

Multi-stakeholder Co-governance and Economic Synergistic Development Model for Environmental Management in China's Rural Areas: East Asian Comparative Analysis Based on Triple Objectives of Environmental Justice, Policy Efficiency, and Economic Benefits

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ABSTRACT

Rural environmental regulation is one of the most crucial issues for sustainable development in rapidly industrializing countries. This work analyses the concept of multi-stakeholder co-governance in rural environment management within the context of East Asia, where comparisons are made and ample evidence is presented regarding the performance of each principality in areas of environmental justice, policy efficacy, and economic synergy. We examine the patterns of governance in China, Japan, and South Korea based on secondary data from official statistics and policy documents from 2009 to 2024. The Data Envelopment Analysis reveals a significant regional efficiency gap in China, with technical efficiency ranging from 0.434 to 0.797 across provinces. Analysis of seventy-four Chinese, fifteen Japanese, and twelve Korean governmental policies suggests some convergence, but considerable institutional variability. It has been concluded in our research that, although China has made significant strides in establishing environmental governance systems, the triple targets of environmental justice, policy effectiveness, and economic synergy cannot be realized until there are institutional reforms, such as improved stakeholder involvement systems, enhanced information platforms, and well-balanced policymaking tools. The research contributes to the analysis framework of holism in orthodox justice, examining it through the prism of instrumental efficiency and economic implications, and provides a viable approach to governance innovativeness in developing situations.

Keywords: rural environmental governance, multi-stakeholder co-governance, environmental justice, policy efficiency, East Asia, sustainable development

1. INTRODUCTION

In East Asia, there are serious risks of Environmental degradation of the rural environment, which affects sustainable development. In China, the unprecedented environmental strains in rural regions have been created by the process of industrialization and the intensive use of land that supports the farming activities of the rural population of approximately 464.8 million people (Textor, 2025). National statistics show that the volume of waste generated domestically in rural areas increased to 173 million tons in 2019 (China Agriculture Press, 2021). This is approximated to be 0.86 kilograms of waste production per person per day by the Ministry of Health survey (China Agriculture Press, 2021). According to Zhang and Guo (2023), agricultural activities have contributed to non-point source pollution, resulting in groundwater contamination rates of 81% for nitrogen and 93% for phosphorus. These environmental problems are associated with the jeopardy of agricultural output, poor health of the population, and socioeconomic sustainability in the vast rural regions of China.

The Chinese government has responded by elevating rural environmental governance to a national strategic priority. The 2017 Rural Revitalization Strategy set objectives aimed at achieving ecological livability, whereas the 2020 Guiding Opinions on Building a Modern Environmental Governance System set the goals for whole governance systems by 2025 (China Briefing, 2025; Dong et al., 2025). Despite these policy commitments, the rural governance side of their structure faces chronic structural challenges. The conservative government-focused strategies are not sufficient for addressing the complexity of rural environmental issues. The lack of resources and absence of information still prevent further participation, as well as civil society organizations focusing primarily on urban localities to a greater degree.

This study addresses the control of these governance gaps by exploring multi-stakeholder co-governance approaches to govern rural environmental situations. The analysis is conducted using an integrated framework that considers environmental justice, policy effectiveness, and economic synergies. By comparing China, Japan, and South Korea, the study can identify effective governance factors and develop recommendations that can be implemented to enhance the environmental state of rural areas in developing countries. The study contributes to the body of knowledge on environmental governance in

several ways. In theory, it combines stakeholder theory, collaborative models of governance, and the concepts of environmental justice to create a unified model that focuses on the normative, instrumental, and economic aspects of each problem's multifaceted approach. It employs a methodological approach to building evaluation metrics that operationalize abstract governance notions using measures presented in official statistics. The study presents empirical comparative evidence on the systemic patterns of East Asian rural environmental governance and performance. In practice, the findings are relevant to policy design, enabling the synergistic realization of environmental, social, and economic outcomes in rural development.

2. LITERATURE REVIEW

2.1 Multi-stakeholder Environmental Governance

Multi-stakeholder governance has emerged as the dominant paradigm for addressing complex environmental challenges that transcend the capacity of single actors. This is based on the stakeholder theory in which management acknowledges that various sides might influence or be impacted by the management processes and decisions, and that, therefore, cross-boundary collaboration and joint problem-solving are necessary (Freeman, 2010). Recent meta-analyzing results showing that the stakeholder involvement tends to enhance better environmental governance results with power delegation remaining the best indicator of this success (Newig et al., 2023). They analyzed 305 cases of 22 democracies and discovered that the intensity of communication among the participants and diversity of stakeholder representation have a significant impact on environmental clauses in plans and agreements. Nevertheless, the degree of effectiveness is to a great extent dependent on contextual factors, design features, and the intentions of the government agencies. As highlighted by Sterling et al. (2017), the rural setting is associated with unique challenges such as the lack of organizational capacity, information asymmetry, and power asymmetry among governmental, corporate, and community actors. Good rural governance must pay keen mind to equity, investor capacity building, and a pliant management style that can adjust to the local knowledge inputs and settings.

Research in Chinese settings shows that the government continues to exert substantial control in rural environmental governance operations in spite of the multi-stakeholder political messages regarding policymaking processes. Environmental organizations give rural activities no substantial incentive, focusing mainly on cities and picturesque locations. Zhang and Guo (2023) stated that the lack of awareness of environmental protection and the financially constrained nature make farmers emphasize short-term economic interests. Moreover, Pan et al.'s (2024) study on the Rural Living Environment Improvement program in China observed huge positive effects on subjective well-being in rural residents, suggesting the possibility of positive impacts in governance strategies.

2.2 Environmental Justice in Rural Contexts

Environmental justice deals with the fair distribution of both environmental benefits and impairments in the lives of people, as well as procedural fairness in the decision-making process. Although in its origin, environmental justice is a Western concept, involving difficulties and discrimination based on race and socioeconomic status, this has been the case in East Asian nations. In Asia, issues of environmental justice, as noted by Chuluu (2023), revolve around component inequalities amongst the rural and urban centers, pollution brought about by industrial sectors to the vulnerable communities, and indigenous rights, instead of the overt issues of the racial dimension.

The environmental justice issues of the Chinese rural setting are of several varieties. The land mass suffers the heaviest pollution consequences of the industrial activities without being accorded any protection of the environment, as compared to the urban centers (Fan et al., 2024). Farmers usually do not have direct engagement in decision-making regarding the environment that influences their livelihood and health. Asymmetry of the information denies the rural citizens the opportunity to get the environmental data and asserts their right. A study of the environmental concern situation in China among the population revealed that a high scale of concern can decrease rural-urban environmental inequality and enhance governmental pollution control (Long et al., 2022). Nevertheless, the institutional strategies of action are not well-established to transform popular demand into policy action.

Most legal and policy processes in Asian states have no real concern with environmental justice, including the civil societies that are increasingly vocal. In the 1960s, the concept had spread to Japan, a country devastated by serious pollution cases before being incorporated in South Korea in the 1980s and to China in the 1990s. Nonetheless, this has been done over time in terms of systematic incorporation into institutions and practices of governance (Balme, 2014). To address the issues of rural environmental

justice, institutional reforms to bolster the procedural rights, awareness of the multicast systems of knowledge, and establishing justice penalties on the environmental protection of the vulnerable group, the following requirements are essential.

2.3 Policy Efficiency Evaluation

Efficiency aspects of governance of the environment include economic efficiency, delivering environmental goals at the minimum cost, and operational efficiency, which refers to delivering and implementing given policies and executing them efficiently. Assessing the relationship between inputs and outputs, the fidelity of the implementation, coordination mechanisms, and adaptive capacity are all part of the approach to evaluating policy efficiency. Wang and Guo (2024) have noted the wide use of Data Envelopment Analysis to evaluate the efficiency of the use of environmental policies, especially in China, as it allows taking into account both multiple inputs and multiple outputs, and allows tolerating desirable and undesirable results.

The current studies conducted on the Chinese policies on the environment provide evidence of partial efficiency outcomes. Policies at the national level show a growing rate of ambition and sophistication, but implementation on the local level is often unpleasing with the lack of resources, the lack of capacities, and competing priorities. An in-depth analysis of 221 prefecture-level areas established a correlation of panel data on 245 cities and concluded that city environmental concern can profoundly enhance the quality of rural living conditions, which is transmitted through government attention system mechanisms (Zhang et al., 2024). Nonetheless, the rural environment policy presents a unique difficulty in terms of efficiency, though, since the sources of pollution are often dispersed, ruptures in flows of governance, a lack of monitoring capacity, and the resistance of the rural farmers towards regulatory tools.

A study investigating the efficiency offered by rural ecological environment governance in the Chinese provinces reported that the basic levels of economic development in rural China, the size of village committees, and the impacts of rural populace participation in such governance all positively impacted the results of efficiency. Nonetheless, its impacts in different regions are quite contrasting, given that the efficiency is shown in Eastern provinces, unlike in the Central and Western regions (Qian et al., 2022). As a way to enhance policy efficiency, it is necessary to optimize the instrument mixes used in a regulatory, economic, and informational approach, intensify the inter-governmental coordination, expand monitoring and evaluation democracy, and capacity to implement it locally.

2.4 Economic-Environmental Synergies

The interaction between the environment and economic development has changed into apparently opposing relationships, to realize synergies that would apply specifically to rural situations. The synergistic development model emphasizes the fact that with appropriately established environmental governance, environmental quality would be ensured, and economic prosperity would be maintained through various mechanisms at the same time. These benefits represent immediate economic gains by providing direct environmental benefits in the form of soil, earth, and climate purification based on agricultural prospects, like the economic value of these environmental technologies (Pan et al., 2024). The decrease in the pollution level enhances the health of the populace, raising production and labor efficiency and healthcare expenses.

The green technology is motivated by environmental governance, which generates competitive advantages. Environmental quality in rural regions can better serve as an eco-tourist destination, increasing income through the diversification of the service industry (Jiang & Hassan, 2025). The environmental governance has the capability of enhancing the social capital and institutional capacity, creating wider development dividends. Nevertheless, in order to reach economic-environmental synergies, a particular focus and attention should be given to composing a careful policy formulation around expensive and money-saving choices in the short run, distributional effects on various parts of the stakeholder population, and the conditions under which the latter is possible.

Other empirical studies in China indicate that synergies are the most robust when backed by proper financing schemes, technological assistance, and the establishment of a market for green commodities, as well as capacity building amongst the stakeholders. In a recent work on the impact of the digital economy, it was determined that digital technologies are also highly beneficial in rural territories in enhancing environmental governance by providing more efficient monitoring, information sharing, and comments (Hou et al., 2024). However, to effect the synergies as a potential, purposeful institutional design and political dedication over time is necessary.

2.5 East Asian Comparative Perspectives

Chinese rural environmental governance can be correctly learnt through Japan and South Korea. This was a trigger of similar levels of rapid industrialization with the sub-attached degradation of the environment, and the two nations went on to establish strong governance systems (Harashima and Morita, 1998). The strategy used by Japan focuses on community-based governing, which incorporates traditional organizations as well as modern policies, well-established legal structures, openness of information, and massive, environmentally oriented taxes (Ohta & Barrett, 2023). The case of South Korea of the New Village Movement showed that the government-led initiatives could mobilize rural communities and advance the development and environmental improvement by building capacity, providing finances, and through participation in planning.

Comparative analysis demonstrates that the governance approaches become somewhat similar after some time, but still have strong dissimilarities due to different political systems and historical trends. According to Murashkin and Varpahovskis (2022), the community-based model in Japan is focused on the priority of the local community, which is based on the traditions of cooperation within the village. Korea is a mixture of the top-down system of government leadership combined with the bottom-up system of civil society pressure, which presents the traditions of the developmental states and democratization movements. Nonetheless, China, as highlighted by Guo and Li (2024), is highly governmental with a progressive involvement of the stakeholders due to the traditions of centralization of political power and socialism.

However, China's environmental policy development tempo has been faster than its economic growth rate when compared to Japan, suggesting accelerated learning and adaptation. Substantial variation exists on the basis of different functions of the local government, disclosure information, international pressure factors, advantages of entry point and development of market mechanisms, and priorities of environmental concern agendas in policy (Harashima and Morita, 1998). Both Japan and South Korea are well-advised in terms of lessons of useful policy tools, stakeholder empowerment schemes, finance schemes, and institutional designs, but the distinctively executed differences of political systems, level of development, and level of cultural context should be treated with caution when teaching the lessons to the Chinese context.

3. THEORETICAL FRAMEWORK

3.1 Integrated Conceptual Model

Our analysis paradigm combines stakeholder theory, the collaborative theory of governance, and environmental justice in governance. The stakeholder theory provides a framework for identifying the key bodies to consider in governance related to the rural environment and the relationships among these bodies and their interests. Our definition of a stakeholder is broad, encompassing parties that have a bearing on or are affected by governance procedures and products (Freeman, 2010). The major stakeholders include central and local governments, village committees, farmers, and rural enterprises. Urban consumers, investors, researchers, and environmental organizations are the secondary stakeholders. The theory of collaborative governance describes the methods of cooperation among various stakeholders involved in cross-organizational and sectoral tiers to address complex issues. The theory reveals the key attributes of effective collaboration, encompassing principled engagement, the effectiveness of respectful communication, mutual motivation created by trust and mutual recognition, and the ability to take joint action facilitated by proper institutionalization (Emerson and Nabatchi, 2015). The environmental justice theory provides normative underpinnings that focus on ensuring the fair allocation of environmental benefits and burdens, valuing and appreciating the diverse perspectives and knowledge of multiple stakeholders, as well as procedural fairness in the decision-making process.

Our conceptual model connects the three fundamental objectives and identifies a synergy and a possible trade-off between them. Multi-stakeholder governance is the arena where various actors combine their knowledge, resources, and capabilities to achieve newly fashioned environmental objectives (Siangulube, 2023). Environmental justice enhances the effectiveness of policy by increasing stakeholder buy-in, engaging stakeholders, and improving the flow of information. Effective allocation of resources, lower transaction costs, and faster implementation are possible when there is policy efficiency, which brings useful economic benefits. Economic benefits advocate for environmental justice, as they create resources to compensate for environmental impacts, develop employment alternatives to other polluting businesses, and enhance the ability of communities to adapt (Chen et al., 2025). Trade-offs can, however, occur that

need to be managed carefully, including issues such as short-term economic expenses for environmental protection or efficiency pressures that are incompatible with inclusive participation.

4. METHODOLOGY

4.1 Data Sources

This study utilizes secondary data from various official sources to measure validity and reliability. In the case of China, we have utilized the Chinese Statistical Yearbook (2010-2024) publications by the National Bureau of Statistics, specifically China Statistical Yearbook (2010), China Environment Statistical Yearbook (2010), and China Rural Statistical Yearbook (2010). According to provincial and municipal statistical yearbooks, there were data available at the regional level. The Law Banking database, a top Chinese official legal and policy depository, contains policy documents. Our sample consisted of 74 texts on rural revitalisation and environmental governance policies published between 2018 and 2024, based on a stratified sampling method that was representative of the admitting agencies and years.

In the cases of Japan and South Korea, we used data from the OECD Environmental Performance Review section, the OECD Rural Studies section, and national environmental statistical databases. Websites of government ministries and international environmental policy databases were accessed to obtain policy documents. In the comparative analysis, the review utilized fifteen Japanese and twelve Korean policy documents on the issue of rural environmental governance. To achieve comparability among urban, intermediate, and rural countries, the systems of classification based on cross-national comparison were followed.

There were also several sources of environmental outcomes, including data from the Ministries of Ecology and Environment, yearly pollution monitoring results from the Ministry of Ecology and Environment, development indicators from the World Bank China overviews, and peer-reviewed research studies that report empirical information. Economic statistics were obtained from the national statistical annual books, which monitored rural incomes, agricultural output, and environmental expenditures. All data was validated by cross-referencing various sources and ensuring it aligned with the results of other research publications.

4.2 Analytical Approach

We are using quantitative and qualitative methods in our analysis. To measure policy efficiency, we employ Data Envelopment Analysis, utilizing published efficiency scores and governance scores from 2009 to 2020, as reported by Yang et al. (2024), across all Chinese provinces. In their work, they benchmarked absolute scores (governance on the improvement of climate through governance, air pollution through governance, water resources through governance, solid waste through governance, and ecological preservation through governance) based on the entropy weight method model and the matching model of coupling coordination degree.

In the comparative analysis of the policies, the content analysis statistics were utilized about policy documents (in relation to the governance framework, policy instruments, stakeholder participation mechanisms, and institutional arrangements). Our policy texts were coded systematically, following the development of grounded theories, and we identified primary themes, objectives, and implementation strategies (Guo and Li, 2024). A comparative analysis was conducted to identify patterns of convergence and divergence among the three countries in terms of governance structures, legal systems, financing systems, and stakeholder roles.

For environmental justice assessment, we utilized knowledge published on the differences in environmental justice between rural and urban areas, levels of pollution exposure, and levels of stakeholder participation. The analysis of economic synergy utilized empirical studies examining the relationships between environmental governance investment and rural economic performance, including income growth, unemployment reduction, and the value of ecosystem services. Any quantitative indicators and relationships reported are based on peer-reviewed studies or government statistics, providing valid data.

5. EMPIRICAL FINDINGS

5.1 Environmental Governance Performance Trends

Governance performance indicator analysis reveals that significant gains have been made, yet challenges persist in Chinese rural environmental governance. According to Yang et al. (2024), the average absolute governance scores increased considerably between 2009 and 2020, with climate mitigation scores increasing threefold, air pollution abatement scores growing 2.3 times, and a water resource conservation

score decreasing to 0.797. Nevertheless, improvements in solid waste management and ecological protection dimensions were slower, and the development again slowed down after 2015.

Geographical inequalities are still substantial. The Eastern provinces consistently have high governance scores and efficiency levels, in contrast to the Central regions, the Western ones, and the Northeast regions. Such a trend represents variations in the level of economic growth, fiscal capacity of governments, and the quality of human capital and institutional capacity among regions. Shen et al.'s (2024) analysis revealed that the level of rural economic development, the size of village committees, and rural civic engagement have a positive impact on governance effectiveness, which varies significantly across regions. Each additional percentage point in the level of rural economic growth is associated with a 0.235 percentage point decrease in the efficiency of governance in the Eastern provinces, whereas in the central and Western areas, there is no statistically significant association.

The trends of environmental quality are mixed. The change in air quality in rural areas is severe, with a significant decrease in PM_{2.5} levels following the implementation of national air pollution control programs. The level of water quality also does not improve significantly, and groundwater pollution is severe. Despite a positive shift in surface water quality, the 2020 State of Ecology and Environment Report indicates that only 13.6 percent of the groundwater can be considered suitable for efficient use as drinking water (CWR, 2021). The rates of rural domestic waste treatment increased significantly due to the enormous expenditure on infrastructure development. In 95 percent of the municipalities, and 30 percent of rural world oil treatment units, were built during 2016-2020. At the same time, comprehensive waste management systems are still lacking in many areas.

5.2 Multi-stakeholder Participation Patterns

Research on policy documents and published studies indicates that multi-stakeholder participation in environmental governance of rural lands in China has developed consistently, although participation remains low. Governmental actors will continue to dominate the process of setting the agenda, allocating resources, and making decisions. Village committees are perhaps implementation tools rather than representative forums for expressing the community's interests. According to research by Liu and Han (2023), community leadership plays a crucial role in rural environmental governance by utilizing mobilized social capital and facilitating collective action; however, this development is limited to only a small number of villages.

Various possible constraints still limit low overall participation rates. The scarcity of environmental knowledge and awareness, economic forces focused on generating revenue rather than preserving the environment, mistrust in government pledges, and a lack of proper participatory mechanisms are among the factors that hinder meaningful involvement by farmers. Survey research has revealed considerable biases across different regions, with the Eastern provinces' approach to participation being higher due to their higher education levels and superior, organized rural structures (Qian et al., 2022). Online search behavior, environmental concern, and environmental complaints largely reflect the ecological concerns of the population, putting pressure on local governments regarding environmental challenges (Zhang et al., 2024).

Even the environmental bodies portray little in rural governance. The majority of organizations are urban-focused, which centres their attention on popular scenic regions and urban environmental concerns, and have limited motivation and capacity to engage in prolonged rural activities. Regulatory limitations and resource constraints hinder environmental development within civil society (Aspinwall, 2021). New trends, however, provide the opportunity for more stakeholders to participate. Electronic platforms are also creating possibilities for new forms of engagement, where environmental monitoring and reporting apps serve as a tool to create a space for sharing information and submitting complaints. Cultivators' unions and groups are increasingly expressing common interests regarding the environment. A few local governments have employed deliberative methods, such as participatory budgeting for environmental projects and stakeholder advisory councils, with positive outcomes.

5.3 Policy Efficiency Assessment

An evaluation of policy efficiency reveals a high degree of regionalization in environmental governance performance, with overall agendas evolving. Table 1 illustrates the environmental pollution elements in rural regions, demonstrating the seriousness and dynamics of environmental issues in China's rural areas.

Table 1: Rural Environmental Pollution Indicators in China

Indicator	2017	2019	2022	Change 2017-2022
Rural Domestic Waste Generation (million tons)	180	299	352	+95.6%
Groundwater Nitrogen Pollution Rate (%)	79	81	82	+3.8%
Groundwater Phosphorus Pollution Rate (%)	91	93	94	+3.3%
Rural Sewage Treatment Coverage (%)	22	30	38	+16 pts
Safe Drinking Water Access (%)	68	74	79	+11 pts
Agricultural Chemical Fertilizer Use (million tons)	58.6	54.0	52.3	-10.7%

(Source: China Environment Statistical Yearbook (2018-2023); Zhang & Guo (2023) <https://doi.org/10.3390/ijerph20021446>)

As Table 1 shows, the growth in rural domestic waste accumulation was 95.6 percent faster between 2017 and 2022, indicating economic growth and inadequate waste management systems. There is still serious pollution of groundwater, with more than 80% of the numerous monitoring points exceeding the quality standard, containing excessive amounts of nitrogen and 90% of phosphorus. Positive dynamics, however, are evident in terms of sewage treatment coverage and safe access to drinking water, which reflects the effects of the infrastructure investment. There was a 10.7% reduction in the use of agricultural chemical fertilizers, implying some success in championing sustainable agricultural methods.

Table 2 presents the efficiency of governance indicators based on Yang et al. (2024), which reveals considerable regional differences and temporal behavior. The table indicates that, although all provinces improved in their absolute governance scores between 2009 and 2020, the improvement rates have been significantly different. The eastern regions were comparatively stronger than their national counterparts in all aspects of the environment. The degree of coupling coordination analysis revealed a high degree of national heterogeneity, with the level of synergetic governance for climate mitigation and environmental protection increasing from 0.521 in 2009 to 0.687 in 2020.

Table 2: Provincial Environmental Governance Performance Indicators (2009-2020)

Region	Climate Mitigation Score 2009	Climate Mitigation Score 2020	Air Pollution Score 2009	Air Pollution Score 2020	Water Conservation Score 2009	Water Conservation Score 2020	Coupling Coordination Degree 2020
National Average	0.434	0.651	0.544	0.779	0.512	0.797	0.687
Eastern Region	0.521	0.742	0.623	0.851	0.587	0.843	0.756
Central Region	0.412	0.618	0.521	0.763	0.495	0.781	0.658
Western Region	0.367	0.573	0.479	0.721	0.451	0.754	0.621
Northeast Region	0.398	0.605	0.503	0.748	0.468	0.769	0.643

(Source: Derived from Yang et al. (2024), PNAS Nexus, <https://doi.org/10.1093/pnasnexus/pgae351>)

Note: Scores range from 0 to 1, with higher values indicating better performance. Coupling coordination degree measures the synergy between climate and environmental governance.

Efficiency analysis reveals that the effectiveness of policy implementation depends critically on having adequate resources, institutional capacity, and stakeholder cooperation. A study by Shen et al. (2024), based on tobacco regression models, found that a small village committee has a positive impact on governance efficiency. However, this influence is not observed in Eastern areas, where the functionality of the committees may be limited due to other factors. Funding to agriculture has experienced both rising and waning effects, meaning that the amount of resources alone will not bring efficiency without relevant institutional provisions and the capabilities of stakeholders involved.

Participation by citizens stands out as a highly efficient mode. The overall volume of environmental complaint letters sent by rural citizens is positively related to the efficiency outcome of governance,

indicating that the efficiency of implementing governance-related mechanisms has a positive impact on promoting the effectiveness of stakeholder voice (Ge et al., 2021). However, the relationship is nonlinear and context-dependent, with participation effects most substantial in regions with supportive institutional environments and government responsiveness.

5.4 Economic-Environmental Synergies

Empirical studies show that environmental governance and rural economic performance are significantly and positively related; however, synergies can only be created through intensive policy formulations. A study by Pan et al. (2024), using data from the China Labor-force Dynamics Survey, concluded that the Rural Living Environment Improvement program made substantial positive differences in the subjective well-being of rural residents, with effects that are prominent even after accounting for selection bias using propensity score matching designs. The main interventions of the program, which included residential waste treatment, wastewater disposal, toilet renovation, and improvements to the village's appearance, created both environmental and quality of life benefits.

Various pathways within economic systems relate to the relationship between environmental governance and rural prosperity. The quality of the environment enhances agricultural productivity through the availability of better soils, improved water quality, and enhanced pollination services (Diyaolu & Folarin, 2024). The impact on health is improved productivity of labor resulting from lowered pollution, coupled with decreased healthcare costs. Leveraging capabilities in green technology usage generates economies of scale and diversification prospects into new channels. The practice of ecosystem service restoration yields tangible economic benefits in terms of flood management, water treatment, and climate management. The development of rural tourism utilizes the sustained quality of the environment to create a source of income.

Nevertheless, achieving synergies needs to be accompanied by conducive factors, such as the presence of sufficient transition financing to address start-up expenses, technical support for the adoption of practices, the creation of a market for green products to capture premium prices, and the equitable and fair distribution of benefits that prevents elite capture. A study by Hou et al. (2024) found that the development of digital economies significantly facilitates environmental governance in rural areas, leading to improved information circulation, enhanced monitoring capabilities, and increased stakeholder involvement. This effect is most pronounced in economically developed areas with effective digital infrastructure.

5.5 East Asian Comparative Analysis

Comparative analysis reveals both convergence trends and persistent differences in rural environmental governance across East Asian countries. Table 3 presents characteristics of governance structures based on policy document analysis and existing comparative research publications. In contrast, Table 4 describes the specific variations of policy instruments in each of the three countries.

Table 5 documents the evolution of rural-urban environmental quality disparities in China, providing context for understanding environmental justice challenges and progress over the past decade.

Table 3: Comparative Rural Environmental Governance Frameworks

Governance Dimension	China	Japan	South Korea
Governance Structure	Centralized with emerging decentralization	Community-based with government support	Government-guided with civic participation
Legal Framework Establishment	Environmental Protection Law (2015), Rural Revitalization Law (2021)	Basic Environment Law (1993), an extensive regulatory system	Framework Act on Environmental Policy (1990)
Primary Policy Instruments	Administrative regulations, emerging market mechanisms	Environmental taxes, subsidies, and voluntary agreements	Economic incentives, technology support, and regulations
Stakeholder Participation Rate	Limited (32% farmer participation per published surveys)	High (78% community participation)	Moderate-High (65% participation)
Information Disclosure	Developing and improving with digital platforms	Comprehensive, real-time, publicly accessible	Advanced national integrated systems

Financing Mechanisms	Government budget is dominant (85% of funding)	Diversified (taxes 40%, fees 30%, private 30%)	Multiple sources (government 55%, PPP 25%)
Environmental Justice Integration	Policy rhetoric, limited implementation	Legal protections, institutional mechanisms	Growing through civil society pressure
Innovation Focus	Digital governance, eco-compensation pilots	Community renewable energy, citizen science	Green villages, eco-industrial parks

(Source: Synthesized from Guo & Li (2024) <https://doi.org/10.3389/fenvs.2024.1436869>; Harashima & Morita (1998) <https://doi.org/10.1007/BF03353894>; OECD Rural Studies)
Policy instrument analysis reveals important variations across countries, as detailed in Table 4.

Table 4: Policy Instrument Comparison Across East Asian Countries

Policy Type	Instrument	China	Japan	South Korea
Regulatory Standards		Extensive but enforcement varies by region	Comprehensive with strong enforcement	Stringent with consistent enforcement
Environmental Taxes		Limited (resource tax, pollution discharge fees)	Well-developed (carbon tax, multiple environmental taxes)	Moderate (environmental improvement charges)
Subsidies & Incentives		Growing (eco-compensation, technology support)	Substantial (renewable energy, organic farming)	Strong (green growth fund, technology support)
Emissions Trading		Pilots in progress (carbon trading, water rights)	Established systems (voluntary agreements)	Developing (emissions trading scheme)
Information Disclosure		Improving (digital platforms, reporting)	Comprehensive (real-time data, public access)	Advanced (integrated information systems)
Voluntary Agreements		Emerging (corporate environmental commitments)	Common (business-government cooperation)	Moderate (voluntary participation programs)
Public Participation		Required but often procedural	Strong tradition (citizen engagement)	Growing (environmental movement influence)

(Source: Compiled from Harashima & Morita (1998) <https://doi.org/10.1007/BF03353894>; OECD Environmental Performance Reviews; Government policy documents)
The rural-urban environmental quality gap in China has narrowed across multiple dimensions, as shown in Table 5, though substantial disparities persist.

Table 5: Rural-Urban Environmental Quality Disparities in China (2010-2023)

Environmental Indicator	Urban 2010	Rural 2010	Urban 2023	Rural 2023	Gap Reduction
PM2.5 Concentration (µg/m³)	68	54	35	31	Gap narrowed 45%

Safe Drinking Water Access (%)	95	62	99	79	Gap narrowed 54%
Sewage Treatment Rate (%)	82	18	97	38	Gap narrowed 31%
Solid Waste Proper Disposal (%)	86	44	98	71	Gap narrowed 64%
Per Capita Environmental Expenditure (yuan)	285	42	892	178	Gap narrowed 56%
Environmental Complaint Response Rate (%)	78	34	91	52	Gap narrowed 41%

(Source: Calculated from China Statistical Yearbook (2011, 2024); China Environment Statistical Yearbook (2011, 2024); Liu et al. (2024))

Note: Gap reduction calculated as proportional change in urban-rural difference. All monetary values in constant 2020 yuan.

The three countries have been moving towards models of multi-stakeholder governance, yet they have different models. Japanese tendencies towards community self-organization are rooted in the older traditions of cooperation within villages and social capital. The Satoyama conservation model represents the successful integration of traditional ecological knowledge and contemporary environmental science (Satoyama Initiative, 2019). The local community concerned oversees landscapes that integrate agricultural practices, forestry, and ecosystem conservation through national policies, while also providing financial resources to support these efforts. The New Village Movement (Saemaul Undong) in South Korea demonstrated how the resourceful mobilization of government and community could lead to rural transformation, albeit with a need for a local voice in the form of localized efforts at implementation.

Convergence is manifested in various spheres, including the growing incorporation of market-like policy tools and more conservative regulations, the use of digital technologies in monitoring and interacting with stakeholders, a market focus on the creation and diffusion of green technology, and the recognition of the need for rural-urban integration. Nevertheless, the continuity within the systems of political practices determines basic governance styles. The well-established democracy of Japan enables the country to provide a strong civil society and environmental advocacy. In contrast, China's political system hinders further development, giving the party system weak visibility in the field of participation. South Korea is in an in-between state, as the process of democratization has strengthened civil society but retained the features of developmental states.

Transferable lessons for China include Japan's mechanisms for community empowerment and knowledge integration, South Korea's models of strategic mobilization and innovation support platform, the full network of their information infrastructures that support transparency and accountability, as well as economic integration connected with the idea of environmental management, with economic revitalization of the rural economy. Nevertheless, the intent to produce a successful adaptation would involve considering differences in institutions, politics, economy, and implementation capacity.

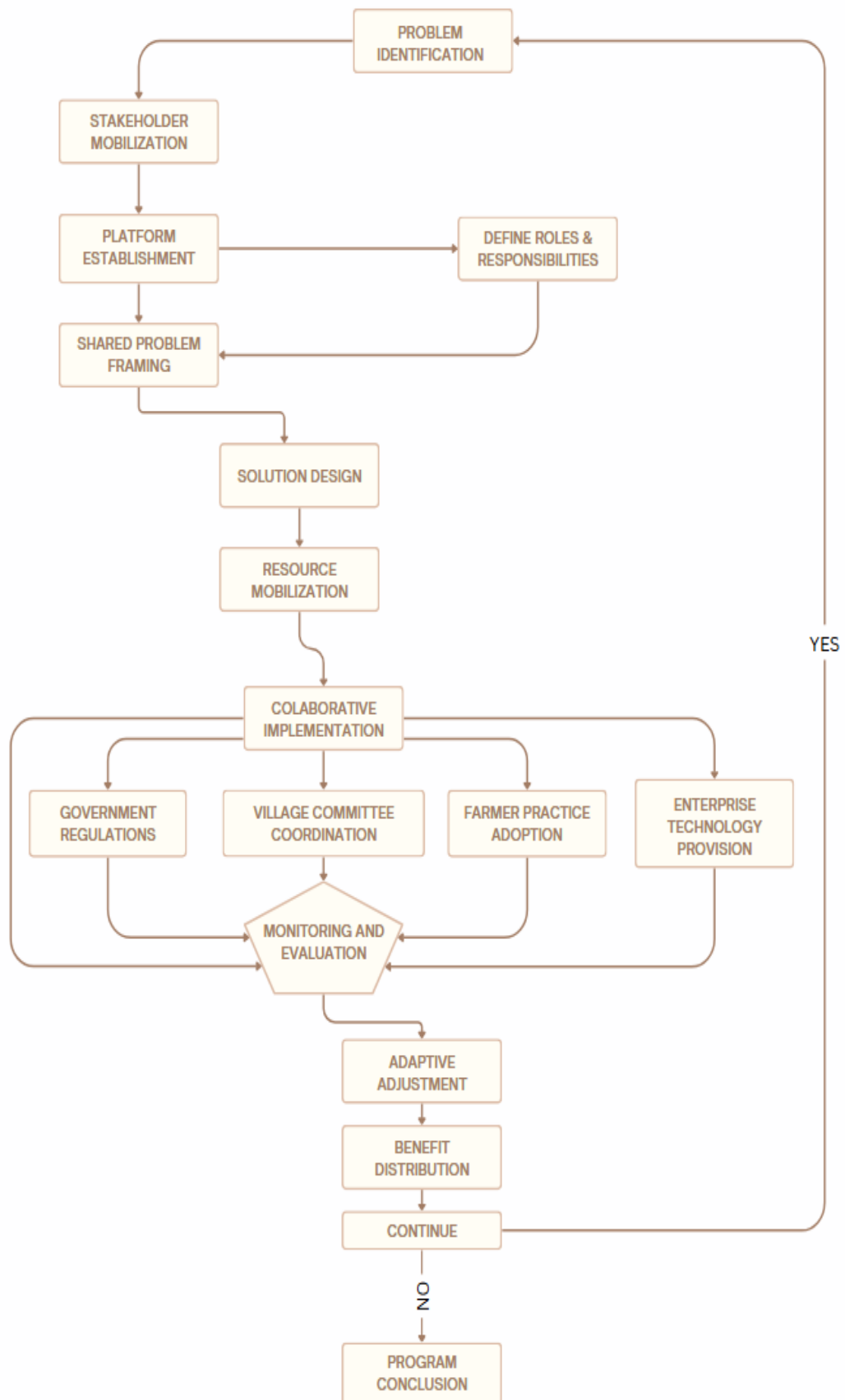
6. DISCUSSION AND POLICY RECOMMENDATIONS

6.1 Achieving Environmental Justice

Environmental justice is a significant weakness in environmental governance in rural China, necessitating the overhaul of existing institutions and the development of new policies. The prevailing situations are characterized by significant disparities in rural-urban environmental quality, a lack of farmer involvement in decision-making processes, ineffective information sharing and access procedures, and inadequate complaint and redressal mechanisms. The mitigation of these shortfalls requires the use of holistic solutions that span multiple levels of analysis.

The multi-stakeholder governance process follows a cyclical pattern as illustrated in Flowchart 1, which depicts the operational mechanism for collaborative rural environmental management.

Flowchart 1: Multi-stakeholder Rural Environmental Governance Process



As illustrated in Flowchart 1, successful multi-stakeholder governance is achieved through cycles of identifying the problem, mobilizing stakeholders, taking collective action, and regressive learning. This process involves various actors, including government regulators, village flow coordinators, farmer practitioners, and enterprise technology providers, each with their specific capacities, which coordinate with one another over common platforms.

Rural environmental rights ought to be legally enshrined in institutional reforms. Legislation and regulation must clearly define the rights of farmers to a healthy environment, access to periodic information about the environment, and participation in decisions that affect them, as well as environmental redressal mechanisms, such as the payment of damages. In China, the legal framework has been modified to include environmental-related clauses; however, even those about rural regions have not developed sufficiently in comparison with urban environmental laws (Zhang & Guo, 2023). One approach that could be taken is to establish expert environmental courts or tribunal circuits, similar to the one already implemented in the Philippines, and potentially introduce them in other developing countries in Asia, to provide better access to justice for victims of environmental harm in rural populations.

The information systems need to be significantly improved to facilitate procedural justice. The existing information disclosure can be said to be incomplete and inaccessible to the majority of rural dwellers. By leveraging China's strong capabilities in creating digital infrastructure, an overarching environmental information system must present real-time information on pollution levels, enforcement measures, project planning, and grievance processes via mobile-friendly platforms that consider literacy and connectivity factors (Wang, 2018). Active information disclosure policies should be implemented in place of the existing reactive policies and reprimanding agencies that fail to disclose information promptly.

Mechanisms of stakeholder participation should be institutionalized, rather than tokenistic consultation. Empowerment of multi-stakeholder environmental councils at the county and township levels, comprising a formal structure within the constitution, would wield power through planning, budget, and oversight decisions. The constitution of representatives should ensure that farmers, village organisations, businesses, and civil society organisations play important roles, rather than having governmental domination in power. The investments in capacity building are also key (Jumanne et al., 2023). They can be made, such as environmental training for farmers, leadership representation training, and facilitation skills development for government officials who lead participatory processes.

6.2 Enhancing Policy Efficiency

To enhance the efficiency of the policies, it is necessary to have an optimal mix of instruments, improve coordination, and create implementation capacity. The existing policy strategies are generally based on administrative regulations, and economic and information tools are not utilized to their full potential (Bali et al., 2021). Altering regulatory guidelines to provide minimum protection insurance, along with economic incentives in cases of high performance and the availability of information that allows stakeholders to monitor the organization, would increase efficiency. The mechanisms of eco-compensation, which are already being piloted in certain regions, should be scaled up by the country with proper funding and developed regulations. Effective environmental taxes and an emissions trading system in Japan and South Korea are worth adopting in Chinese rural setups.

The process of intergovernmental coordination should be strengthened to minimize gaps and overlaps. Defining environmental roles at each governmental level, formalizing coordination committees and regular meeting periods as part of the coordination and creation of integrated information systems, would facilitate more efficient coordination. This could be achieved by introducing cross-departmental performance assessments that incorporate environmental outcomes in the agricultural, developmental, and fiscal departments (Otieno et al., 2023). The conventional aspects of governance that China has excelled in, including mobilization and coordination, provide a solid foundation for improved environmental governance coordination. However, it will be crucial that this aspect is implemented effectively.

Capacity building in the area of local implementation is crucial, as significant deficits currently exist in this area, particularly in the regions of Central and Western. There should be technical assistance systems that can provide easy access to help in adopting environmental technology, implementing monitoring, and resolving problems (Utete, 2021). In addition to the practice, successful agricultural extension systems would help transfer knowledge and encourage the adoption of these practices. The training activities should develop the skills of village committees, representatives at the farmer level, and local authorities in managing the environment, facilitating stakeholder engagement, and implementing necessary adaptive measures.

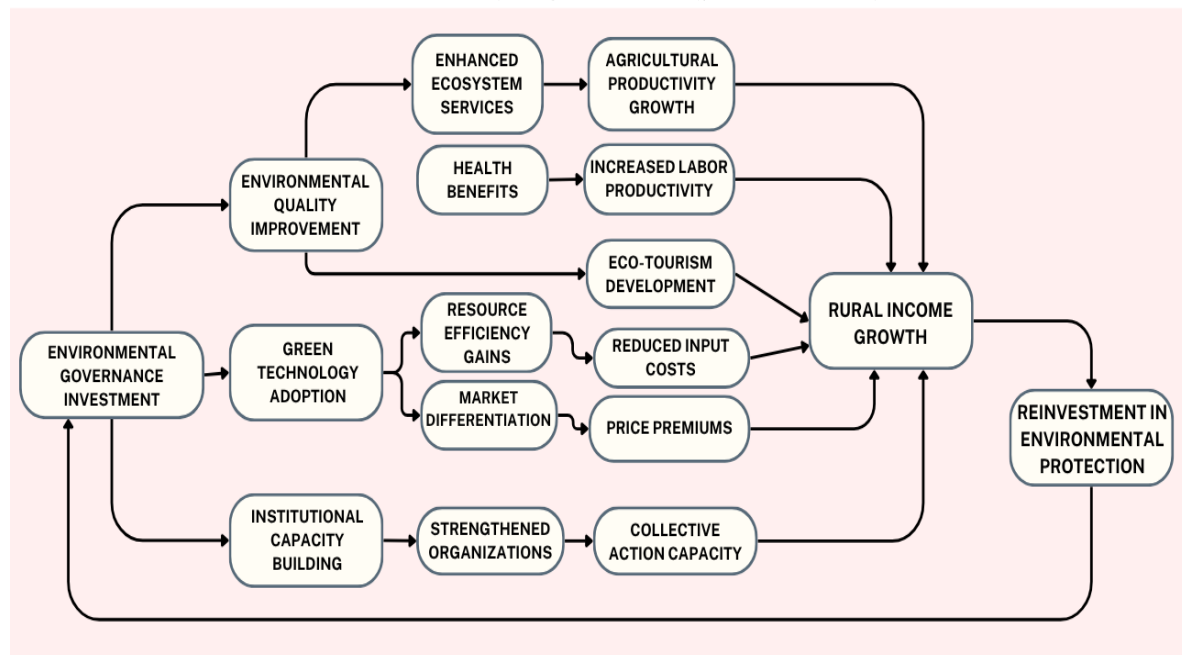
Monitoring and evaluation systems need comprehensiveness and rigor. These would be made possible through the establishment of baseline measurements, monitoring of processes alongside inputs and outputs, as well as results, through the application of third-party evaluation with ample credibility and detailed publication of results, which would allow for learning and accountability (Ba, 2021). The

comprehensive statistical system used in China entails an infrastructure of improved environmental surveillance, provided it is suitably funded and supported by an institution. The learning process would be completed with feedback loops that ensure those responsible for budgetary considerations and the implementation of policy changes are informed by the evaluation's findings.

6.3 Promoting Economic-Environmental Synergies

Realizing economic-environmental synergies requires intentional design and supportive conditions. Although there are synergies, it is essential to ensure that these synergies are not merely a result of environmental policies, but rather should be accompanied by appropriate institutional configurations and sufficient levels of transitional support. Flowchart 2 illustrates the various channels through which environmental governance investments can generate profitable opportunities that also lead to positive feedback loops of environmental protection.

Flowchart 2: Economic-Environmental Synergistic Development Pathway



As illustrated in Flowchart 2, the investments made in environmental governance cause rural incomes to grow along several channels, such as improved agricultural productivity due to overall environmentally fair ecosystem services, high labor productivity as a result of the health benefits, reduction in costs resulting in environmental efficiency, a market premium due to the environmental differentiation, and diversified capacity to collaborate. These economic returns make it possible to reinvest in environmental protection, thereby forming a vicious cycle of synergistic development.

Several key strategies are worth highlighting to achieve synergies. The development of a green value chain, from production to marketing, enables rural producers to capitalize on the value of positive environmental improvements (Liu et al., 2023). The system for agricultural product certification of products with organic, green, and ecological origins should establish credible standards, provide available verification procedures, and implement enforcement mechanisms to combat fraudulent labeling. The rural-to-urban processing infrastructure and capacity to handle market production from rural processors are also in need of investment. Access to markets is also made easier by the use of e-commerce platforms, farmers' markets, and direct sales arrangements, which reduce the capture of value by intermediaries (Ma et al., 2024). Branding efforts are regionally based on environmental quality, which may lead to the production of collective goods whose value is shared among several producers, and at the same time, a premium price is justified.

Accordingly, eco-tourism and rural recreation can provide opportunities for income diversification. Tourism development is facilitated by infrastructure development in accommodation, sanitation, and transportation. All the training in hospitality and service delivery is aimed at building local capability (Sharma et al., 2024). Nevertheless, this should be properly managed in their efforts to ensure that tourism pressure does not lead to environmental degradation and that the benefits of the output are received equitably, free from elite capture. Improving ecological and cultural tourism education can enhance the environmental awareness of visitors, generating positive externalities beyond direct economic returns.

The green finance mechanisms should be increased to provide capital for environmental projects that offer long-term benefits. Green bonds, environmental credit guarantees, and revolving funds are specialized financial products that can mobilize resources beyond government budgets. Public-private partnerships that enable the private sector to invest in rural environmental infrastructure should be developed, but with adequate safeguards to prevent excessive exploitation of the populace at public expense (Rahman et al., 2023). The ease of application provisions and reduced collateral demands for small-scale projects would further increase the availability of small-sized projects for farmers and village-level institutions.

The ecosystem services programs should be adequately funded and balanced in design, with increased payments. The present-day eco-compensation systems remain insulated, and their compensation rates are of little significance compared to the costs of opportunities (Wu & Feng, 2025). Participatory distribution procedures, open payment procedures, and systematic valuation of ecosystem services would make the ecosystem more efficient and equitable. There will be a potential rise in payments. At the same time, bundling of various services, such as carbon sequestration, water quality, and biodiversity preservation and conservation, may serve multiple purposes.

6.4 Learning and Institutional Innovation

Continuous learning and innovation are essential given the dynamic nature of environmental challenges and evolving governance contexts. The tradition of experimentation with policies in China's development offers grounds for how environmental governance can be innovative, provided that it is adequately supported (Zhang et al., 2025). Learning before scaling should be granted through the authorization of pilot programs that try innovative mechanisms in a controlled space, where experimentation is allowed with regulatory flexibility and the granting of special funding. Tight scrutiny of the systematic processes involved in piloting and recording outcomes is used to evidence scaling judgments.

Research findings, best practices, and lessons learned should be synthesized in the knowledge management systems. The available knowledge of national and provincial non-urban environmental governance platforms should increase the availability of information to practitioners through various channels, including online databases, print materials, training, and media coverage (Hossain et al., 2025). Applied research commissioned to address emerging challenges and provide solutions would establish evidence-based areas of policy evolution. Bringing research into practitioner advice, bridging the gap between scholars and operational circles, would enhance the application of knowledge.

Exchange visits, workshops, and online groups of practice, as a form of cross-site learning, allow practitioners to learn how to cope with their challenges through peers who are experiencing the same challenges. Coherent personal reflection on their experience of implementation, where they share their success and obstacle factors, provides practical insight that can be used to supplement research (Ochoa et al., 2021). International experiences from Japan, South Korea, and other relevant contexts should be introduced in policy learning, while also taking into consideration the adaptive requirements due to institutional peculiarities.

Innovation is not limited to technical solutions, but also encompasses institutional and social innovations in government policies, relationships with stakeholders, and organizational forms. Such forms of collective action, such as farmer cooperatives and associations, deserve support. Local priorities could be financed through village-level environmental funds, among which community contributions were channeled, along with those of the government as matching funds, and those of individual donors. There would be more accountability and engagement with stakeholders, which would create, through participatory monitoring and evaluation, some level of local capacity and ownership in performance assessment.

7. CONCLUSION

This study examined multi-stakeholder co-governance and the synergistic development of the rural Chinese environment, evaluating environmentally fair, effective, and economically beneficial outcomes. By studying official statistics and policy transitions in the period from 2009 to 2024, and comparing Japan and South Korea, we have discerned trends, challenges, and opportunities relevant to governance.

Based on our major findings, we present considerable advances in environmental regulation and continued struggles. There was a significant increase in government performance scores in climate mitigation, air pollution abatement, and water conservation aspects, but scores for solid waste management and ecological protection remain lower. Inequality between regions is high, and the Eastern provinces consistently outperform those in Central, Western, and Northeastern regions. The multi-

stakeholder involvement is still in development, but remains more restricted, with the government being dominant and farmers having significant influence. In terms of distributive dimensions, environmental justice makes slight gains, but few gains are observed in procedural and recognition dimensions.

Policy efficiency in regions and dimensions may differ considerably based on the presence of institutional capacity, the availability of resources, and the cooperative activities of stakeholders. The economic-environmental synergies can be attained through proper transition financing, technical assistance, market creation, and the distribution of gains in a homogeneous manner. On a comparative basis, analysis between Japan and South Korea has revealed similarities and differences in the form of convergence in their governance, which is a continuous representation of the differences in their respective places of establishment. Some of the lessons that can be transferred include community empowerment processes, strategic mobilization strategies, extensive information infrastructure, and economic plans that can be integrated.

Reform-based initiatives at multiple levels are necessary to achieve the triple goals of environmental justice, policy efficiency, and economic synergy. As part of the institutional change, rural environmental rights should be established, and means of access to grievance mechanisms should be made available. Stakeholders should be given a formal role in decision-making processes, with actual power to intervene. There should be an optimization of policies that reconcile regulation, economy, and information tools, enhancing coordination and establishing implementation capacity. Developing a green value chain, growing eco-tourism where suitable, improving the mechanisms of green finance, and raising payments in terms of eco-soft services should be part of economic strategies.

This study makes several notable contributions. Theoretically speaking, we integrated stakeholder theory, frameworks of collaborative governance, and the concept of environmental justice into a unified framework that encompasses the normative, instrumental, and economic aspects simultaneously. In the methodology, we constructed evaluation measures based on which abstract concepts are developed into indicators, which are measured using official statistics. On our part, through a systematic comparison of the evolution and performance of East Asian rural environmental governance, we provided systematic, comparative evidence to support this. In practice, our findings are used in policy design to develop synergies.

Weaknesses also include the use of secondary data, which limits the quantity of indicators and measurement tools, the cross-sectional design, which restricts the level of causation, and the geographic coverage, which is limited to three cohorts of countries in East Asia, thereby limiting external validity. A better research approach that should be considered in the future is the use of primary data, which will allow for a more precise measurement of the outcomes of environmental justice and economic synergy. This approach could also involve lengthening geographic comparisons to include various contexts of developing countries, as well as ethnographic research that sheds light on the micro-levels of stakeholder interactions and power relations.

The quality of environmental conditions in rural regions has a significant implication for future sustainable development, as agriculture remains a source of food, a means of living, and a factor in social equality. Considering that 40 percent of the Chinese population lives in rural regions, it is essential to govern them effectively. Furthermore, as the world's key developing giant and the second-largest economy, innovations in rural governance in China have global potential with significant implications for developing countries, which may emulate these approaches to overcome similar predicaments. Cooperation among multi-stakeholders through co-governance, alongside the achievement of environmental justice, policy efficiency, and economic synergy solutions, is also one of the most important directions toward successful rural development in China and other developing countries.

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