

INTEGRATING THE PENTAHHELIX APPROACH INTO HUMAN RESOURCE DEVELOPMENT TO PROMOTE SUSTAINABLE ORGANIZATIONAL PERFORMANCE AND ACCELERATE SDGS ACHIEVEMENT

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Abstract: Purpose This research analyzes the implementation of the pentahelix approach in Human Resource Management Development strategies in village government. The primary focus is on improving the sustainable performance of village officials to support the achievement of the SDGs in villages. The novelty of this research lies in the application of the pentahelix approach to village governance by integrating HRD and sustainable performance. This approach differs from previous research, which generally focuses on the industrial, tourism, or urban sectors. Methods This research uses a qualitative case study approach. Data were obtained from primary and secondary sources and analyzed descriptively using NVivo software for qualitative data management. A SWOT analysis was conducted to identify strengths, weaknesses, opportunities, and threats in the implementation of a pentahelix-based HRD strategy. Finding This research applies the pentahelix approach to village governance by integrating HRD and sustainable performance. This approach differs from previous research, which generally focused on the industrial, tourism, or urban sectors. This research has limitations in the use of a single case study, which limits the generalizability of the findings, and the remote location, which limits the frequency of field visits. Practically, this study recommends a pentahelix approach as a strategy for developing village apparatus human resources and enhancing skills. Further research is recommended using a comparative approach between villages or quantitative methods to measure the impact of the pentahelix approach on sustainable performance and the achievement of the village SDGs.

Keywords: Pentahelix; Human Resource Development; Sustainable Performance; Sustainable Development Goals.

Abstrak: Penelitian ini untuk menganalisis implementasi pendekatan pentahelix dalam strategi Human Resource Development pada pemerintahan desa. Fokus utama pada peningkatan sustainable performance aparatur desa guna mendukung pencapaian SDGs di Desa. Kebaruan penelitian ini pada penerapan pendekatan pentahelix dalam tata kelola pemerintahan desa dengan mengintegrasikan HRD dan sustainable performance. Pendekatan ini berbeda dari penelitian sebelumnya yang umumnya berfokus pada sektor industri, pariwisata atau perkotaan. Metode Penelitian ini menggunakan kualitatif dengan pendekatan studi kasus. Data diperoleh melalui sumber primer dan sekunder yang dianalisis secara deskriptif menggunakan perangkat lunak NVivo untuk pengelolaan data kualitatif. Analisis SWOT untuk mengidentifikasi kekuatan, kelemahan, peluang dan ancaman dalam implementasi strategi HRD berbasis pentahelix. Temuan Hasil penelitian menunjukkan bahwa strategi HRD berbasis pentahelix berkontribusi signifikan terhadap peningkatan sustainable performance aparatur desa. Kontribusi tersebut tercermin melalui penguatan kapasitas sumber daya manusia, peningkatan kolaborasi multipihak, serta integrasi nilai-nilai SDGs dalam tata kelola desa. Penelitian ini memiliki keterbatasan pada penggunaan studi kasus tunggal yang membatasi generalisasi temuan, lokasi penelitian jauh sehingga membatasi intensitas kunjungan lapangan. Secara praktis, penelitian ini merekomendasikan pendekatan pentahelix sebagai strategi pengembangan SDM aparatur desa dan pengembangan peningkatan keterampilan. Penelitian lanjutan disarankan untuk menggunakan pendekatan komparatif antar desa atau metode kuantitatif guna mengukur pengaruh pendekatan pentahelix terhadap kinerja berkelanjutan dan pencapaian SDGs desa.

Kata Kunci: Pentahelix; Pengembangan Sumber Daya Manusia; Kinerja Berkelanjutan; Tujuan Pembangunan Berkelanjutan.

INTRODUCTION

1. Background

The Sustainable Development Goals (SDGs) at the village level still face fundamental challenges in Human Resource Development (HRD), where limited capacity of village officials hinders the realization of sustainable performance in the aspects of public services, village governance and the effectiveness of SDGs program implementation. This condition is reflected in Muara Ritan Village, Tabang District, Kutai Kartanegara Regency which has an area of 811.19 km² with a population of 1,047 people and an economic structure based on agriculture, plantations, MSMEs and the tourism potential of the Karanganyar River, but has not been able to optimize the available natural resources due to the limited quality of human resources of the apparatus (Badan Pusat Statistik, 2023). Based on data from the Ministry of Home Affairs (Kemendagri) quoted by (Zulfikar, 2019) It is known that around 60% of village officials have a high school education, accompanied by low work motivation, weak work discipline, and minimal managerial and digital competencies. This situation is exacerbated by the implementation of Village SDGs which tends to be administrative in nature, limited to village deliberation forums without substantive strategies such as ongoing training of officials or strengthening multi-stakeholder partnerships, resulting in a decline in the quality of public services by 30-40% as shown by data (Badan Pusat Statistik, 2022). Based on the report (Antara News, 2023) Although the Ministry of Home Affairs' Village Governance and Development Strengthening Program (P3PD) has realized 93% of the training target of 130,000 village officials by 2023.

The theoretical basis of this research is rooted in the Resource Based View (RBV) which was introduced (Wernerfelt, 1984) and refined by Barney (1991) through the VRIN/VRIO (valuable, rare, inimitable, non-substitutable/organized) framework, which positions the internal resources of village apparatus organizations as the main foundation for sustainable competitive advantage. RBV emphasizes that competent human resources in village apparatus are a rare strategic asset that is difficult to imitate, a prerequisite for managing local potential effectively. This theory is in line with the Sustainable Development Theory (Brundtland, 1987) which defines sustainable development as fulfilling the needs of the current generation without sacrificing those of future generations, operationalized through the Triple Bottom Line (Elkington, n.d.), profit (economic performance), people (social responsibility), and planet (environmental sustainability). The Pentahelix model (Etzkowitz & Leydesdorff, 2000), an evolution of the Triple Helix, complements the conceptual framework with the synergy of five actors: government, academia, business, community, and media to overcome the limitations of Human Resource Development.

Research gaps were identified through five previous studies that had related themes but different focuses and studies. Study Desak Made Santi Diwyarthi et al. (2024) examine the Pentahelix model in empowering women in cultural tourism in Taro Village, temporary (Widyawati et al., 2024) focuses on the policy strategy for achieving SDGs at the Jenepono Regency level. Study (Sutrisno et al., 2024) discussing food security in Klampok Village, (Yulianti Ririn et al., 2025) reviewing the development of smart villages within the framework of Society 5.0 and (Dewi Ida Ayu Indrayani et al., 2024.) analyzing collaborative governance in the management of Taro Village tourism. The five studies used a descriptive qualitative approach, but most focused on the tourism sector, regional policies, and digitalization without specifically integrating the Pentahelix model within the Human Resource Development framework to strengthen village governance. This gap gave rise to new research that focused on adapting the Pentahelix model to village governance rather than the industrial or tourism sectors by integrating a Human Resource Development approach that includes strengthening the competence and capacity of apparatus, performance and productivity evaluation, career development, motivation and work discipline, and the provision of work facilities into a sustainable performance framework that includes economic, social, and environmental dimensions. This approach was used to test the effectiveness of the collaboration of five Pentahelix actors in strengthening the capacity of Muara Ritan Village apparatus as a research location that represents the characteristics of a remote village in Kalimantan with limited educational facilities.

The urgency of research is crucial considering that villages contribute 74% to the achievement of national SDGs with the proportion of the rural population reaching 43% (Times Indonesia, 2020). East Kalimantan Province, including Kutai Kartanegara Regency, is still in the middle category in the distribution of educational facilities as reported by (Badan Pusat Statistik, 24). This condition, coupled with a moderate level of urbanization, further widens the gap in human resource quality between regions and reinforces the need for a sustainable and contextual strategy for developing village apparatus human resources. This study aims to formulate a Pentahelix-based Human Resource Development (HRD) strategy in order to comprehensively improve the sustainable performance of the Muara Ritan Village Government. The purpose of this study is to analyze the implementation of the Pentahelix approach in developing village apparatus HRD, examine the

contribution of Pentahelix-based HRD strategies to improving sustainable performance that includes economic, social and environmental dimensions, and explain the role of HRD strategies in supporting the achievement of the SDGs of Muara Ritan Village with a focus on priority goals, namely poverty alleviation, improving the quality of education, providing clean water and sanitation, strengthening village institutions and partnerships to achieve goals.

This study provides theoretical contributions by enriching the literature on Human Resource Development in village government through the pentahelix approach and the integration of the Resource Based View (RBV) and Sustainable Development Theory (SDT) perspectives in explaining the performance of sustainable village government. This study recommends the application of the pentahelix model as a strategy for developing human resources for village officials, strengthening cross-sector training policies based on the experience and needs of officials, and developing local economic empowerment programs that have proven effective in Muara Ritan Village. This study opens opportunities for further studies using a comparative approach between villages or quantitative methods to strengthen the empirical validation of the findings. This research can serve as a strategic framework for remote villages in realizing inclusive and sustainable development through the synergy of the five pentahelix actors.

2. Theoretical Review

Resource Based View

Resource Based View (RBV) was put forward by Birger Wernerfelt (1984) and further developed by (Barney Jay, 1991) emphasizes that an organization's internal resources and capabilities are key factors in creating sustainable competitive advantage. Through the VRIN/VRIO framework, RBV explains that an organization's success is largely determined by its ability to manage valuable, rare, difficult-to-imitate, and non-substitutable resources, and is supported by the organization's capacity to utilize these resources effectively and sustainably. RBV is rooted in Edith Penrose's (1959) thinking in Resource Based Theory (RBT), which highlights the importance of strategically acquiring, developing, and utilizing resources. Organizations are viewed as a collection of physical and human resources that, when combined and managed optimally, are capable of generating sustainable competitive advantages that are difficult for others to imitate.

Sustainable Development Theory

Sustainable Development Theory is rooted in the Brundtland Report (1987), which defines development as an effort to meet the needs of the current generation without compromising the ability of future generations to meet their own needs. Sustainable development, as explained in the Brundtland report entitled *Our Common Future*, is defined as development that meets the needs of the current generation without compromising the ability of future generations to meet their own needs (Connelly, 1999). Sustainable development is a community effort to meet basic needs while improving well-being without compromising the availability of resources for future generations. This concept is based on the principle of sustainability, which ensures that social, economic, and environmental systems continue to function optimally over the long term without experiencing capacity degradation. Sustainable development requires the formulation and implementation of strategies, policies, and programs that are continuously evaluated and adapted to the dynamics of developments to ensure balanced resource utilization.

Human Resource Development

According to (Noe, 2020), Human Resource Development encompasses a series of activities designed to strengthen employee capacity through the enhancement of technical skills, soft skills, and education that support their personal professional development. Human Resource Development is a conceptual framework that focuses on planned and systematic efforts to improve the competencies, skills, and knowledge of individuals within an organization. This concept plays a strategic role in boosting employee performance, increasing organizational productivity, and building adaptive competitiveness amidst the dynamic developments in the world of work. HRD is seen as a strategic process to optimize human resource potential through organizational development, training programs, and individual competency enhancement. HRD is a systematic effort to develop human abilities and skills through training and development activities aimed at improving performance (Swanson, 1995).

Sustainable Performance

Sustainable Performance is the ability of an organization to integrate economic, social and environmental dimensions into operational activities to create long-term value for all stakeholders

(Siddiqui & Salleh, 2024). The three pillars of sustainability framework explains that the economic dimension is oriented towards human well-being and sustainable growth, the environmental dimension emphasizes natural resource management and compliance with ecological regulations, while the social dimension emphasizes the role of labor in creating social value and improving community welfare (AlNuaimi et al., 2021). These three dimensions are integrated with each other and emphasize that organizational sustainability can only be achieved through a balance between economic performance, social responsibility and environmental concern.

Sustainable Development Goals (SDGs)

The Sustainable Development Goals (SDGs) were developed as a continuation of the Millennium Development Goals (MDGs) which were implemented in the 2000-2015 period and serve as a global framework in efforts to reduce extreme poverty. The theory of sustainable development is a conceptual foundation that emphasizes the importance of equitable economic growth, inclusive and sustainable as the main prerequisite for long-term development (Hidayati & Nugrahani, 2021). Development must be directed toward meeting the needs of the present generation without compromising the ability of future generations to meet their own needs. This idea formed the basis for the SDGs, which emphasize balance between economic, social, and environmental dimensions.

Pentahelix

The Pentahelix model is a further development of the Triple Helix and Quadruple Helix collaborative frameworks. The Triple Helix concept was introduced by (Etzkowitz & Leydesdorff, 1997) describes the development relationship paradigm involving three main actors: government, business and academia. This model evolved into the Pentahelix which expanded collaboration by involving mass media as well as non-governmental organizations or social entrepreneurs as additional elements. (Etzkowitz & Leydesdorff, 2000) explains that expanding interactions to five actors, namely government, academics, industry, society and media, is believed to be able to create innovation and encourage sustainable development through the integration of complementary roles. This idea is rooted in Joseph Schumpeter's (1934) theory of economic development, which states that economic growth is driven by the role of entrepreneurs and innovators as producers of innovation, the primary drivers of development. Etzkowitz and Leydesdorff developed this idea by emphasizing the importance of synergy between actors in driving innovation, building a knowledge-based economy, strengthening technological progress, and the growth of start-ups.

RESEARCH METHODS

Qualitative research aims to understand the phenomena experienced by research subjects, such as behavior, perception, motivation and actions holistically and presented in the form of words and language in a natural context (Moleong, 2013). This research uses a qualitative method with a case study approach to understand in depth the implementation of Pentahelix in the development of Human Resource Development in the Muara Ritan Village Government to improve sustainable performance and support the achievement of Village SDGs. Research data comes from primary and secondary data, primary data is obtained through structured interviews, field observations and documentation of Pentahelix actors, while secondary data comes from official documents, BPS publications, scientific journals, books and relevant previous research. Data collection was carried out through interviews, observation and documentation, then analyzed descriptively qualitatively using an interactive analysis model (Miles & Huberman, 2002) This includes data collection, data reduction, data presentation, and drawing and verifying conclusions, supported by NVivo software for theme grouping and data management. It also includes a SWOT analysis to identify strengths, weaknesses, opportunities, and threats in developing the human resource capacity of village officials. Matriks SWOT merupakan alat untuk menyusun faktor strategis organisasi secara sistematis dengan mengaitkan peluang dan ancaman dari lingkungan eksternal dengan kekuatan dan kelemahan internal. Analisis ini menghasilkan empat alternatif strategi yang dapat diterapkan dalam pengambilan keputusan organisasi.

Table 1 SWOT Matrix

	<i>Strengths (S)</i> Daftar semua kekuatan yang dimiliki	<i>Weaknesses (W)</i> Daftar semua kelemahan yang dimiliki
<i>Opportunities (O)</i> Daftar semua peluang yang dapat diidentifikasi	Strategi SO Gunakan semua kekuatan yang dimiliki untuk memanfaatkan peluang yang ada	Strategi WO Atasi semua kelemahan dengan memanfaatkan semua peluang yang ada
<i>Threats (T)</i> Daftar semua ancaman yang dapat diidentifikasi	Strategi ST Gunakan semua kekuatan untuk menghindar dari semua ancaman	Strategi WT Tekan semua kelemahan dan cegah semua ancaman

Source : (Fahmi, 2016)

The IFAS and EFAS matrices are used to assess internal and external factors to determine strategic positioning in a SWOT analysis. The IFAS focuses on internal strengths and weaknesses, while the EFAS examines external opportunities and threats. According to (Jannah & Firdaus, 2022) The SWOT analysis begins by identifying and comparing these internal and external factors. After identifying the internal and external factors involved in implementing the Pentahelix approach in Muara Ritan Village, the IFAS and EFAS matrices were developed.

Table 2 Internal Factor Analysis Strategy (IFAS)

Faktor-Faktor Strategi Internal	Bobot	Rating	Skor (Bobot X Rating)
Kekuatan			
1			
2	A	B	A x B
Kelemahan			
1			
2	C	D	C x D
Total	1,00		$(\sum (A \times B) + \sum (C \times D))$

Source : Rangkuti, 2016

1. Identify internal factors in the form of organizational strengths and weaknesses, then write them in the first column of the IFAS table.
2. Assign a weight to each factor on a scale of 0-1 according to its importance to the strategic position, with the total weight not exceeding one.
3. Determine the rating using a scale of 1-4, with strengths receiving high scores and weaknesses receiving low scores.
4. Calculate the weighted score by multiplying the weights and ratings to obtain each factor's contribution to the organization's condition.
5. Provide a brief explanation of the reasons for selecting the factors and the basis for assigning the weights and ratings.
6. Add all scores to obtain the total IFAS score, which indicates the organization's ability to respond to internal factors and its position compared to other organizations (Rangkuti, 2008:25-26).

Table 3 External Factors Analysis Strategy (EFAS)

Faktor-Faktor Strategi Eksternal	Bobot	Rating	Skor (Bobot X Rating)
Peluang			
1			
2	A	B	A x B
Ancaman			
1			
2	C	D	C x D
Total	1,00		$(\sum (A \times B) + \sum (C \times D))$

Source : (Rangkuti, Analisis SWOT Teknik Membedah Kasus Bisnis, 2016)

1. Determine external factors. Arrange 5-10 key factors, consisting of opportunities and threats, in the first column of the EFAS table.
2. Determine weights. Assign a weight to each factor on a scale of 0-1 based on its importance to the organization's strategy.
3. Assign ratings. Determine the rating in the third column using a scale of 1-4, adjusting for the factor's influence on the organization's condition:
 - a. Opportunities, rated high (4 = very large, 1 = small).
 - b. Threats, rated low (1 = very large, 4 = small).
4. Calculate the weighted score. Multiply the weight x the rating to obtain the score in the fourth column. This value indicates the contribution of each factor to the organization's strategic position.
5. Add all the weighted scores to obtain the total EFAS score. This indicates the organization's ability to respond to external factors and can be used to compare its strategic position with other organizations in the same sector (Rangkuti, 2008:22-23).

RESEARCH RESULT

Pentahelix Analysis

a. Government

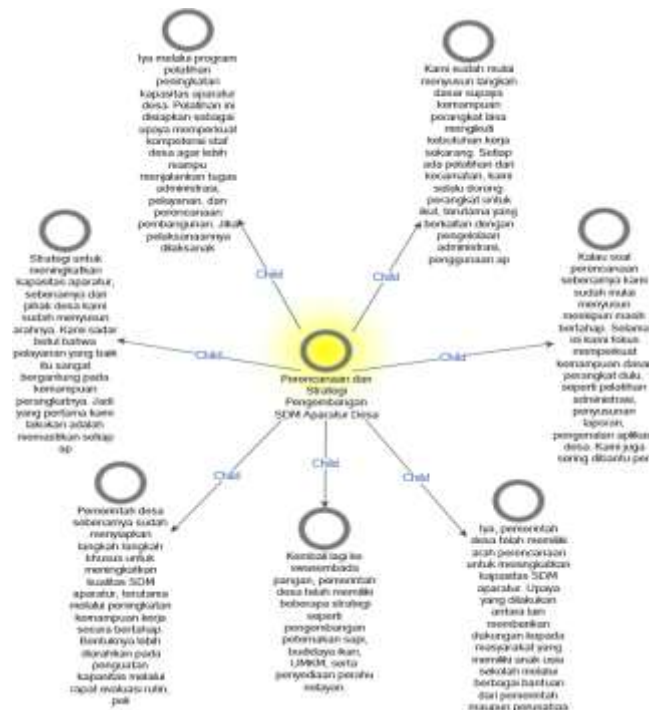


Figure 1. Village Apparatus Human Resource Development Strategy
 Source: (Data Processed by Researchers, 2026)

The Muara Ritan Village Government is implementing an integrated human resource capacity development strategy based on the community's real needs. This strategy is implemented through training mapping for youth groups, PKK mothers, farmers, and MSMEs with applied programs such as food processing training, barbershops, motorcycle repair and mechanics, hydroponic farming, fish farming, and handicrafts. All training activities are complemented by ongoing mentoring so that the skills acquired can produce real products and economic activities. This strategy is implemented in stages with an emphasis on strengthening the basic competencies of the apparatus through training and technical guidance in the areas of administration, village finance, reporting, and digital work systems, accompanied by ongoing evaluation to improve the professionalism of public services and support sustainable village development.

The involvement of local human resources is prioritized through strengthening mutual cooperation, village deliberations, and the utilization of community labor, supported by strategic partnerships with companies. This strategy encourages the development of village officials' capacity in digital administration management, which contributes to the elevation of Muara Ritan Village's status from

a developed village to an independent village. Although the program is flexible and not implemented routinely every year, its implementation has proven effective because the results can be directly applied by the community, such as young people who opened a barbershop service business. The integration of the SDGs into the RPJMDes and RKPDes documents until 2030 is still being carried out in stages due to limited data accuracy and weak coordination between actors. It is hoped that professional and technology-based village officials will be realized through continuous training, measurable evaluation, and structured collaboration, so that the village government can play a key role in the Pentahelix in accelerating the achievement of the SDGs through sustainable human resource development.

The challenges facing the Muara Ritan Village Government in developing human resources are multidimensional and interrelated. The primary challenge lies in low community awareness and participation, with some residents not yet fully understanding the importance of capacity building through education, training, and active involvement in village activities such as mutual cooperation and deliberation. A mindset still oriented towards old habits means that not all human resource development programs are seen as necessary, despite the increasing complexity of development demands. Limited competencies, differences in educational background, and age are obstacles to adapting to new work systems in digital administration and technology-based reporting. Although the village budget is relatively adequate, the implementation of human resource capacity building has not been optimal due to time constraints, high workloads for officials, minimal regular training, and a shortage of mentors. The village's geographical distance from training centers, limited learning facilities, and unequal access to information also slow down the human resource development process.

b. Academics



Figure 2 Ideal Form of Cooperation between Villages and Academics
 Source: (Data Processed by Researchers, 2026)

Ideal collaboration between village governments and academics is built through a continuous process of confirmation and coordination. Academics play a role in providing guidance and input tailored to field conditions. This is also realized through the dissemination of educational information, which in the future needs to be developed in a structured manner so that village and educational needs can be integrated. Academics view the quality of human resources as a determining factor in the success of sustainable development with real contributions. Ideal collaboration is expected to take the form of continuous guidance with a structured Pentahelix synergy, with the government providing policies and budgets, academics providing technical assistance for data-based evaluations, business actors contributing CSR and training, and the community as the main implementer and educational media for transparency, as a lack of strategic human resource development has the potential to cause slow public services, suboptimal development planning, and villages lagging behind other regions due to a lack of digital innovation.

The contribution of academics and students to human resource development and the achievement of SDGs in villages is felt to be significant, particularly in the field of education, through collaboration with village governments that begins with an understanding of field conditions and community needs. This role is manifested in the formulation of empowerment programs, the provision of scholarships for underprivileged children, support for educational facilities, dissemination of educational information and socialization of opportunities to continue their studies at university. The involvement of students through KKN activities and the Student Bina Desa program has had a real impact in the form of increased interest in learning, as well as increased insight and motivation for children to learn, thus overall contributing to increasing the capacity of village human resources through direct involvement in the field.

c. Business Actors



Figure 3. Human Resource Development for Village Economic Independence
 Source: (Data Processed by Researchers, 2026)

Human resource development for village economic independence needs to be focused on training tailored to community needs, accompanied by mentoring, and supported by the establishment of village cooperatives to develop local businesses in Muara Ritan Village in a structured and sustainable manner. The availability of a local workforce with high enthusiasm and sufficient quality for basic operations requires specialized technical skills improvement through advanced training from the village government and third parties. The challenge of human resource management lies in the differences in individual understanding when teaching skills from scratch: some grasp quickly, others require gradual, patient guidance. The community's need for skills for economic independence is focused on practical entrepreneurship such as food processing, handicrafts, business management, and recycling bottles into valuable products for women.

The village government's support for businesses in Muara Ritan Village is quite tangible, particularly in the form of training and facility provision. The village government has held several training sessions for MSMEs, such as business management training and bucket-making training facilitated by students from the Mulawarman University Village Development program. All materials, from glue guns, wrapping paper, ribbons, and glue gun refills, are provided by the village until the event is complete. The village also facilitates collaboration with external parties through corporate social responsibility (CSR) programs, allowing businesses to obtain equipment to support their operations.

The role of entrepreneurs in sustainable village development is realized through the utilization of local labor, skills sharing, and involvement in village activities, so that businesses not only grow economically but also provide social benefits to the community. Businesses have the potential to create job opportunities, increase income, and create productive activities for housewives, fostering economic empowerment and community togetherness. This role is not yet optimal because some businesses are still small-scale and independently managed, although there is a desire to involve the community as they grow. Village government support in the form of capital assistance or business facilities is considered crucial to encourage the realization of local economic ideas.

d. Community/Society

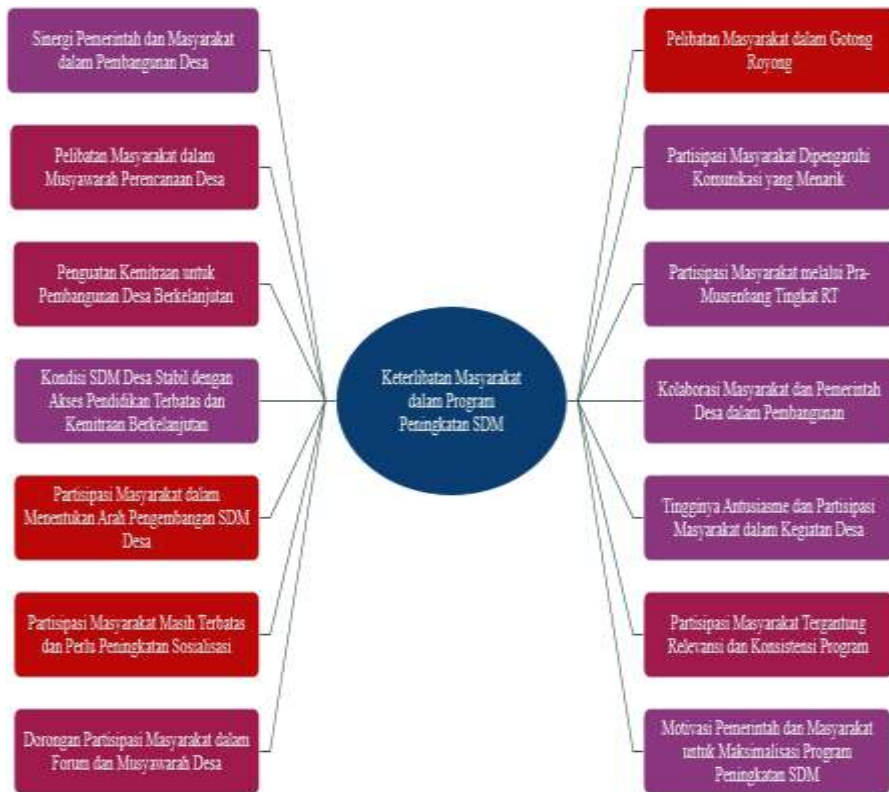


Figure 4 Community involvement in human resource development programs
 Source: (Data Processed by Researchers, 2026)

Community involvement in the planning and implementation of human resource development programs in Muara Ritan Village is quite good and shows a positive trend. The village government consistently involves the community through formal mechanisms, such as pre-Musrenbang at the neighborhood level, village deliberations, and evaluation forums for the RPJM and RKPDes, which provide a space for residents to express their aspirations, needs, and program proposals related to training and empowerment. Community participation is not limited to beneficiaries, but is also reflected in direct involvement in mutual cooperation activities, infrastructure development, participation in training, and roles as local workers, which simultaneously provide economic benefits and strengthen a sense of ownership of development outcomes. Community enthusiasm tends to increase for activities that are routine, relevant, and have a direct impact on livelihoods, such as skills training and MSME development. The level of participation remains uneven because some residents are passive due to limited understanding, time, and interest, so participation is often dominated by the same groups. Compared to the previous period, public awareness of involvement in human resource development programs has increased as tangible benefits are felt. However, strengthening participation is still needed through more effective outreach, ongoing activity intensity, and expanded reach to ensure community involvement is more inclusive and sustainable.

e. Media

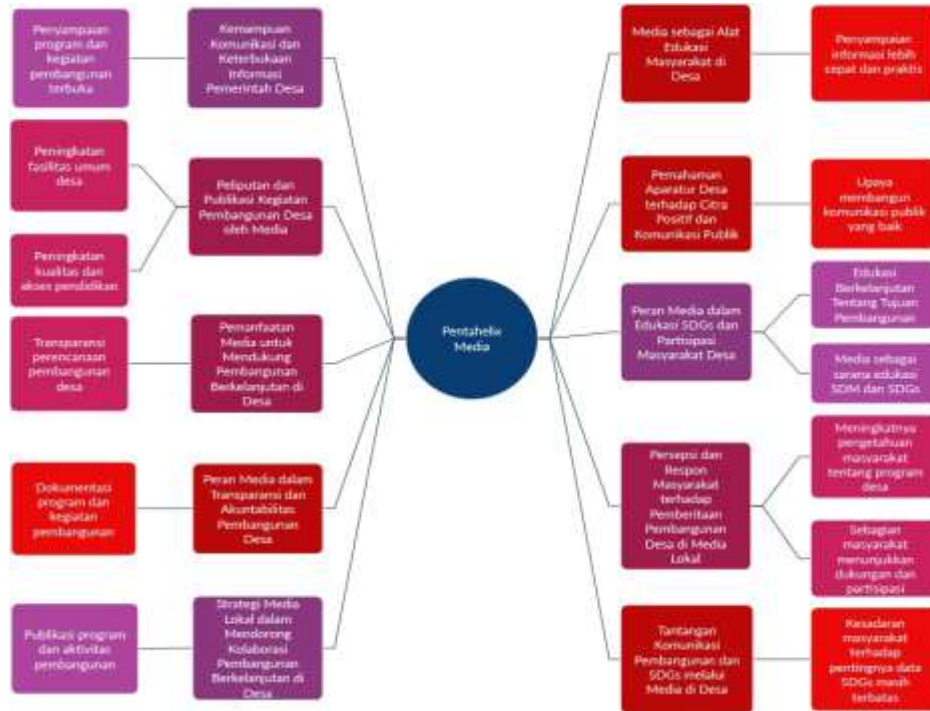


Figure 5. Pentahelix Media
 Source: (Data Processed by Researchers, 2026)

The role of village media in supporting sustainable development and achieving the SDGs in Muara Ritan Village is quite effective in terms of education, information dissemination, transparency, and increasing community participation. Media is utilized as a fast, practical, and relevant means of communication to convey village development programs, activities, and directions openly and sustainably, so that the community has a better understanding of the development process and is encouraged to participate in SDG data collection. Village media coverage focuses on priority issues such as infrastructure, public facilities, clean water, the economy, education, health, poverty alleviation, and environmental protection, contributing to the formation of a positive image and public trust in the village government. Public response to the news is generally positive, although not entirely uniform, due to differences in interests and levels of understanding. The main challenge lies in the still limited understanding of the SDGs concept among some communities, resulting in media messages not being fully received optimally. Although a formal media collaboration strategy has not been designed, consistent publication activities can open up space for cross-stakeholder collaboration and strengthen transparency and accountability in village development.

SWOT Analysis

Table 4 SWOT Matrix

IFAS	Strengths	Weaknesses
	<ol style="list-style-type: none"> 1. Multi-party collaboration with the village government as the main driver 2. Experience and understanding of village officials regarding local conditions 3. Utilization of village media as a means of transparency and accountability 4. Empowerment-based poverty alleviation 5. Legally aware institutions 	<ol style="list-style-type: none"> 1. Pentahelix collaboration has not been integrated long term 2. The organizational structure is not ideal and the discipline of some of the apparatus is not consistent. 3. Gap in educational capacity of civil servants 4. Economic empowerment has not reached all vulnerable groups 5. Limited access and readiness for further education

<p>EFAS</p>	<p>6. Transparency of deliberations and public trust 7. Broad cross-sector partnerships.</p>	<p>6. Access to clean water and sanitation is not yet evenly distributed 7. Dependence of village programs on external support.</p>
<p>Opportunity</p> <ol style="list-style-type: none"> 1. Development of a more structured pentahelix collaboration 2. Quality and integration of village SDGs data in development planning 3. Increased community participation and awareness of village development 4. Cooperation with universities and supporting institutions 5. Support for village apparatus training through collaboration between the government, universities and the private sector. 6. Opportunities for cross-sectoral clean water and sanitation programs 7. Utilization of social media for public services and participation 	<p>Strategy SO</p> <ol style="list-style-type: none"> 1. Optimizing pentahelix collaboration and cross-sector partnerships to strengthen the implementation of Village SDGs 2. Utilizing the quality of human resources of civil servants and digital governance to develop development planning based on SDGs data that is on target. 3. Developing MSMEs and productive community businesses through CSR support 4. Expand education and training programs for civil servants and the community with support from universities, the government and the private sector. 	<p>Strategy WO</p> <ol style="list-style-type: none"> 1. Strengthen the integration of pentahelix collaboration into village medium-term planning so that it is not incidental. 2. Utilize external training programs to increase the capacity of village officials who still have limited education and technical skills. 3. Developing productive economic empowerment based on entrepreneurship training to reduce community dependence on social assistance. 4. Optimizing cross-sector program opportunities to accelerate the provision of clean water, sanitation and access to further education.
<p>Threats</p> <ol style="list-style-type: none"> 1. Limited community adaptation to digital transformation and village economic development 2. Economic vulnerability and dependence on the primary sector 3. Risk of decreasing participation across pentahelix actors 4. Limited access to further education and the risk of dropping out of school 5. The discipline of the apparatus is not yet consistent and the legal literacy of the community is low 6. Limited village access to training and mentoring 7. The distance from the business area is far and there is potential for disruption to the security of the plantation products. 	<p>Strategy ST</p> <ol style="list-style-type: none"> 1. Leveraging village leadership, public trust and transparency of deliberations to reduce community resistance to digitalization and development innovation. 2. Using legally aware institutions and village legal aid posts to prevent social conflict 3. Strengthening strategic partnerships to maintain the sustainability of development programs amidst uncertainty about external support 4. Develop an inclusive digital public service system to increase efficiency and public trust. 	<p>Strategy WT</p> <ol style="list-style-type: none"> 1. Reorganize the village organizational structure and strengthen the discipline of the apparatus to prevent a decline in the quality of public services 2. Reduce dependence on external aid by gradually building community economic independence 3. Improve digital and legal literacy in society to reduce social resistance and the potential for administrative conflict 4. Establishing basic development priorities, particularly clean water, sanitation and education, to reduce the risk of declining human resource quality and community welfare.

Table 5 Internal Factor Analysis Strategy (IFAS)

Internal Strategy Factors	Weight	Rating	Score (Weight x Rating)
Strenghts			
1. Multi-party collaboration with the village government as the main driver	0,10	4	0,40
2. Experience and understanding of village officials regarding local conditions	0,08	3	0,24
3. Utilization of village media as a means of transparency and accountability	0,09	3	0,27
4. Empowerment-based poverty alleviation	0,09	4	0,36
5. Legal awareness institutions and village legal aid	0,07	3	0,21
6. Transparency of deliberations and public trust	0,08	4	0,32
7. Broad cross-sector partnerships	0,09	4	0,36
Total	0,60		2,16
Weakness			
1. Pentahelix collaboration has not been integrated long term	0,07	2	0,14
2. The organizational structure is not ideal and the discipline of some of the apparatus is not consistent	0,07	2	0,14
3. Gap in educational capacity of civil servants	0,07	2	0,14
4. Economic empowerment has not reached all vulnerable groups	0,04	1	0,04
5. Limited access and readiness for further education	0,06	1	0,06
6. Access to clean water and sanitation is not yet evenly distributed	0,06	2	0,12
7. Dependence of village programs on external support	0,03	1	0,03
Total	0,40		0,67
Total Keseluruhan	1,00		2,83

Strenghts

1. Multi-stakeholder collaboration with the village government as the main driver with a weight of 0.10 and a rating of 4 is the main strength of Muara Ritan Village because the village government is able to coordinate the involvement of academics, business actors, the community and the media across sectors with real impacts in the form of training, mentoring and support for development programs.
2. The experience of the apparatus and its ability to adapt to government digitalization with a weight of 0.08 and a rating of 3 strengthens the quality of public services and village administrative governance, although the impact is still internal and requires strengthening so that its implementation is evenly distributed across all apparatus.
3. The use of village media as a means of transparency and accountability with a weight of 0.09 and a rating of 4 plays an important role in supporting the accuracy of poverty alleviation program targets because data collection information is delivered openly, accurately and accompanied by administrative and social assistance that provides real benefits to the community.
4. Empowerment-based poverty alleviation in Muara Ritan Village with a weight of 0.09 and a rating of 4 is considered strategic because it is in line with SDGs 1 and has shown a positive impact in increasing the independence and economic capacity of the community.
5. Legal awareness institutions and village legal aid with a weight of 0.07 and a rating of 3 are a strength in maintaining social stability and resolving conflicts through deliberation, although their utilization by the community still needs to be improved.
6. Transparency of village deliberations and high public trust with a weight of 0.08 and a rating of 4 are important social capital that strengthens policy legitimacy, supported by openness of information and consistent public participation and receiving a positive response from residents.
7. Cross-sector partnerships with a weight of 0.09 and a rating of 3 with companies, government agencies, educational institutions and community organizations expand access to resources, funding and innovation, supporting village programs although still requiring stronger integration for long-term planning.

Weakness

1. Pentahelix collaboration has not been integrated in the long term with a weight of 0.06 and a rating of 2 because even though multiple parties have been involved, village strategic planning has not been optimal, this weakness can still be improved to ensure the sustainability of the program.
2. The organizational structure is not yet ideal and the discipline of the apparatus is not yet consistent with a weight of 0.07 and a rating of 2, because vacant positions, dual duties and inconsistent discipline affect the effectiveness of the apparatus' work, although it has not paralyzed village governance.
3. The gap in educational capacity of civil servants with a weight of 0.07 and a rating of 2 arises from differences in educational background, affecting analytical and technical abilities in carrying out government duties, but can still be overcome through training and capacity building.
4. Economic empowerment has not reached all vulnerable groups with a weight of 0.07 and a rating of 2, indicating the importance of inclusiveness in village development, because although efforts have been made, its scope and sustainability still need to be expanded.
5. Limited access and readiness for further education with a weight of 0.06 and a rating of 1 is a serious weakness that has the potential to affect the long-term quality of village human resources and requires special attention.
6. Unequal access to clean water and sanitation with a weight of 0.04 and a rating of 1 is a fundamental weakness that has a direct impact on the health and quality of life of the community, and still requires optimal cross-sectoral handling.
7. The dependence of some village programs on external support with a weight of 0.03 and a rating of 1 is a long-term weakness that risks disrupting the sustainability of empowerment and poverty alleviation programs if this support is reduced.
8. The total IFAS score of 2.83 indicates that the Muara Ritan Village Government's internal position is quite strong, with internal strengths outweighing weaknesses. This indicates the village has sufficient internal capacity to capitalize on external opportunities and minimize threats, supporting the achievement of the SDGs through a collaborative approach and community empowerment.

Table 6. External Factors Analysis Strategy (EFAS)

External Strategy Factors	Weight	Rating	Score (Weight x Rating)
Opportunity			
1. Development of a more structured pentahelix collaboration	0,11	4	0,44
2. Quality and integration of village SDGs data in development planning	0,10	4	0,40
3. Increased community participation and awareness of village development	0,10	4	0,40
4. Cooperation with universities and supporting institutions	0,09	3	0,27
5. Support for village apparatus training through collaboration between the government, universities and the private sector	0,08	3	0,24
6. Opportunities for cross-sectoral clean water and sanitation programs	0,09	4	0,36
7. Utilization of social media for public services and participation	0,08	3	0,24
Total	0,65		2,35
Threats			
1. Limited community adaptation to digital transformation and village economic development	0,07	2	0,14
2. Economic vulnerability and dependence on the primary sector	0,04	2	0,08
3. Access to clean water and proper sanitation is not yet evenly distributed	0,08	1	0,08
4. Limited access to further education and the risk of dropping out of school	0,06	2	0,12

5. The discipline of the apparatus is not yet consistent and the legal literacy of the community is low	0,08	2	0,16
6. Limited village access to training and mentoring	0,01	2	0,02
7. The distance from the business area is far and there is potential for disruption to the security of the plantation products.	0,01	2	0,02
Total	0,35		0,63
Total Keseluruhan	1,00		2,97

Opportunity

1. The development of a more structured Pentahelix collaboration is a strategic opportunity for Muara Ritan Village, with a weight of 0.11 and a rating of 4 because it supports the systematic involvement of academics, the private sector, the community, and the media to strengthen cross-sectoral development.
2. The availability of Village SDGs data is a strategic opportunity for village governments for more data-based, measurable and targeted planning with a weighting of 0.10 and a rating of 4 because it directly improves the quality of program planning and evaluation.
3. Increasing community participation and awareness of village development is an important opportunity with a weight of 0.10 and a rating of 4, because it has a direct impact on determining village development priorities that can be utilized optimally.
4. Collaboration with universities and supporting institutions is a strategic opportunity with a weight of 0.09 and a rating of 3, supporting the strengthening of governance and public services, although its utilization still depends on the readiness of village officials.
5. Support for village apparatus training through collaboration between the government, universities, and the private sector is an important opportunity with a weight of 0.08 and a rating of 3, strengthening human resource capacity and the effectiveness of public services.
6. The cross-sectoral program opportunity related to clean water and sanitation has a weight of 0.09 and a rating of 4, indicating great potential in improving the quality of life of the community and supporting sustainable village development.
7. The use of social media for public services and community participation is an opportunity to increase village transparency and communication, with a weight of 0.08 and a rating of 3, indicating an important role even though its effectiveness still depends on the digital literacy of residents.

Threats

1. Limited community adaptation to digital transformation and village economic development is a weakness that impacts program effectiveness. A weighting of 0.07 and a rating of 2 indicate the need for increased digital literacy, training, and mentoring to better prepare communities to participate in village economic development and empowerment.
2. The economic vulnerability of communities still dependent on the primary sector poses a threat to income stability and community well-being. This factor is given a weight of 0.08 because it has the potential to hinder efforts to diversify the village economy. A rating of 2 indicates that this threat is moderate and requires a sustainable economic empowerment strategy.
3. Unequal access to clean water and adequate sanitation poses a threat to the health and productivity of rural communities. A weighting of 0.07 reflects its widespread impact on the community's quality of life. A rating of 1 is given because this threat is significant and could pose a health risk if not addressed promptly.
4. Limited access to higher education facilities in villages poses a threat to the sustainability of education for the younger generation. This factor is given a weighting of 0.06 due to its long-term impact on the quality of village human resources. A rating of 2 indicates that this threat is quite significant, although it can be minimized through scholarship support and educational collaboration.
5. Inconsistent civil servant discipline and low public legal literacy are weaknesses that can hinder the effectiveness of village governance and the implementation of development programs. A weight of 0.08 and a rating of 2 indicate a moderate impact, but attention is still needed to strengthen civil servant discipline and public legal understanding.
6. Limited village access to training and mentoring is a weakness that hinders capacity building for both civil servants and the community. A weight of 0.01 and a rating of 2 indicate a relatively small impact, but it still requires attention to ensure optimal implementation of human resource development programs.
7. The distance from the business area and the potential for security disruptions to the plantation's produce are obstacles that can reduce the effectiveness of community economic activities. A

weight of 0.01 and a rating of 2 indicate a relatively small impact, but it still needs to be considered in village business planning and management.

8. The total EFAS score of 2.98 indicates that the external position of Muara Ritan Village is favorable with greater opportunities than threats, so that the village has broad potential to optimize collaboration, SDGs data-based planning and strengthening the capacity of officials and the community for sustainable development.

DISCUSSION

1. Implementation of the Pentahelix approach in the development of Human Resource Development in the Muara Ritan Village Government

The implementation of the Pentahelix approach in Human Resource Development (HRD) in Muara Ritan Village emphasizes collaboration between the government, academics, business actors, communities/society and the media to increase the capacity of village officials and support the achievement of SDGs. The village government is the main driver through community-based training, technical assistance and continuous evaluation, despite challenges such as differences in educational backgrounds of officials, limited facilities and low public awareness of training. Academics play a role in technical assistance, data-based evaluation, and scholarship programs, while business actors support local economic development through training, business assistance and CSR programs. Community participation in training and development activities increases the sustainability of the program, while local media serves as a means of education, transparency and promotion of development programs and village SDGs.

A SWOT analysis shows that the implementation of Pentahelix has strengths in the form of multi-stakeholder collaboration, experienced officials, transparent deliberations and cross-sector partnerships, as well as opportunities from training support, increased community participation, and the quality of village SDG data. Weaknesses include integration that is not yet long-term, a less than ideal organizational structure and limited apparatus capacity, while threats include community resistance to digitalization, dependence on external assistance, and inconsistent apparatus discipline. The implemented strategy includes optimizing cross-sector collaboration, strengthening apparatus capacity, organizational restructuring, and legal literacy to address weaknesses and threats. With this approach, Muara Ritan Village has succeeded in sustainably increasing the capacity of apparatus human resources, encouraging community participation, and strengthening local economic empowerment, thus becoming a model for other villages in achieving the SDGs.

2. Contribution of Pentahelix-Based Human Resource Development Strategy to the Sustainable Performance of the Muara Ritan Village Government

The Pentahelix-based Human Resource Development (HRD) strategy in Muara Ritan Village has significantly contributed to improving the sustainable performance of village officials through strengthening human resource capacity, cross-sector collaboration, and integrating SDGs values into governance. Collaboration between the government, academics, business actors, the community, and the media creates synergy that enhances the technical and managerial competencies of officials, encourages innovation in development programs, and strengthens public services. Sustainably trained village officials are able to manage digital administration, design SDG data-driven programs, and facilitate local economic empowerment through entrepreneurship training and support for MSMEs, thus achieving a balanced economic, social, and environmental impact in village development.

This strategy strengthens community participation and government accountability through deliberation mechanisms, evaluation of the Village Medium-Term Development Plan (RPJMDes), and publication of activities through village media. Support from academics and students through Community Service Programs (KKN), technical assistance, and scholarship programs improves the quality of education and learning motivation, while business actors contribute to economic independence through training and CSR programs. Sustainable village performance is not only evident in the improvement of apparatus competence and efficiency of public services, but also in community empowerment, strengthening cross-sector partnerships, and integrating sustainable development principles, making Muara Ritan Village a model for implementing Pentahelix-based HRD in remote villages.

3. The role of pentahelix-based Human Resource Development strategies in supporting the achievement of the Sustainable Development Goals (SDGs) in Muara Ritan Village.

The Pentahelix-based Human Resource Development (HRD) strategy plays a crucial role in supporting the achievement of the Sustainable Development Goals (SDGs) in Muara Ritan Village by integrating cross-actor collaboration and strengthening the capacity of village officials. The

village government, as the primary driver, collaborates with academics, business actors, the community, and the media to design development programs tailored to local needs and based on SDG data, such as poverty alleviation, improving education quality, providing clean water and sanitation, and strengthening village institutions. Village officials, who possess technical, managerial, and digital competencies strengthened through training and mentoring, are able to manage administration, program evaluation, and implement activities sustainably. Academic support through mentoring, scholarships, and the Community Service Program (KKN) improves community literacy and skills, while business actors play a role in empowering the local economy through entrepreneurship training, and village media strengthens transparency and public participation. This Pentahelix synergy ensures that every village development program not only improves the quality of officials but also has a real impact on the community and accelerates the achievement of the SDGs in Muara Ritan Village in a comprehensive and sustainable manner.

CONCLUSION

The implementation of a Pentahelix-based Human Resource Development strategy in the Muara Ritan Village Government has proven effective in increasing the capacity of village officials and strengthening cross-sector collaboration, thus contributing significantly to improving sustainable village government performance and supporting the achievement of the SDGs. This approach combines the roles of government, academics, business actors, communities, and the media to create development programs based on local needs, SDG data, and public participation. Sustainably trained village officials are able to manage administration, design data-driven programs, and facilitate local economic empowerment, thereby improving the quality of public services and encouraging sustainable village development. A SWOT analysis shows that despite challenges such as limited apparatus capacity, a less-than-ideal organizational structure, and community resistance to digital innovation, the Pentahelix-based HRD strategy successfully leverages the power of multi-stakeholder collaboration, apparatus experience, and training support to achieve sustainable and integrated village performance. Further development should be directed at strengthening Pentahelix institutions, increasing competency-based apparatus capacity, and utilizing village SDG data as a basis for strategic decision-making. This research has implications for strengthening the village HRD model based on Pentahelix collaboration in sustainable development and provides a reference for village governments in designing adaptive, participatory and SDGs-oriented HRD development strategies.

SUGGESTION

1. The Muara Ritan Village Government is advised to strengthen its Pentahelix-based HRD strategy through more structured long-term planning integrated with village development documents. Strengthening the capacity of village officials should focus on improving managerial competency, digital literacy, and understanding the SDGs, enabling them to design and manage sustainable development programs. Collaboration with academics, business actors, and the media should be formalized in the form of strategic partnerships to ensure consistent support for training, mentoring, and publication of village programs.
2. Further research is recommended to develop quantitative or mixed-methods studies to more objectively measure the impact of Pentahelix-based HRMD on village apparatus performance and SDG achievement. Further research could also expand the focus to villages with different characteristics to test the replicability and generalizability of this model, thereby enriching research on village government human resource development and sustainable development at the local level.

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