its ownership. Peasants' property rights should be strengthened through land consolidation, and the value of their assets should rise. The innovation of the rural land system is the key to rural land consolidation's breakthrough in a subsystem.

The subsystem's arrangement factors' influence on the overall system's order p_b is described as

$$p_b = \sum_{a=1}^k \mu_{ba} + \sum_{b=1}^m \delta_{ab} \quad (7)$$

As shown in Equation (7), the entire rural development system μ_{ba} and each order parameter a and b are both weighted by this variable δ_{ab} .

The promotion of integrated growth in the primary, secondary, and tertiary sectors is a prerequisite for the regeneration of small towns and rural areas. The goal is to boost the income and employment of rural residents while ensuring the long-term health of rural regions through land consolidation, modern agricultural development, and the emergence of new enterprises based on agricultural experimentation and land circulation. Various institutional safeguards are put in place to ensure that the property is transferred and owned consistently with the land's usage rather than its ownership. More property rights for peasants should be granted through land consolidation, as should a rise in the value of peasant assets. Innovating the rural land system is the key to rural land consolidation's breakthrough. There is a statistical error when an observation's expected value differs significantly from the actual value, based on the entire population from which a statistical unit was randomly selected.

Figure 5 shows the innovation of sustainable rural development. Sustainable rural development (SRD) and ecological livability have a complicated and multi-dimensional interaction. Ecological livability has become increasingly prominent due to the notion of sustainable development. Ecological and living sustainability can be separated since SRD is a primary carrier of SRD. A pleasant rural natural environment, rural production, and a rural way of life are the foundations of long-term rural development founded on sustainability. The concept of sustainable development has made environmental livability more prominent. It is possible to separate environmental sustainability from

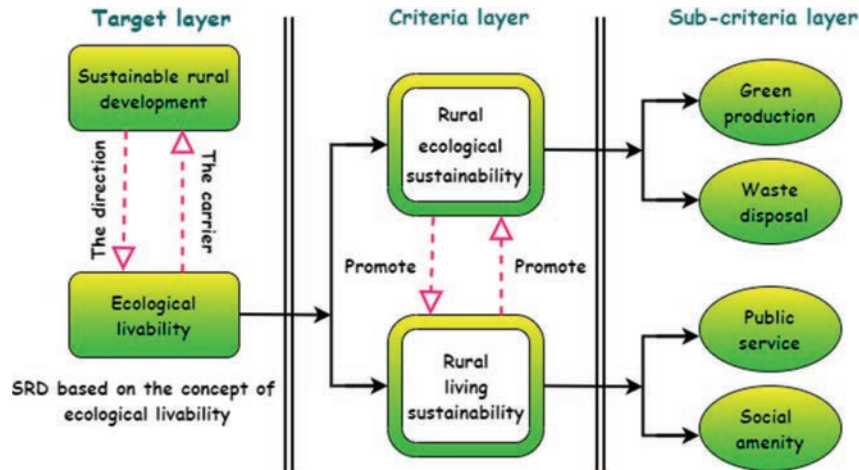


Figure 5 The innovation of sustainable rural development.

human sustainability because SRD is the primary transporter of SRD. Rural development built on the principles of long-term sustainability relies on a healthy rural natural environment, rural production, and a rural way of life.

On the other hand, rural residents drive rural development, providing the workforce required for long-term expansion. Rural residents are supported by a habitable environment that supports their basic requirements for survival and development. Policymakers are guided to take specific actions to enhance ecological viability through sustainable development, which serves as an overarching objective and direction. In contrast, improving the ecological livability, which serves as a means to execute sustainable development, can help the SDR. Considering ecological sustainability and livability, they developed the SRD index system based on ecological livability. The rural function's index value is described as fulfilling rural residents' needs for survival and growth because the rural inhabitants and the environment interact peacefully. SRD brings together a diverse group of individuals with very different backgrounds and perspectives to achieve their common goal.

Rural ecological sustainability (RES) and rural living sustainability (RLS) are included in this index system to promote sustainable development. They cannot use a static viewpoint to evaluate SRD since it is dynamic. Because rural inhabitants and the environment interact peacefully, RLS is described as fulfilling rural residents' requirements for survival and growth. SRD comprises people who share the same goal and have quite varied priorities. Using green production to measure rural inhabitants'

pollution-control practices during agricultural output. Green Production (GP) measures the decrease of agricultural pollution and the enhancement of agricultural resource usage. Waste disposal (WD) is selected to measure the amount of waste disposed of throughout agricultural production and everyday living. Waste disposal is essential. Social and economic issues can arise from improper trash disposal, including environmental damage, public health concerns, and future demographic trends to maintain a healthy environment and community. Because of its complexity and multi-dimensionality, there's no uniform definition or assessment technique for livability.

Liveability has previously been described as the quality of life, life satisfaction, and living circumstances for residents, an abstract notion representing the features of a local living environment. Specifically, rural life should be safe, healthy, convenient, and pleasant. However, various locations and groups' cultural backgrounds and living situations and the criteria for evaluating livability can vary. Aside from some minor differences, the RLS assessment covers the same things. From the perspective of making a place inhabitable, public service (PS) plays a critical role in making a place more livable. Rural people's fundamental needs must be met to secure their long-term well-being. A town's quality of life can be directly linked to the availability of public amenities. A place's link to its surroundings will influence sustainable development in light of society's fast growth. People have a hard time staying in locations where traffic is congested for lengthy periods.

Figure 6 shows the logical analysis of rural multi-functioning systems. Rural roles in social development are always changing due to shifting demands on production, consumption, and the environment. Demand among the traditional farming community is a solid predictor of a change in demand. A considerable distance separates the city and rural regions at this age, and rural residents can support themselves. The research has focused mostly on rural areas that depend on farming as a source of income. Rural areas are essential as a space carrier for agricultural production and rural lifestyles. Industrialized countries have widened the demand hierarchy. Traditional agricultural development models that have depended on high labor input to boost land yield for a long time are being replaced by new models that increase labor productivity as human-land conflicts develop. Agricultural employment is low, causing excess rural labor to be diverted to nonagricultural businesses. In the face of human-land conflicts, traditional agricultural development models are being replaced by newer models that focus on increasing labor

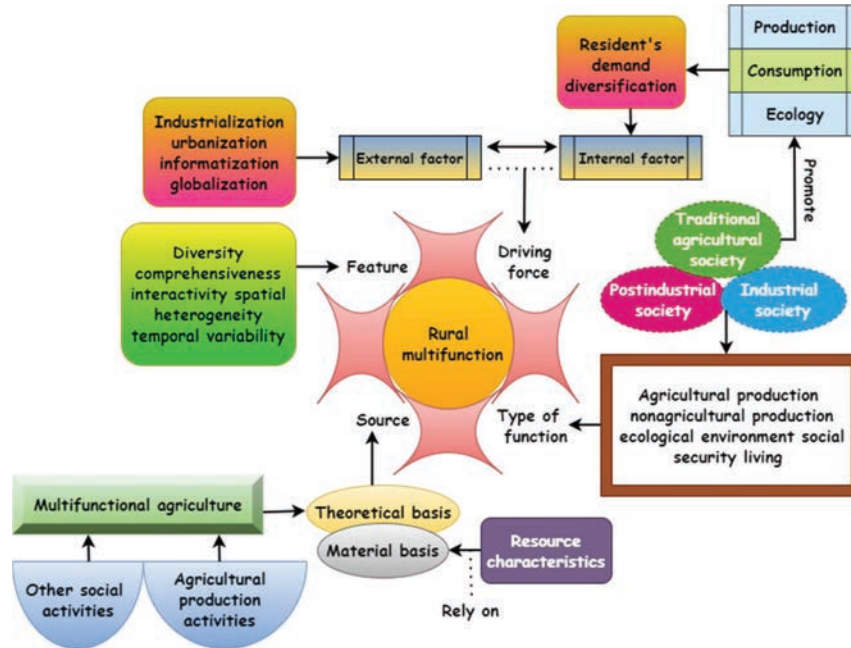


Figure 6 Logical analysis of rural multi-functioning systems.

productivity. A lack of employment opportunities in agriculture has led to a shift of rural workers from agriculture to non-agricultural industries.

In the countryside, a nonagricultural production role is established. It is a tendency in the postindustrial society that people's desire for consumption shifts from material goods to nonmaterial ones. There is an increasing tendency for middle-class people to reside in cities with higher income levels, including scientific and cultural qualities that lead to a more green consensus, encouraging the development of ecological consumer patterns. Villages' ecological roles have grown more significant throughout time. People's expectations for a better quality of life simultaneously rise as their incomes rise. The social security system is getting more people's attention. In addition, the government is devoted to enhancing rural regions' social security systems. Consider the remoteness and potential of rural areas when developing rural development strategies tailored to rural areas' specific needs. RES development, rural development, rural development ratio, stability, rural development productivity, and rural growth loss are all analyzed using the proposed method.

Multifunctionality in rural regions refers to their capacity to carry out a wide range of human activities to suit people's demands at a given point in socio-economic development. Rural areas have unique resource features, and these functions are derived from this. Rural multifunctionality is agricultural and nonagricultural output, living and environmental functions, and social security. Rural multifunctionality, like agricultural multifunctionality, is centred on the land's potential for many purposes. The regional and temporal heterogeneity of rural multifunction is evident. The suggested method increases the inadequate management of RES development, rural development ratio, stability ratio, productivity ratio, and loss of growth in the rural area.

4 Simulation Outcome

Rural development is essential to a nation's economic, social, and environmental well-being. Poverty eradication depends on it as most of the world's poor reside in rural areas. Beyond the urban-rural split, subregional and regional settings where poverty manifests itself. Coordination of rural development programs that contribute to long-term livelihoods at all levels of government is thus vital, and the benefits that can be reaped from doing so are substantial. Consider the remoteness and potential of rural places while developing rural development strategies tailored to the specific needs of rural areas. The proposed method analyzes the inadequate management of RES development, rural development ratio, stability ratio, productivity ratio, and loss of growth in a rural area. It is hoped that land consolidation, modern agricultural development, and the rise of new businesses based on agricultural experimentation and land circulation will help increase rural residents' incomes and employment while safeguarding rural regions' long-term health.

Figure 7 shows the inadequate management of RES development. At this point in promoting SRD, from the standpoint of RES, green production (GP) and waste disposal (WD) had not attained a coordinated development. The development of WD has been better than GP in economically developed eastern coastal regions. When it came to the inland districts, where domestic economic circumstances have been less than ideal, they performed better in GP. Since regional strengths must be maintained to construct a firm foundation for the SRD's regional upgrading route, regional weaknesses must be addressed while keeping regional strengths.

Additionally, the east coast should be improved, while the west and northeast should compensate for WD. GP and WD cooperation in the central



Figure 7 Inadequate management of RES development.

Table 1 Rural development ratio

Year	GIS	QDM	SEM-SRD
2016	59.3	76	84
2017	60	65	89.7
2018	52	78	79
2019	55	69	85
2020	58.9	77.6	91
2021	51	71	98.4

region should be enhanced. Social planners should avoid placing GP and WD at odds to establish a coordinated development pattern and instead focus on the entire consideration. Economically affluent eastern coastal regions have seen greater growth in WD than in General Purpose (GP). The inland districts, where domestic economic conditions have been less than ideal, performed better in GP than the coastal districts. Regional weaknesses must be addressed while maintaining regional strengths to ensure that the SRD’s regional upgrading route has a solid foundation.

Table 1 shows the rural development ratio. Rural development often refers to a strategy for boosting the well-being of those who live in rural regions, whether they are densely inhabited or isolated. Forestry and agriculture, two land-intensive industries, have long been the focus of rural development. Urbanization and global manufacturing networks, on the other hand, have

changed the character of rural communities throughout time. When discussing rural development, it is common to refer to efforts to improve the lives of those who live in rural areas, whether they are populated or isolated. Rural development has long been focused on forestry and agriculture, two land-intensive industries. As a result of urbanization and global manufacturing networks, the character of rural communities has changed over time in developmental ratio. The nation's growth is still highly dependent on rural development. Agricultural production provides a living for more than two-thirds of the country's population, yet one-third of rural India still lives in poverty.

Compared to 2016, rural development is expected to rise faster in 2021 by 98.4%. Because of this, the government must be productive and provide enough resources to improve the quality of life for its citizens. In rural development, the focus is on the efforts made to strengthen the economy in rural regions. It's important to use groups that help rural residents learn important cultural information so that everyone can participate in rural development and reap the benefits together. When evaluating the rural development index system, there are multiple factors and levels to consider.

Figure 8 shows the stability ratio. Rural areas should have reliable public services and the technical, social, and environmental circumstances essential to support regional economies and urban-rural connectivity if they are to develop. Sustainable urban and rural development refers to improving the

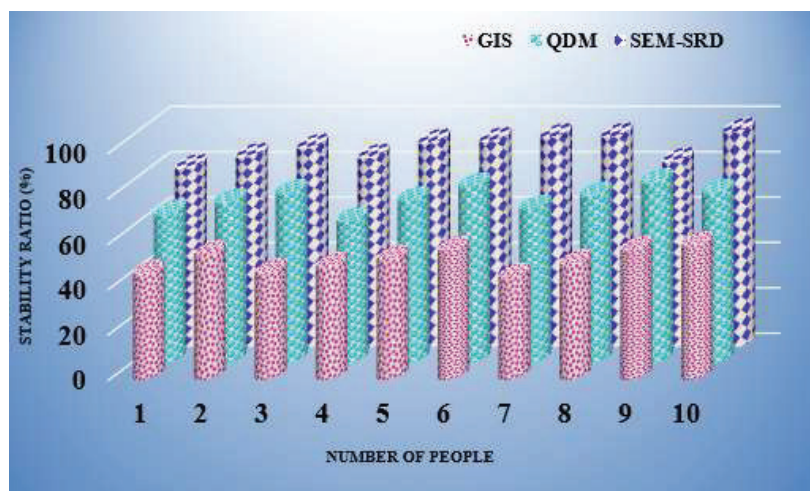


Figure 8 Stability ratio.

Table 2 Productivity ratio

Number of People	GIS	QDM	SEM-SRD
10	52	66	79
20	75	82	84
30	65	80.8	90.4
40	73	79	88
50	64	75.8	82
60	70	83	95
70	68	78	89
80	60	86	92.4
90	71	89.4	81
100	54.8	81	98.9

quality of life in an area without placing any additional load on future generations (e.g., reducing natural capital and an excessive local debt). As a solution to India’s economic progress, agriculture can help sustain rural communities. When it comes to increasing the quality of life and economic stability for residents in remote or sparsely inhabited places, it is known as community development. The proposed method improves the stability ratio by 95.1% compared to the existing method. From Tables 1 and 2, the values were chosen from 2021, and rural development is expected to grow at a rate of 98.4% faster than in 2016. As a result, the government is under pressure to be efficient and provide adequate funding to improve the lives of its people.

Table 2 shows the productivity ratio. The amount of output compared to the volume of inputs is widely used to measure productivity. An economy’s ability to create a certain output at a given cost is measured by the efficiency of its production inputs. To quantify agricultural productivity, one looks at the ratio of agricultural outputs to the inputs used to produce them. When calculating total agricultural production, the weight of different items is the most often used method known as crop yield. The suggested approach improves productivity by 98.9% compared to the existing methods. The ability of a plot of land to yield a crop is referred to as its productivity. A land’s average productivity is its output divided by its total area (e.g., production per acre).

Figure 9 shows the loss of growth in the rural area. Poverty and illiteracy, as well as unemployment, homelessness, crime, and other social harms that result from poor living conditions and a lack of amenities and services, are big issues in rural regions, according to a study of the literature. Poverty, illiteracy, unemployment, homelessness, and crime and violence are the most pressing issues. Poverty is a state where people cannot meet their basic needs

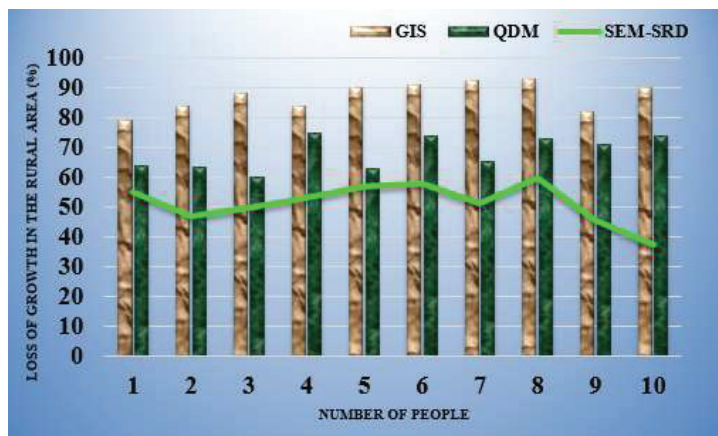


Figure 9 Loss of growth in the rural area.

because of a lack of resources. Figure 9 shows that rural areas have lost growth. According to a literature study, people in rural areas suffer from poverty and illiteracy and a host of other social ills such as unemployment, homelessness, crime and more. The most pressing issues are poverty, illiteracy, unemployment, homelessness, criminality, and violence. Poverty is defined as the inability to meet one's essential requirements due to an absence of resources. Poor growth and mobility in rural areas are often caused by inadequate infrastructure. Inadequate roadways sometimes hinder access to farming supplies and markets in rural locations. People in rural regions cannot access new technology and developing markets because of a lack of roadways. The proposed method reduces the loss of growth by 37.5% compared to the existing methods.

The suggested method evaluated the inadequate management of RES development, rural development ratio, stability ratio, productivity ratio, and loss of growth in the rural area.

5 End of the Proposed Method

In rural revitalization efforts, land engineering is used to rejuvenate land resources and enhance landowners' capacity. Hollowed settlements and degraded land have been consolidated into high-quality agriculture, increasing land production significantly. A key part of rural rejuvenation is the reform of rural land systems. Generally, structural equation modeling based

on sustainable rural development (SEM-SRD) has been undervalued as a larger regional and national innovation system component. A strong innovation process is important to a town's ability to compete economically, and more must be done to unlock the innovation system's potential for rural revival. Other countries' antipoverty efforts could benefit from a three-dimensional process model of rural innovation systems. The world's long-term prosperity depends on integrating national innovation-driven initiatives with rural redevelopment programs. To accomplish rural rejuvenation, the three primary industries must promote agriculture, the city, and the village. The numerical outcome of the suggested method enhances the inadequate management of RES development by 96.6%, rural development ratio by 98.4%, stability ratio by 95.1%, productivity ratio by 98.9%, and loss of growth in the rural area by 37.5%.

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Biography



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