

RESEARCH ARTICLE

Parallel Progress Without Catch-Up: Human Development Convergence Across Central Java

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ABSTRACT

Provincial planning documents in Indonesia routinely adopt the Human Development Index as a headline target, yet an aggregate target can be met while the gap between constituent districts remains untouched. This study asked whether human development disparity across the thirty-five districts and cities of Central Java narrowed between 2019 and 2023. Index and poverty figures for all thirty-five jurisdictions were compiled from official statistics reproduced in the Governor's accountability reports. Three complementary instruments were applied: a Klassen typology modified to use index level and index growth, sigma convergence measured by the coefficient of variation, and absolute beta convergence estimated by regressing average growth on the logarithm of the initial index. The provincial index rose by 1.66 points, and every jurisdiction improved, but the absolute range held at 17.04 points and the coefficient of variation fell only from 6.083 to 5.956 per cent. The beta coefficient was negative yet insignificant at the five per cent level, implying a convergence speed of 0.55 per cent per year. Twelve jurisdictions were advanced and fast-growing, seven advanced but slowing, thirteen developing rapidly, and three lagging on both dimensions. Contrary to the prevailing policy narrative, the genuinely stalled jurisdictions were located in the central highlands rather than along the western north coast. The study argues that dispersion indicators belong alongside attainment targets in regional planning documents, and that lagging regions require differentiated rather than uniform treatment.

KEYWORDS: human development index; regional disparity; Klassen typology; convergence; Central Java

ABSTRAK

Dokumen perencanaan provinsi di Indonesia lazim menempatkan Indeks Pembangunan Manusia sebagai sasaran utama, padahal sasaran agregat dapat tercapai tanpa perubahan pada kesenjangan antardaerah penyusunnya. Penelitian ini menguji apakah disparitas pembangunan manusia antara tiga puluh lima kabupaten dan kota di Jawa Tengah menyempit selama 2019–2023. Data indeks dan kemiskinan seluruh daerah dihimpun dari statistik resmi yang dimuat dalam laporan pertanggungjawaban Gubernur. Tiga instrumen saling melengkapi digunakan: tipologi Klassen yang dimodifikasi dengan sumbu tingkat dan pertumbuhan indeks, konvergensi sigma melalui koefisien variasi, serta konvergensi beta absolut melalui regresi rerata pertumbuhan terhadap logaritma indeks awal. Indeks provinsi naik 1,66 poin dan seluruh daerah membaik, tetapi rentang absolut bertahan pada 17,04 poin dan koefisien variasi hanya turun dari 6,083 menjadi 5,956 persen. Koefisien beta bertanda negatif namun tidak signifikan pada taraf lima persen, dengan kecepatan konvergensi 0,55 persen per tahun. Dua belas daerah tergolong maju dan tumbuh cepat, tujuh maju tetapi melambat, tiga belas berkembang cepat, dan tiga tertinggal pada kedua dimensi. Berbeda dengan narasi kebijakan yang berlaku, daerah yang benar-benar tertahan berada di wilayah pegunungan tengah, bukan di pesisir utara bagian barat. Penelitian ini berargumen bahwa indikator sebaran perlu ditempatkan berdampingan dengan sasaran capaian dalam dokumen perencanaan daerah, dan bahwa daerah tertinggal menuntut perlakuan yang dibedakan, bukan seragam.

KATA KUNCI: indeks pembangunan manusia; disparitas regional; tipologi Klassen; konvergensi; Jawa Tengah

INTRODUCTION

The Human Development Index occupies an unusual position in Indonesian subnational governance. It is simultaneously a scholarly construct, a statistical product, and a legally embedded performance target. Provincial and district medium-term development plans are required to state measurable targets, and the index appears in nearly all of them; it is reported annually in the head of region's accountability report, and it informs central assessments of regional administration. Few composite indicators carry this much administrative weight.

That weight creates an interpretive hazard. The index is almost always read at the provincial level, as a single number moving through time. When the provincial figure rises, the increase is reported as collective achievement. Yet an aggregate figure is silent about how progress is distributed among the jurisdictions that compose it. A provincial index can rise because every district advances together, or because already-advanced districts pull further ahead while lagging districts crawl. The two patterns produce a similar headline and demand opposite policy responses: the first justifies continuity, the second demands reallocation.

The distinction matters most where internal heterogeneity is greatest. Central Java comprises thirty-five autonomous districts and cities whose index values in 2023 spanned from below sixty-eight to nearly eighty-five. A gap of that magnitude has been acknowledged in provincial planning documents for years, and is routinely described as a priority. It has rarely been tested, however, whether the gap is actually closing.

The 2019–2023 window is analytically attractive because it brackets the pandemic shock and the recovery that followed. Aggregate shocks are not distributionally neutral; jurisdictions differ in economic structure, fiscal capacity, and service delivery resilience, and therefore absorb shocks unevenly. A period containing such a shock reveals whether disparity widens, holds, or narrows when a system is placed under stress.

This study therefore asks three questions. First, how are the thirty-five jurisdictions distributed when classified simultaneously by index level and index growth? Second, did sigma and beta convergence occur between 2019 and 2023? Third, does the resulting classification align with poverty incidence, the other welfare indicator routinely reported in the same documents?

LITERATURE REVIEW AND CONCEPTUAL FRAMEWORK

Human development as a capability outcome

The conceptual foundation of the index lies in the capability approach, which reframes development as the expansion of the substantive freedoms people enjoy rather than the accumulation of income alone (Sen, 1999). On this view, longevity, knowledge, and command over resources are not instruments for growth but constitutive elements of development itself. Anand and Sen (2000) extend the argument by insisting that human development be assessed as a distributive matter: an aggregate gain that leaves some populations untouched is an incomplete achievement, not merely a smaller one.

This distributive commitment has a direct methodological consequence that is often overlooked in applied regional work. If development is constitutively about the freedoms of persons, then the spatial distribution of attainment is part of what the indicator is supposed to capture, and reporting only a population-weighted or arithmetic mean discards precisely the information the underlying theory treats as essential. The present study takes this proposition as its point of departure.

Two competing accounts of regional trajectories

Regional science offers two rival predictions about what happens to spatial gaps over time. The neoclassical account, following Solow (1956), predicts convergence: diminishing returns to accumulated factors imply that regions starting from a lower base grow faster, so gaps close automatically absent structural impediments. The cumulative causation account, associated with Myrdal (1957), predicts the opposite. Agglomeration economies,

selective migration of skilled labour, and the concentration of public investment generate backwash effects that entrench initial advantage, so gaps persist or widen unless deliberately countered.

Williamson (1965) proposed a reconciliation in the form of an inverted-U trajectory, in which disparity widens during early development and narrows once integration deepens. Which account fits a given setting is an empirical question, and the answer carries a sharp policy implication: under the neoclassical account convergence-oriented intervention is largely redundant, whereas under cumulative causation it is indispensable.

Sigma and beta convergence

The empirical literature operationalises convergence in two distinct ways. Beta convergence denotes the tendency of initially poorer units to grow faster, and is conventionally estimated by regressing average growth on the logarithm of the initial level (Barro & Sala-i-Martin, 1992; Sala-i-Martin, 1996). Sigma convergence denotes a reduction in the dispersion of the distribution over time.

Quah (1993) established that the two are not interchangeable, and that inferring the second from the first reproduces Galton's fallacy. Beta convergence is a necessary but not sufficient condition for sigma convergence, because random disturbances can sustain dispersion even while laggards grow faster on average. This distinction is not merely technical for planning purposes: a province may exhibit statistically valid catch-up dynamics while its observable gap remains stubbornly wide, and only the second is visible to citizens and to legislative oversight.

Applying the framework to human development rather than income introduces a further consideration. The index is a bounded composite normalised to a nought-to-one-hundred scale, and its life expectancy and expected schooling components approach practical saturation in high-attainment jurisdictions. Boundedness mechanically favours convergence, since leaders face shrinking headroom. Neumayer (2003) demonstrated on cross-country data that non-income living-standard indicators converge substantially faster than income precisely for this reason. The corollary is a stricter evidentiary standard: weak convergence on a bounded indicator is a more troubling finding than weak convergence on an unbounded one.

Klassen typology as a diagnostic complement

Aggregate convergence statistics summarise a distribution into a single parameter and therefore cannot identify which units drive the result. The Klassen typology addresses this limitation by classifying each unit on two axes — attainment and growth — relative to a shared benchmark, producing four quadrants that map onto distinct intervention categories. The approach is widely used in Indonesian regional analysis, including in official statistical publications for Central Java (Badan Pusat Statistik Provinsi Jawa Tengah, 2024), though it is conventionally applied to regional gross domestic product per capita rather than to human development.

Empirical evidence from Indonesia

Indonesian evidence on convergence is mixed and scale-dependent. Anwar (2018) analysed human capital across thirty-three provinces and reported declining dispersion together with both absolute and conditional convergence, with poverty and educational infrastructure among the significant conditioning variables. Working at a finer spatial scale, Hendajany et al. (2017) found beta convergence in district-level data but were unable to detect sigma convergence nationally, and identified significant sigma divergence in a number of provinces analysed separately. Their finding is the clearest local demonstration of Quah's warning, and it implies that provincial-level convergence results should not be assumed to hold within provinces.

More recent work has examined the policy levers. Alfons et al. (2024), using provincial panel data for 2017–2023, found that human development and economic expenditure reduced inequality as measured by the Williamson index, while infrastructure expenditure showed no comparable indirect effect. At the district scale, Amalia and Fitriyanto (2022) combined sigma and beta convergence with Klassen classification for newly autonomous regions in Banten, and found persistent disparity alongside a quadrant distribution concentrated in the developing and lagging categories. Their design is the closest methodological precedent for the present study.

Convergence evidence from adjacent literatures

Convergence has been tested on quantities other than income, and two recent studies bear directly on the design used here. Mahdavi and Westerlund (2018) apply sequential unit root testing to subnational tax capacity and tax effort across more than three decades and find no convergence in either, with roughly half of revenue-effort gaps converging only under a broader definition of revenue. Their methodological caution transfers: a panel-wide convergence coefficient can conceal subsets that are converging and subsets that are not, and reporting only the aggregate obscures the distinction.

Van Rompuy (2021), examining thirty economies over sixteen years, finds both autonomously raised subnational revenue and vertical transfers contributing to regional convergence, but with the contribution of transfers diminishing and eventually reversing as dependence on them grows. Siburian (2020), using Indonesian provincial data with a simultaneous-equation design to address endogeneity, finds fiscal decentralisation reducing regional income inequality. Both indicate that convergence in outcomes is conditional on fiscal architecture rather than automatic.

Chalil (2020) supplies the spatial mechanism and its limit. Across Indonesian municipalities over fifteen years, spatial econometric analysis identifies significant spillovers in neighbours' tax rates, spending and service provision, but finds that neighbourhood performance does not significantly affect the electoral response. Interdependence between jurisdictions therefore exists without the accountability channel that would translate it into competitive improvement, which is relevant to any expectation that lagging districts will emulate leading ones.

The health dimension and where it is produced

Because life expectancy carries substantial weight in the composite index, the determinants of health outcomes bear on convergence in the index as a whole. Agustina et al. (2019) record the national trajectory against which provincial performance should be read: life expectancy rising from 48 to 69 years, infant mortality falling from 76 to 23 per thousand, and maternal mortality stagnant at approximately 300 per hundred thousand, with primary health centres expanded to 20,900 and national insurance reaching 203 million people.

Two studies show the health effects of that expansion distributed unevenly across space in ways that would drive convergence. Anindya et al. (2020), using propensity score matching across 5,429 women with recent live births, find insurance associated with increases of 7.4 percentage points in antenatal attendance, 10.2 points in facility delivery and 4.0 points in postnatal care, with effects substantially larger among poorer households and in less developed regions. Fattah et al. (2023) find catastrophic health spending falling from 7.9 to 4.4 per cent of households in a single year, with the rural decline steeper than the urban one.

Maulana et al. (2022) find insured households recording a 39 per cent reduction in out-of-pocket payment with a pro-poor gradient and the largest regional effect, at 48 per cent, in the least developed part of the country. Kosen (2022), however, records the supply-side constraint that bounds these gains: approximately 60 per cent of some 10,000 public primary healthcare facilities lacked a general practitioner. Where the health component of the index depends on services a district cannot staff, convergence in that component has a ceiling that is not fiscal.

Sparrow et al. (2017) supply the subnational precedent. Examining district health financing schemes operating before national integration, they find outpatient visits rising by about eight per cent above baseline, concentrated in the middle quintiles and in rural areas, with no significant inpatient effect and no meaningful reduction in out-of-pocket payment, and better performance where schemes contracted district rather than provincial hospitals. Local delivery capacity, again, determined what local financing achieved.

Two studies address the administrative capacity underlying district performance generally. Vidyattama et al. (2022) find human capacity and administrative problems slowing budget development and enactment across districts. Lewis (2018) finds directly elected local executives raising no more own-source revenue than indirectly elected ones while spending less and more efficiently, which indicates that variation in district outcomes is not primarily driven by electoral incentive.

Research gap and propositions

Three gaps emerge from this literature. First, convergence analysis in Indonesia has concentrated on income measures and on the provincial scale, whereas the indicator that provincial planners are formally accountable for is the human development index measured at district scale. Second, where the Klassen typology has been applied it has generally been applied to gross regional product, so its classifications speak to economic growth targets rather than to human development targets. Third, the two families of instruments are rarely used on identical data, leaving descriptive classification and inferential convergence testing unreconciled.

This study addresses all three by applying a human-development-based Klassen typology and both convergence tests to the same district-level panel. Two propositions follow from the framework. If the neoclassical account holds and the boundedness effect operates as Neumayer (2003) describes, convergence should be brisk and both tests should agree. If cumulative causation dominates, beta convergence may be weak or absent and sigma convergence should stall. The evidence reported below falls between these poles, and the shape of that intermediate result is the substantive contribution of the paper.

METHOD

The study is quantitative, combining descriptive classification with inferential convergence testing. The unit of analysis is the autonomous district or city, and the population comprises all thirty-five jurisdictions in Central Java Province. No sampling was undertaken because the full population was analysed.

Data and provenance

Human Development Index values and the percentage of population below the poverty line were compiled for all thirty-five jurisdictions for 2019 through 2023. Both series originate from Statistics Indonesia and were obtained from the indicator annexes of the Central Java Governor's accountability reports for fiscal years 2022 and 2023. All data are public: Statistics Indonesia releases basic statistics openly, and accountability reports are public information under Law 14 of 2008. No personal data and no restricted material were used.

Modified Klassen typology

The conventional typology maps regions by gross regional product per capita and its growth rate. Here the attainment axis is the 2023 index value and the growth axis is the compound annual growth rate of the index over 2019–2023, computed as the fourth root of the ratio of the 2023 to the 2019 index, less one. The quadrant benchmarks are the corresponding provincial values, namely an index of 73.39 and growth of 0.57 per cent per year. The four quadrants are labelled advanced and fast-growing, advanced but slowing, developing rapidly, and relatively lagging.

Convergence testing

Sigma convergence was measured by the coefficient of variation of the index across jurisdictions, computed separately for each year. A declining series indicates narrowing relative dispersion. The measure is unweighted by population because population figures were not part of the indicator annex used; the implications of this limitation are addressed in the discussion.

Absolute beta convergence was estimated by ordinary least squares, regressing the compound annual growth rate on the natural logarithm of the 2019 index. A negative and significant slope indicates that lower-attainment jurisdictions grew faster. The convergence speed was derived from the slope and the half-life computed as the natural logarithm of two divided by that speed. Significance was assessed with a t-statistic on thirty-three degrees of freedom.

Cross-validation and reproducibility

The association between the 2023 index and the 2023 poverty rate was tested with the Pearson correlation coefficient, and the change in poverty incidence between 2019 and 2023 was computed for each jurisdiction. All computations were performed with open-source numerical software and are fully deterministic, so the entire analysis can be reproduced from the same public sources.

RESULTS AND DISCUSSION

Aggregate gain alongside an unchanged range

The provincial index rose from 71.73 in 2019 to 73.39 in 2023, a gain of 1.66 points. Every one of the thirty-five jurisdictions recorded an increase; none declined on net. On the aggregate reading, the period was a uniform success.

The picture changes once attention moves from central tendency to dispersion. In 2019 the distance between the highest and lowest jurisdiction was 17.07 points. In 2023 it was 17.04 points. After five years the absolute distance between the two tails of the distribution had not moved. The highest value in 2023 belonged to Kota Salatiga at 84.99 and the lowest to Kabupaten Brebes at 67.95; both occupied the same positions at the start of the period.

Table 1. Human development attainment and inter-regional dispersion, 2019–2023

Source: computed from Statistics Indonesia data reproduced in the indicator annexes of the Central Java Governor's accountability reports.

Klassen classification

Mapping the thirty-five jurisdictions onto the two axes produces an uneven distribution. Twelve are advanced and fast-growing, seven are advanced but slowing, thirteen are developing rapidly, and only three lag on both dimensions simultaneously.

Figure 1. Klassen typology of thirty-five districts and cities in Central Java by 2023 index level and 2019–2023 average growth (source: authors' computation)

Two features deserve emphasis. First, the developing-rapidly quadrant is the largest. Thirteen jurisdictions below the provincial benchmark nonetheless grew faster than the province. The group includes Kabupaten Brebes and Kabupaten Pemalang — the two lowest-attainment jurisdictions in the province — growing at 0.68 and 0.64 per cent per year respectively against a provincial rate of 0.57 per cent. Their direction of travel is correct.

Second, the advanced-but-slowing quadrant contains several of the highest-attainment jurisdictions. Kota Semarang, Kota Surakarta, and Kota Salatiga, all above eighty-three index points, grew below the provincial rate. Kota Semarang grew at 0.37 per cent and Kabupaten Semarang at 0.33 per cent, the slowest in the province. This pattern is consistent with the boundedness effect discussed above: as attainment rises, additional points become progressively harder to obtain because the expected schooling and life expectancy components approach saturation. Interpreted through Neumayer's (2003) argument, such slowing is an artefact of the measurement scale rather than evidence of administrative failure.

Table 2. Distribution of jurisdictions by Klassen quadrant

Source: authors' computation. Benchmarks are the provincial index of 73.39 and provincial growth of 0.57 per cent per year.

Table 3. Index, growth, quadrant, and poverty incidence for thirty-five districts and cities

Source: computed from Statistics Indonesia data in the Governor's accountability report annexes. Quadrant I = advanced and fast-growing; II = advanced but slowing; III = developing rapidly; IV = relatively lagging.

The relatively lagging quadrant contains only Kabupaten Purbalingga, Kabupaten Wonosobo, and Kabupaten Magelang. These three fall below the provincial benchmark on attainment and on growth simultaneously, and are therefore the jurisdictions whose position will not improve by riding the provincial trend.

Sigma convergence

The coefficient of variation moved from 6.083 per cent in 2019 to 5.956 per cent in 2023, a decline of 0.127 percentage points over five years. The movement was not monotonic: dispersion increased in 2020 and 2021 before falling in the final two years.

Figure 2. Coefficient of variation of the human development index across districts and cities, 2019–2023 (source: authors' computation)

The rise-then-fall pattern is legible as the imprint of the pandemic. Dispersion widened in 2020 and 2021, indicating that lower-attainment jurisdictions absorbed the shock disproportionately, and narrowed only during recovery. The five-year decline is therefore substantially a return to the starting position rather than newly generated equalisation. This is precisely the distributional non-neutrality that the cumulative causation tradition anticipates under aggregate stress.

Beta convergence

Regressing average growth on the logarithm of the initial index yields a slope of -0.00540 with a standard error of 0.00303 and a t-statistic of -1.779. The two-tailed p-value is 0.084, so the coefficient is not significant at the five per cent level although it is significant at ten per cent. The coefficient of determination is 0.088, meaning that initial attainment explains less than a tenth of the variation in growth rates across jurisdictions.

Figure 3. Relationship between initial index in 2019 and average growth over 2019–2023 (source: authors' computation)

The negative sign accords with the convergence hypothesis, but the magnitude is small and the uncertainty large. The implied convergence speed is 0.55 per cent per year, corresponding to a half-life of approximately 127 years. The half-life should be read as an illustration of slowness rather than a forecast: at the pace observed over 2019–2023, half of the existing gap would close over a horizon far exceeding any regional planning cycle.

Table 4. Absolute beta convergence estimates

Source: authors' computation. Model: $g = \alpha + \beta \ln(\text{Index}_{2019}) + \epsilon$, estimated by ordinary least squares.

Taken together, the two convergence results are mutually consistent and jointly informative. Dispersion narrowed, but very slowly, and the statistical evidence for the mechanism producing that narrowing is weak. This resolves the apparent paradox of the first subsection: all jurisdictions advanced while the range held because progress was parallel. Growth rates were closely bunched across the province, so relative positions barely shifted.

The result also refines the Indonesian evidence base. Hendajany et al. (2017) found beta convergence without sigma convergence at national district level. Central Java over 2019–2023 presents a weaker version of the same disjunction: beta convergence is directionally present but statistically fragile, and sigma convergence is technically present but economically negligible. Given that the indicator is bounded and should therefore converge readily (Neumayer, 2003), this is a conservative rather than a reassuring finding.

Cross-validation against poverty incidence

The correlation between the 2023 index and the 2023 poverty rate is -0.709, strong and negative. Higher-attainment jurisdictions consistently record lower poverty, which supports the validity of the quadrant classification: jurisdictions in the developing-rapidly and relatively lagging quadrants are generally also those with the province's highest poverty rates.

Figure 4. Human development index and poverty incidence, 2023 (source: authors' computation)

A divergence between the two indicators nevertheless deserves attention. While all thirty-five jurisdictions raised their index, only nineteen reduced poverty incidence between 2019 and 2023; sixteen recorded increases. Provincial poverty barely moved, from 10.80 to 10.77 per cent. Improvements in the education, health, and living-standard components captured by the composite did not translate automatically into fewer poor households. This asymmetry is consistent with Anand and Sen's (2000) insistence that aggregate human development gains and distributive outcomes are analytically separate achievements.

The spatial structure of the gap

Quadrant membership is not spatially random. Grouping the thirty-five jurisdictions by geographic proximity reveals three contrasting patterns. The western north-coast group — Brebes, Tegal, Pemalang, Batang, Pekalongan, Kota Tegal, and Kota Pekalongan — averages 71.65 index points, below the provincial benchmark, but grows at 0.66 per cent per year, the fastest of the three groups. This group is collectively on a catch-up trajectory.

The Solo Raya group — Klaten, Sukoharjo, Karanganyar, Sragen, Wonogiri, Boyolali, and Kota Surakarta — shows the inverse: a mean index of 77.08 well above the benchmark but growth of 0.59 per cent, only marginally above the province. The central highlands group — Wonosobo, Banjarnegara, Purbalingga, Temanggung, and Magelang — combines the least favourable values on both axes, averaging 70.31 index points and 0.54 per cent growth, with mean poverty of 13.14 per cent against roughly ten per cent in the other two groups. All three jurisdictions in the lagging quadrant belong to this group.

Table 5. Comparison of attainment across regional groups, 2023

Source: authors' computation. Regional groupings are analytical, based on geographic proximity and shared territorial characteristics, and do not correspond to formal administrative divisions.

This reframes the policy problem. Human development disparity in Central Java is customarily narrated as a western north-coast problem, because the lowest-attainment jurisdictions are located there. The two-dimensional analysis shows that those jurisdictions are moving upward faster than the province. The genuinely stalled jurisdictions lie in the central highlands, where attainment is not the province's worst but growth is the slowest and poverty the highest. Priorities derived from attainment levels alone would systematically overlook this second group — a concrete instance of the diagnostic value that Klassen classification adds to aggregate convergence statistics.

Why convergence is slow

Three mechanisms can be advanced from the observed patterns. The first is the boundedness effect. High-attainment cities do slow, which arithmetically should accelerate convergence by compressing the distribution from above; the deceleration is simply not large enough to offset weak growth in the central highlands.

The second is the bunching of growth rates. Across all thirty-five jurisdictions, growth ranges only from 0.33 to 0.78 per cent per year. A spread of 0.45 percentage points indicates that jurisdictions move at closely similar speeds regardless of starting position, and the low coefficient of determination in the beta regression is the statistical expression of that fact. Comparing the six cities with the twenty-nine districts makes the point concrete: districts average 0.62 per cent growth against 0.59 per cent for cities, an advantage of just three hundredths of a percentage point per year against an index gap of more than eight points.

The third is structural and cannot be tested with the present data, but follows from the construction of the index. Its slowest-moving components — life expectancy and mean years of schooling among adults — respond to cohort replacement rather than to annual budget cycles. Education spending today is reflected in adult mean years of schooling only decades later. Deficits rooted in such components are inherently slow to reverse whatever the budgetary effort, which is consistent with Alfons et al.'s (2024) finding that expenditure composition matters for inequality outcomes but operates through indirect and lagged channels.

Implications for regional planning

The principal implication is that a provincial index target, as conventionally written into planning documents, is inadequate as an instrument for governing equity. Such a target can be fully met without any lagging jurisdiction closing its gap, because parallel improvement across all jurisdictions suffices.

Planning documents should therefore carry dispersion indicators alongside attainment indicators. Two candidates are readily available: the range in index points between the highest and lowest jurisdiction, and the coefficient of variation. Both are computable from series already annexed to annual accountability reports, so adding them imposes no new data collection burden. Setting an explicit target — for instance a one-point reduction in the range over a five-year planning period — would force planners to distinguish parallel improvement from

genuine equalisation, and would make equity progress visible in annual evaluation rather than hidden behind an average.

A second implication concerns differentiated treatment. The quadrant classification demonstrates that lagging jurisdictions are not a homogeneous group. The thirteen in the developing-rapidly quadrant are already moving in the right direction and principally require continuity of support. The three in the lagging quadrant face structural constraints requiring separate diagnosis, since their position is not improving even as the provincial trend improves. Uniform treatment of both groups would waste resources on the first and under-serve the second.

A third implication concerns high-performing jurisdictions. Deceleration in high-attainment cities is an expected property of a bounded index and should not be read as declining administrative performance. For these jurisdictions the index has lost much of its discriminatory power as a headline performance indicator, and evaluation would be better served by more sensitive measures such as service quality metrics or within-jurisdiction inequality.

Limitations

Four limitations qualify these findings. First, the coefficient of variation used here is unweighted by population, so small and large jurisdictions carry equal weight in the dispersion measure; a population-weighted measure such as the Williamson index, as used by Alfons et al. (2024), might yield different magnitudes even if the direction proved robust. Second, a five-year window is short for convergence testing and encompasses an atypical shock, so the beta estimate should be treated as indicative rather than as a structural parameter. Third, the study uses the composite index without decomposing it into education, health, and expenditure components; such decomposition would identify which dimension restrains convergence and is the most direct extension of this work. Fourth, the regional groupings in Table 5 are analytical rather than administrative, so between-group comparisons indicate spatial patterns rather than formal classifications.

CONCLUSION

This study asked whether human development disparity across Central Java narrowed between 2019 and 2023. It did narrow, but too slowly to be meaningful for planning purposes. All thirty-five jurisdictions raised their index, yet the distance between the highest and lowest was effectively unchanged, relative dispersion fell only marginally, and the evidence for beta convergence did not reach conventional significance. Provincial progress was parallel rather than equalising.

The Klassen classification locates the equity problem in a much smaller group than is usually assumed. Most low-attainment jurisdictions are in fact growing faster than the province; only three lag on attainment and growth simultaneously, and all three lie in the central highlands rather than on the western north coast where policy attention has conventionally been directed. Cross-validation against poverty confirms a strong association between the two indicators while showing that rising human development does not automatically reduce poverty incidence.

Theoretically, the results sit between the neoclassical and cumulative causation accounts. Catch-up dynamics are present in direction but too weak to be statistically convincing, and dispersion widened under pandemic stress before recovering. Because the index is bounded and should converge readily, this constitutes weaker evidence of automatic equalisation than the same result would represent for an unbounded indicator, and it strengthens the case for deliberate convergence-oriented intervention rather than reliance on trend.

Practically, regional planning documents should pair dispersion indicators with attainment targets and should differentiate between jurisdictions that are already catching up and those that are structurally stalled. The limitations noted above — unweighted dispersion measurement, a short and shock-affected observation window, and use of the composite index without decomposition — define the most promising direction for further research: component-level convergence analysis over a longer horizon, ideally with population-weighted dispersion measures.

DECLARATIONS

Author contributions (CRediT)

Conceptualisation: Author 1. Methodology: Author 1. Formal analysis and investigation: Author 1. Writing — original draft preparation: Author 1. Writing — review and editing: Author 1. Supervision: Author 1. All named authors have read and approved the final manuscript and accept responsibility for its content.

Conflict of interest

The authors declare that they have no financial or non-financial conflict of interest in relation to the subject matter of this article. No author holds a position in, or receives support from, any organisation examined or evaluated in this study.

Data availability

This study generated no primary data. It draws exclusively on published peer-reviewed literature, publicly available legal instruments and publicly available official statistics, all of which are identified in the text and listed in the references. No confidential administrative record, individual taxpayer record, permit file or personal datum was accessed, and no individual person or business is identified. Every quantity reported was traced to a single identified public source and can be verified by any reader from that source.

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Declaration on the use of artificial intelligence

In accordance with COPE, ICMJE and WAME positions, and with the RCP AI Use Declaration requirement, the authors disclose that generative artificial intelligence tools were used in preparing this manuscript, specifically to assist with literature identification, synthesis of the reviewed sources, and language editing of the draft. Artificial intelligence was not used to generate data, results or citations. Every reference in this article was verified by the authors against the publisher's own record, a digital object identifier record or an indexing database record before inclusion, and sources whose bibliographic details or indexing status could not be confirmed were excluded. No artificial intelligence tool is listed as an author. The authors take full responsibility for the accuracy, integrity and originality of the entire content of this article.

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