



The Changing Face of Rural Kediri: A Study on Rural Transformation Processes

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Dixzi Anindita Sandy¹

¹Kantor Pertanahan Kabupaten Kulon Progo, Daerah Istimewa Yogyakarta, Indonesia
dixzianin@gmail.com

Abstract

Urbanization, along with the flow of various elements, has triggered changes in the economic, social, and spatial structures of many regions, driving processes of rural transformation. This transformation presents challenges for both rural and urban development due to its broad impact on physical, socio-economic, and cultural aspects. Kediri Regency, located on Java Island, has experienced such changes, with 29 villages reclassified as urban between 2000 and 2010, based on BPS Regulation No. 37 of 2010—indicating a clear sign of rural transformation. This study aims to assess the degree of rural transformation in Kediri Regency by analyzing physical, economic, and socio-demographic aspects. The research uses spatial and socio-economic data from 2013 and 2023, analyzed through descriptive quantitative methods, GIS, and a weighted scoring analysis. Findings show that all three studied villages—Bringin, Gempolan, and Petok—have undergone varying levels of transformation. Bringin displays the most significant economic and socio-demographic transformation, driven by growth in non-agricultural employment, household income, and access to education and health services. Gempolan ranks highest in overall transformation due to industrial growth, land-use changes, and expanded infrastructure and services. In contrast, Petok shows minimal transformation, particularly in economic and physical aspects, with stagnant development indicators. Overall, rural transformation is most advanced in Bringin, likely due to its proximity to Pare, a secondary city, which stimulates rural change through increased urban economic interaction.

Keywords: rural transformation, economic transformation, physical transformation, socio-demographic transformation

1. Introduction

Urbanization is a key driver of structural change in both urban and rural areas, particularly in developing countries (Arfanuzzaman & Dahiya, 2019). In Indonesia, the share of the urban population increased from 49.9% in 2010 to 57.29% in 2021, and is projected to surpass 70% by 2045 (Roberts et al., 2019). This trend reflects not only the physical expansion of urban land but also a fundamental shift in socio-economic and spatial systems across rural landscapes. The diffusion of population, infrastructure, services, and economic activities from urban cores into rural hinterlands has led to dynamic processes of rural transformation (Guan et al., 2018).

Rural transformation can be understood as a multidimensional and comprehensive process involving economic diversification, spatial restructuring, and social change (Berdegué et al., 2013; Rigg, 2014). It is marked by a decline in dependence on agriculture, increasing non-agricultural employment, industrial growth, and improved access to

¹ Corresponding Author: Kantor Pertanahan Kabupaten Kulon Progo, Daerah Istimewa Yogyakarta, Indonesia
Email: dixzianin@gmail.com

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infrastructure and services. Liu (2021) emphasizes that such transformations are driven by key elements—population, land, and industry—interacting through rural–urban linkages. Mitsuda and Ito (2011) further suggest that land-use change is a crucial physical indicator of transformation, reflecting socio-economic restructuring processes.

Java Island, as the most densely populated region in Indonesia, exhibits strong signs of rural transformation. East Java Province, in particular, has experienced a significant increase in urban village classification. In Kediri Regency, 29 villages were reclassified as urban between 2000 and 2010, according to BPS Regulation No. 37/2010, signaling accelerated socio-spatial change (Puspa Sari et al., 2018; Bapenas, 2020; Kemendesa, 2020). These transformations are influenced not only by internal rural development but also by proximity to Kediri City—a primary urban center—and Pare, a fast-growing secondary city driven by commerce and education (e.g., the renowned "Kampung Inggris" area).

Further economic shifts are evident in Kediri Regency's changing industrial structure. Between 2010 and 2020, the contribution of agriculture, forestry, and fisheries sectors declined by 5.4%, while manufacturing and information-communication sectors grew by 1.6% and 2.6%, respectively (Putri, 2020). This reflects a broader national trend toward de-agrarianizing and the agrarian transition, as described by Rigg (2014), whereby rural economies become increasingly integrated with urban and service sectors.

Meanwhile, the physical landscape is also being transformed. Industrial and residential land use expanded by 80% and 12%, respectively, between 2010 and 2020, while agricultural land decreased by 4% (Putri, 2020). Such patterns are associated with broader infrastructure and service improvements in rural areas, especially those closer to urban centers.

However, this transformation also raises critical planning challenges. IFAD (2016) and Imai & Malaeb (2018) highlight that rural–urban transformation, if unbalanced, may widen regional disparities and increase inequality between urban and rural communities. D'Amour et al. (2017) also stress that rapid urban expansion can lead to environmental degradation and fragmented governance.

Given these conditions, it is vital to assess the degree of rural transformation at a localized scale, accounting for economic, physical, and socio-demographic dimensions. Yet, most studies in Indonesia remain focused on macro-scale patterns, often overlooking micro-level dynamics and the influence of secondary urban centers.

This study aims to analyze the degree of rural transformation in Kediri Regency by examining three core aspects: economic change, physical development, and socio-demographic transition. Three villages—Bringin, Gempolan, and Petok—were selected to capture spatial variability based on proximity to urban centers. The findings are expected to inform rural planning strategies that promote balanced development and minimize urban-rural inequality.

2. Methods

2.1 Study Area

This study was conducted in Kediri Regency, East Java, focusing on 29 rural villages reclassified as urban areas based on Statistics Indonesia Regulation No. 37 of 2010.

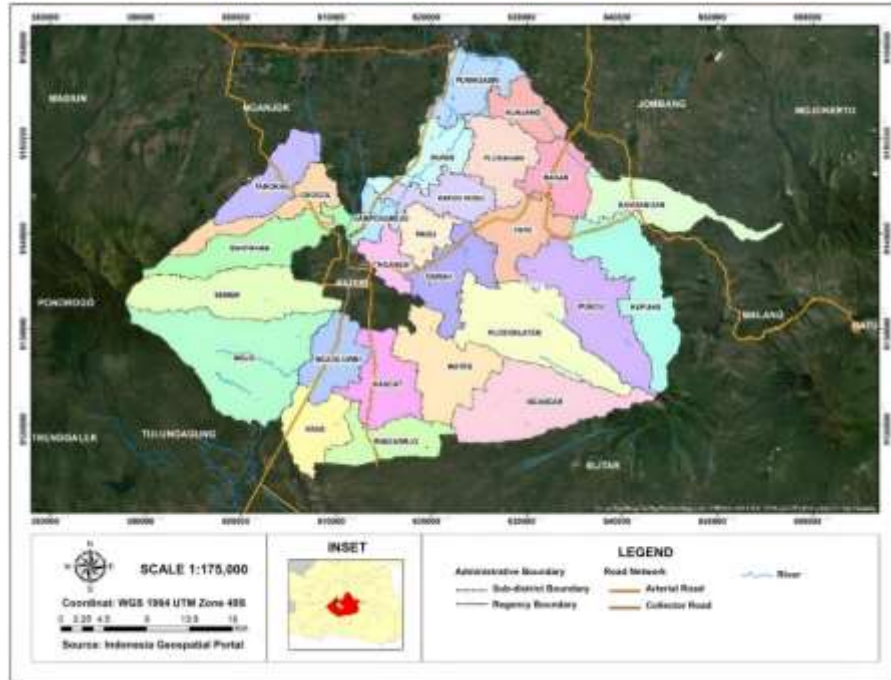


Figure 1. Study Area Map

The target population comprised households that had resided continuously in these villages since 2013 and included at least one employed member. A multi-stage sampling strategy was adopted. In the first stage, area sampling was used to select three representative villages—Petok, Gempolan, and Bringin—based on their proximity to urban centers (Kediri City as a primary city and Pare as a secondary city), using a 5 km, 10 km, and 20 km buffer zone (Figure 2). This spatial differentiation allowed the study to examine variations in rural transformation across differing levels of urban influence.

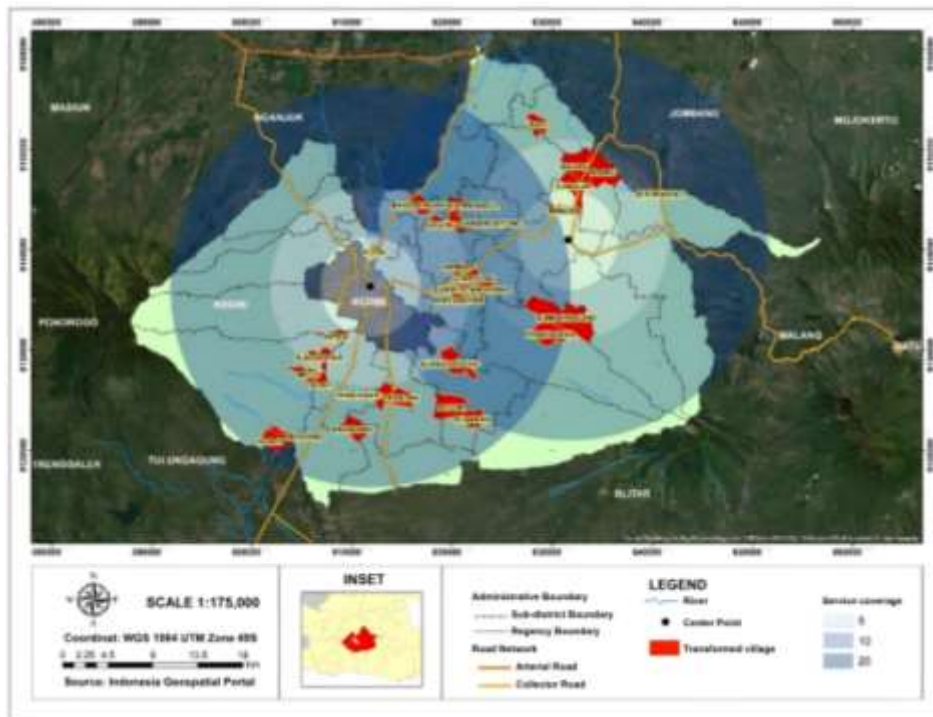


Figure 2. Multi-Ring Buffer Analysis Map
(author, 2022)

In the second stage, incidental (non-probability) sampling was used to select respondents within each village, resulting in a total of 100 household samples: 26 from Petok, 21 from Gempolan, and 53 from Bringin. The sample size was determined using Slovin's formula with a 10% margin of error (Buchori, 2022; Kothari, 2004).

2.2 Data and Analytical Methods

The study assessed rural transformation across three dimensions: economic, physical, and socio-demographic. Relevant variables were defined and operationalized as follows:

Table 1: Relevant variables

Rural Transformation	Variables
Economic Transformation	<ul style="list-style-type: none"> • Employment shifts (agricultural to non-agricultural sectors, 2013–2023) • Growth in household and small-scale industries (2011–2021) • Household income and consumption expenditures (2013–2023)
Physical Transformation	<ul style="list-style-type: none"> • Land use changes and asset ownership (2013–2023) • Infrastructure development, including educational, health, and trade facilities (2011–2023)
Socio-Demographic Transformation	<ul style="list-style-type: none"> • Population growth, density, and migration trends (2011–2021) • Literacy, education attainment, and school accessibility (2013–2023) • Health insurance coverage and access to medical services (2013–2023)

Source: Author, 2022

The research applied an input-process-output framework. Inputs consisted of socioeconomic and spatial data from 2013 and 2023. The data were analyzed through a combination of: descriptive statistical analysis (used to identify patterns of change in economic activity, infrastructure, education, and health), GIS-based analysis (particularly for detecting spatial changes in land use (2013–2023)), weighted index analysis (used to construct degree of rural transformation). Each indicator was normalized and weighted using mean deviation-based standardization methods (Yang et al., 2018), enabling quantitative comparison of transformation levels across the three villages.

A weighting analysis was employed to assess the degree of rural transformation in the three villages using quantifiable data derived from the variables associated with economic, physical, and socio-demographic transformation. This study utilized a weighting method in which all data were first converted into dimensionless values to normalize indicator scales within a range of 0 to 1. Subsequently, weights were assigned based on the mean deviation method as proposed by Y. Yang et al. (2018). Variables with differing units or dimensions were standardized using the mean and standard deviation, following equations (1) and (2) below.

$$X_{standardized} = \frac{X - mean(x)}{std_{dev}(x)} \quad (1)$$

$$std_{dev}(x) = \sqrt{\frac{1}{N-1} \sum_{i=1}^N (x - mean(x))^2} \quad (2)$$

After the data for each variable were normalized, the next step was to assign weights to each data point based on the mean deviation, as expressed in equation (3) below.

$$Mean\ Deviation = \frac{\sum_{i=1}^n |x_i - \mu|}{n} \quad (3)$$

The final output was the classification of rural transformation into three levels—low, moderate, and high—based on standard deviation intervals from the mean.

Table 2: Relevant variables

Formula	Classification
$x \leq (\text{mean} - 1\text{SD})$	Low
$(\text{mean} - 1\text{SD}) < x \leq (\text{mean} + 1\text{SD})$	Moderate
$x > \text{mean} + 1\text{SD}$	High

*SD: *standard deviation*

Source: Author, 2022

Data sources included both primary data obtained via household questionnaires, in-depth interviews with community leaders and local government officials, and field observations and secondary data from official statistical publications (e.g., BPS, Bappeda, BIG), complemented by satellite imagery analysis.

3. Results and Discussion

3.1 Economic Transformation

Economic transformation in the studied villages reveals distinct spatial patterns of rural change, strongly influenced by proximity to urban centers and the structure of local economies. Bringin Village, located only 5 kilometers from Pare—a secondary urban hub—exhibited the most notable economic shift from 2013 to 2023. Survey data show a marked increase in the proportion of households engaged in non-agricultural sectors, rising from 41% to 68%. This shift was accompanied by growth in household income and diversification of livelihood sources, particularly in trade, services, and small-scale processing industries.

A key driver of economic change in Bringin is its strategic proximity to Pasar Induk Pare, which functions as a major regional distribution node for agricultural and non-agricultural goods. The presence of this urban market center has stimulated local entrepreneurship and informal sector growth, consistent with Berdegué et al. (2013), who note that improved market access is a catalyst for rural transformation. In addition, household interviews revealed that residents increasingly operate food processing units and kiosks linked to urban demand, reflecting growing integration into broader economic networks.

Gempolan Village, positioned equidistant (10 km) from both Kediri City and Pare, experienced moderate economic transformation. The proportion of non-agricultural workers increased from 36% to 52% over the same period, supported by the emergence of home-based garment and handicraft industries. Though not as dynamic as Bringin, Gempolan's access to a main collector road linking the two cities enhances its economic connectivity. This corresponds with findings by Liu (2021), who identifies infrastructure accessibility as a key determinant of transformation in rural Asia.

In stark contrast, Petok Village—although only 5 km from Kediri City—exhibited stagnant economic conditions. Agricultural dominance persisted, with non-agricultural employment rising only marginally from 33% to 37%. Household income data and expenditure levels showed no significant improvement over the decade. Field interviews highlighted barriers such as weak institutional support, lack of entrepreneurial activity, and declining agro-industry performance, particularly the cassava flour industry which had been a traditional economic mainstay. This supports Imai & Malaeb's (2018) argument that not all rural areas benefit equally from urban proximity, especially in the absence of enabling local conditions.

Overall, the comparison reveals that spatial proximity alone does not guarantee economic transformation. Rather, it is the interaction between location, infrastructure, and local economic initiatives that determine the scale and direction of change. The economic divergence between Bringin, Gempolan, and Petok highlights the need for spatially sensitive policy approaches that consider local capacities and institutional context, as emphasized by IFAD (2016) and Rigg (2014).

The findings reveal a clear trend of economic diversification among the three villages. Petok and Gempolan had a consistently higher proportion of non-agricultural employment, while Bringin, though initially more agriculturally inclined, showed signs of transition. This shift aligns with Berdegué et al. (2013) and IFAD (2016), who characterize rural transformation as a movement away from agricultural dominance toward non-agricultural sectors and off-farm employment, reflecting pluralism in rural livelihoods.

The stagnation in Petok's household income and industry development, particularly in its starch industry, indicates structural inertia. In contrast, Bringin experienced significant growth in small-scale industries and income levels, likely due to its proximity to Pare, a secondary city. These results affirm Rigg's (2014) observation that rural transformation often follows a de-agrarianization trajectory, where urban influence accelerates shifts in employment and industrial structure.

3.2 Physical Transformation

Physical transformation in the study area is most clearly reflected in changes in land use and infrastructure development over the past decade. The analysis of satellite imagery and spatial data between 2013 and 2023 revealed substantial variation among the three villages, with Bringin and Gempolan undergoing significant spatial restructuring, while Petok remained largely unchanged.

Bringin Village recorded the most dynamic land use transformation. The built-up area expanded by 17.36%, primarily due to the conversion of agricultural land to residential and commercial uses. This land conversion was concentrated along the main road corridors that connect the village directly to the urban center of Pare. The expansion of paved roads, permanent housing structures, and trade facilities was particularly evident in Dusun Sumberjo and Dusun Bringin Tengah. These changes are consistent with Mitsuda and Ito (2011), who argue that physical transformation in rural areas often begins with linear development along arterial roads and is intensified by market-driven land commodification. This trend has also been observed in other peri-urban areas in Java, such as Sleman, where land conversion follows similar spatial patterns (Kusumo & Kuniarsih, 2021).

This transformation was further supported by infrastructure development. Between 2013 and 2023, Bringin added two additional primary schools, one new health post (poskesdes), and several small retail establishments (warung and toko). Interviews with residents and officials confirmed that land prices in Bringin increased nearly twofold over the period, indicating growing demand for residential and commercial land. These trends support the findings of Puspa Sari et al. (2018), who documented similar patterns of peri-urban growth in other parts of East Java.

Gempolan Village also experienced notable physical transformation, though it was more incremental and evenly distributed. The built-up area expanded by 14.65%, and land previously used for seasonal crops was converted into housing compounds and small workshops, particularly in areas bordering the Gurah main road. Infrastructure development in Gempolan included improvements to drainage systems, a new midwifery clinic (bidan desa), and the expansion of the local village office (balai desa). Unlike Bringin, which experienced node-based development centered on urban pull factors, Gempolan's transformation was more internally driven by local infrastructure planning initiatives supported by kecamatan-level programs. This aligns with observations by Wilonoyudho et al. (2017), who note that rural infrastructure improvements often result from combined efforts between local government and community self-help initiatives.

Petok Village, in contrast, displayed minimal physical transformation. The built-up area increased by only 5.82%, and most new structures were simple, semi-permanent dwellings or basic service kiosks. Despite being located relatively close to Kediri City, Petok suffers from poor internal road conditions, limited land market activity, and a low level of infrastructure investment. The health post was inactive by 2023, and no new educational or public facilities were built during the study period. Furthermore, several irrigation channels remained in poor condition, affecting both agricultural productivity and land value. These observations reflect Guan et al. (2018)'s findings that physical transformation is not only a function of urban proximity, but also requires strong institutional and economic stimuli at the local level.

A comparative spatial analysis further illustrates these differences. While Bringin and Gempolan show spatial expansion along transportation axes and at village nodes, Petok's spatial form remains largely static, reflecting a stagnating physical landscape. This suggests that physical transformation in rural areas is contingent upon both accessibility to urban functions and internal capacity to leverage development opportunities. In cases where rural villages are unable to integrate spatially or institutionally with urban systems, transformation remains limited or even regressive.

In sum, physical transformation in Kediri Regency's rural areas is highly uneven. Bringin represents a peri-urban village in active integration with secondary urban systems; Gempolan exemplifies internally driven, moderate transformation; and Petok reflects the case of peripheral stagnation. These findings reaffirm that rural spatial change must be analyzed not just by proximity metrics, but through a multi-scalar lens involving land markets, infrastructure planning, and governance efficacy (d'Amour et al., 2017; Liu, 2021).

3.3 Socio-Demographic Transformation

Socio-demographic transformation across the three studied villages reveals significant variation in population dynamics, access to education and healthcare, and overall improvements in human development indicators. These shifts are closely related to physical and economic changes, but they also reflect broader structural factors such as regional service delivery capacity, mobility, and quality of governance.

Bringin Village experienced the most profound socio-demographic transformation between 2013 and 2023. The village population increased by 13.7%, a rise largely attributed to migration inflows from neighboring rural areas and

young families relocating from Pare due to lower housing costs. Household survey results indicate significant improvements in access to public services: the proportion of households reporting “easy access” to primary education rose from 68% to 91%, while access to public health facilities increased from 62% to 85%. In addition, the village saw a notable increase in health insurance coverage (JKN-PBI and JKN-Mandiri), which rose from 34% to 76% during the study period. These improvements align with IFAD’s (2016) framework, which considers access to social services a central component of inclusive rural transformation.

Literacy rates and educational attainment also improved in Bringin. Field interviews with school administrators confirmed an increase in student enrollment in early childhood and elementary education, supported by the construction of one new PAUD and one primary school. Several households cited better educational access as a key reason for choosing to remain in the village rather than migrating to urban centers, reflecting a reversal of the typical rural–urban movement described in Rigg (2014).

Gempolan Village followed a similar but more moderate trajectory. Population growth reached 8.3%, with internal demographic shifts showing an aging but increasingly educated population. The share of residents completing secondary education increased from 42% to 61%, and the village also benefited from improved access to maternal health services through the establishment of a new posyandu and midwife clinic. However, some hamlets in the village, particularly those farther from the main road, continued to report low satisfaction with service accessibility, highlighting persistent spatial inequality within the village itself. These findings support Wilonoyudho et al. (2017), who argue that intra-village disparities in service access can persist even as aggregate indicators improve.

In contrast, Petok Village showed very limited socio-demographic progress. Population growth was negligible (only 2.1%), and the village reported a slight decline in school attendance rates among youth aged 15–18, largely due to out-migration and economic hardship. Health infrastructure was static, and the only poskesdes in the village ceased operations in 2020 due to staffing shortages. The percentage of households with access to clean water remained stagnant at 61%, the lowest among the three villages. These figures indicate a stagnating or even regressive trend in social well-being, consistent with the “locked-in periphery” condition described by Liu (2021), wherein rural areas disconnected from urban flows face cumulative disadvantage.

Household interviews in Petok revealed a deeper social dynamic: while some residents acknowledged the appeal of moving closer to urban centers, many older residents expressed reluctance to leave due to attachment to land and social networks. This illustrates the often-overlooked cultural dimension of rural transformation, in which economic and social logic may not align—a tension also noted by Yang et al. (2020) in their study of rural settlements in China.

Taken together, the three villages exhibit a clear socio-demographic gradient. Bringin leads in all human development indicators, benefiting from better access, in-migration, and urban spillovers. Gempolan reflects a case of stable, moderate transformation, driven by service expansion and demographic resilience. Petok remains marginalized, showing how limited infrastructure and institutional support can stifle social advancement despite geographic proximity to an urban center. These patterns reinforce the argument that transformation is not merely about distance, but about functional integration, service penetration, and institutional strength (Imai & Malaeb, 2018; Guan et al., 2018).

3.4 Composite Rural Transformation Index

To capture the overall degree of rural transformation in the three villages, this study developed a composite index based on 13 indicators across three dimensions: economic, physical, and socio-demographic. Each variable was normalized using min-max scaling, and weighted scoring was applied to reflect the relative importance of each domain. The final index represents the aggregate transformation score of each village, enabling comparative analysis of their rural change trajectories. The weighted index analysis—adapted from Y. Yang et al. (2018)—quantified the overall degree of rural transformation. The results were:

Variable	Data Type	Change Rate (2013-2023)	Av. Change Rate	Std. Dev.	Normalized	Av. Dev.	Weight	Degree of RT
Rural Livelihood	Change in the proportion of nonagricultural workers	Petok: 0.00 Gempolan: 0.00 Bringin: 0.09	0.03	0.05		0,77	0,010	
	Change in the proportion of households with side job	Petok: 0.00 Gempolan: 0.00 Bringin: 0.19	0.06	0.11		1,72	0,021	

Variable	Data Type	Change Rate (2013-2023)	Av. Change Rate	Std. Dev.	Normalized	Av. Dev.	Weight	Degree of RT
Industry	Change in number of industries	Petok: -0.29 Gempolan: 4.00 Bringin: 1.53	1.75	2.15		29,33	0,362	
Land Use	Built-up land conversion	Petok: 0.38 Gempolan: 2.00 Bringin: 1.78	1.39	0.88		17,36	0,214	
Infrastructure Development	Change in available health facilities	Petok: -0.17 Gempolan: 0.17 Bringin: 0.00	0.00	0.17		1,60	0,020	
	Change in available education facilities	Petok: 1.00 Gempolan: -0.13 Bringin: 2.00	0.96	1.06		18,52	0,229	
Education	Change in available trade	Petok: -0.59 Gempolan: 0.33 Bringin: -0.54	-0.27	0.52		6,43	0,079	
	Change in proportion of households with electricity access	Petok: 0.00 Gempolan: 0.05 Bringin: 0.02	0.02	0.03		0,47	0,006	
	Change in proportion of households with toilets	Petok: 0.00 Gempolan: 0.00 Bringin: 0.01	0.01	0.01		0,18	0,002	
Health	Change in literacy rate	Petok: 0.04 Gempolan: 0.00 Bringin: 0.00	0.01	0.02		0,77	0,010	
	Households with access to education	Petok: 0.19 Gempolan: 0.00 Bringin: 0.04	0.08	0.10		0,58	0,007	
Health	Change in proportion of households with health insurance	Petok: 0.30 Gempolan: 0.06 Bringin: 0.38	0.25	0.17		2,98	0,037	
	Households with access to health services	Petok: 0.19 Gempolan: 0.10 Bringin: 0.06	0.12	0.07		0,31	0,004	

Range	Classification
$x \leq (\text{mean} - 1\text{SD})$	Low
$(\text{mean} - 1\text{SD}) < x \leq (\text{mean} + 1\text{SD})$	Moderate
$x > \text{mean} + 1\text{SD}$	High

The results of the composite index confirm the patterns observed in the separate dimensions. Gempolan Village achieved the highest overall transformation score, with an index value of 0.74. This performance reflects balanced improvements across all three dimensions: economic diversification, land use expansion, and consistent development in social services. Gempolan's strategic location between two urban centers and along a collector road facilitates regional connectivity, while internal community planning and infrastructure support have helped drive multidimensional growth.

Bringin Village followed with a transformation index of 0.71, slightly lower than Gempolan but with notable peaks in economic and socio-demographic dimensions. Its proximity to Pare provides strong market linkages, employment opportunities, and service accessibility, all of which contribute to rapid transformation. However, the slightly lower score in physical infrastructure diversity, particularly in terms of institutional buildings and public facilities beyond basic services, moderated its overall composite score. This finding echoes Berdegué et al. (2013), who noted that rapid transformation in some domains can outpace other sectors without integrated planning.

Petok Village scored significantly lower, with an index of 0.41, indicating limited transformation. Despite its geographic proximity to Kediri City, Petok lacks the infrastructural integration and institutional activation needed to

stimulate change. Economically, it remains agriculturally dominated; physically, it exhibits low built-up expansion; and socially, it suffers from stagnant population dynamics and service access gaps. These outcomes reinforce the concept of spatial inequality within transformation processes, where mere proximity to urban cores does not ensure rural integration unless matched by governance, capital flow, and institutional alignment (Rigg, 2014; Liu, 2021).

The comparative results are visualized in the transformation index chart (as seen in your original analysis), showing that while Gempolan and Bringin have entered a phase of rural-urban convergence, Petok remains in a rural stagnation zone. This highlights a critical insight: rural transformation is not only a function of distance from urban centers, but of spatial interaction intensity, institutional preparedness, and local absorptive capacity (Yang et al., 2020).

From a policy standpoint, the transformation index supports the need for differentiated rural development strategies. Villages like Bringin may benefit from urban-linked entrepreneurship schemes and mobility infrastructure, while Gempolan's balanced transformation suggests the value of reinforcing local governance and planning capacity. Petok, meanwhile, requires targeted interventions in infrastructure, service delivery, and local economic activation to break the cycle of rural stagnation. This approach aligns with IFAD (2016) and the rural development agenda promoted in Indonesia's National Medium-Term Development Plan (RPJMN), which emphasizes spatial equity and inclusive growth.

In conclusion, the composite index not only synthesizes rural transformation across dimensions but also functions as a diagnostic tool for identifying policy gaps and planning priorities. Its application in Kediri Regency demonstrates that rural transformation is both a spatial and institutional process, shaped by connectivity, capacity, and coordination.

4. Conclusion

This study examined the degree of rural transformation in three selected villages in Kediri Regency—Bringin, Gempolan, and Petok—through a multidimensional analysis covering economic, physical, and socio-demographic aspects. The findings demonstrate that rural transformation is not a uniform process but rather a spatially differentiated phenomenon shaped by proximity to urban centers, infrastructure access, and local institutional capacity.

Bringin Village experienced the most significant economic and socio-demographic transformation, largely due to its strategic proximity to Pare, a secondary city, and the resulting spillover effects. Gempolan achieved the highest overall transformation index, supported by balanced progress across all dimensions and strong integration with regional infrastructure and services. In contrast, Petok Village exhibited limited change, remaining economically and physically stagnant despite its geographic closeness to Kediri City.

These results underscore that physical distance to urban areas does not automatically translate into transformation benefits. Instead, the intensity of rural-urban interaction, the presence of enabling infrastructure, and the strength of local governance institutions are critical in shaping rural change trajectories. This supports existing literature that calls for a more nuanced understanding of transformation processes beyond spatial proximity alone.

The application of a composite transformation index in this study offers a practical tool for diagnosing village-level disparities and identifying development priorities. It also reinforces the importance of localized planning approaches that account for intra-regional variability.

From a policy perspective, differentiated strategies are required (Bappenas, 2020; Kemendes, 2020) to ensure spatial justice and balanced rural-urban development. Meanwhile, villages like Petok need targeted investment in basic services, economic activation, and institutional support to overcome stagnation and foster inclusive transformation.

Ultimately, this research contributes to the growing discourse on rural transformation in Indonesia by providing empirical evidence at the village scale. It highlights the need for integrated rural-urban planning and reaffirms the importance of spatially sensitive policies to support equitable and sustainable rural development.

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