

HUMAN CAPITAL AND LABOUR PRODUCTIVITY IN RIAU PROVINCE: A DESCRIPTIVE-COMPARATIVE ANALYSIS USING 2023–2026 NATIONAL LABOUR FORCE SURVEY AND HUMAN DEVELOPMENT INDEX DATA

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Abstract:

Purpose:

This study examines human capital and its relationship with labour productivity in Riau Province using a descriptive-comparative quantitative approach and 2023–2026 secondary data.

Methodology:

Secondary data from Statistics Indonesia (Sakernas, HDI and GRDP), Bank Indonesia and the Ministry of Finance are analysed using trends, comparisons, relative productivity indices and approximate output-per-worker estimates.

Findings:

Riau's 2025 HDI was 76.31 and mean years of schooling were 9.55. Informal employment accounted for 52.00%, agriculture employed 34.40% of workers (RPI 0.81), and female labour force participation was 47.68%. Estimated annual output per worker was approximately IDR 186 million at 2010 constant prices.

Implication:

Policies should improve access to secondary education, align vocational training with downstream industries, expand women's economic participation, and support employment formalization.

INTRODUCTION

Human resource quality is widely recognized as a key determinant of productivity and long-term economic growth. Schultz (1961) considered education, health, and training investments that enhance human productive capacity, while Becker (1964) systematically conceptualized these investments within human capital theory. In the growth literature, human capital accumulation is regarded as a source of endogenous growth (Lucas, 1988; Romer, 1990) and has demonstrated empirical explanatory power for cross-country income differences (Mankiw, Romer, & Weil, 1992). For resource-dependent regional economies, the central question is whether natural resource wealth is accompanied by improvements in workforce quality sufficient to sustain productivity when commodity price cycles reverse.

Riau Province provides a relevant case. In the fourth quarter of 2025, Riau ranked sixth in Indonesia in gross regional domestic product (GRDP) at current prices and second among provinces outside Java, contributing 5.08% of national GDP (Bank Indonesia, 2026). Its economy is supported by manufacturing (30.45%), agriculture, forestry, and fisheries (27.96%), and mining (15.03%) (Riau Regional Office of the Directorate General of Treasury, 2026). Economic growth fluctuated from 3.52% in 2024 to 4.79% in 2025; Bank Indonesia (2026) attributed part of this variation to changes in oil palm fresh fruit bunch (FFB) prices.

Human development indicators, however, present a more moderate picture. Riau's 2025 Human Development Index (HDI) of 76.31 placed it in the "high" category and tenth among Indonesia's ten highest-HDI provinces, whereas the Riau Islands Province reached 80.53 and entered the "very high" category (CNBC Indonesia, 2025; GoodStats, 2025). More than half of Riau's workforce remained informally employed (52.00% in August 2025), and 34.40% worked in agriculture (Metro Riau, 2025). The female labour force participation rate (LFPR) was only 47.68%. This contrast between a large economy and the suboptimal quality and utilization of labour constitutes the research problem.

This study aims to (1) describe Riau Province's human capital stock and disparities across districts and municipalities; (2) examine workforce utilization through unemployment, participation, and informality indicators; (3) estimate and interpret aggregate and sectoral labour productivity; and (4) formulate policy implications. The contribution of this article is to integrate education, employment, and output indicators into a single analytical framework based on the latest available official data for Riau.

Human Capital Theory

Human capital theory holds that individuals and societies can increase productivity by investing in education, training, and health (Schultz, 1961; Becker, 1964). Becker distinguished general training, whose benefits are transferable across firms, from firm-specific training, whose value is limited to a particular employer, resulting in different financing implications. Mincer (1974) operationalized this concept through an earnings equation relating wages to years of schooling and work experience, which subsequently formed the basis for estimating returns to schooling.

Human Capital, Technology, and Growth

Lucas (1988) identified human capital accumulation as an engine of growth, while Romer (1990) emphasized knowledge and innovation, which require an educated workforce. Nelson and Phelps (1966) showed that education accelerates technological diffusion; regions with low educational attainment therefore tend to lag in adopting new technologies. Mankiw et al. (1992) extended the Solow model to include human capital and found that the model explained much of the variation in income across countries. Hanushek and Woessmann (2008) further argued that the quality of cognitive skills, rather than merely years spent in school, drives growth. This distinction matters because widely available indicators, such as mean years of schooling, capture educational quantity rather than quality.

Labour Market Dualism and Resource-Based Economies

Lewis (1954) described a dual economy in which labour remains in a low-productivity traditional sector before moving into a modern sector. This framework is relevant to the concentration of employment in agriculture and informal work. Sachs and Warner (1995) showed that countries heavily dependent on primary resource exports tend to grow more slowly; one frequently proposed mechanism is the weak incentive to invest in human capabilities when income can be generated from commodities. In this article, that mechanism is treated as an interpretive hypothesis rather than an empirically tested finding.

Analytical Framework and Propositions

The analysis encompasses three dimensions: (a) human capital stock (HDI and mean years of schooling); (b) workforce utilization (open unemployment rate, labour force participation rate, and informality); and (c) outcomes in the form of productivity (output per worker). The literature review yields three propositions evaluated indicatively: P1, low educational attainment limits a region's capacity to absorb technology and high-value-added employment; P2, the concentration of workers in agriculture and informal employment constrains aggregate productivity; and P3, low female labour force participation reflects the underutilization of human capital.

METHODS

This study employs a descriptive-comparative quantitative design based on secondary data. The unit of analysis is Riau Province, with Indonesia, the Riau Islands Province (for HDI), and Riau's districts and municipalities (for mean years of schooling) serving as comparators. The data cover February 2023 to February 2026, subject to publication availability.

The principal sources are the National Labour Force Survey (Sakernas), HDI, and GRDP statistics published by Statistics Indonesia (BPS); Bank Indonesia's Riau Provincial Economic Report; and state budget performance releases issued by the Riau Regional Office of the Directorate General of Treasury. Some Sakernas figures for Riau and district-level mean years of schooling were obtained from news reports quoting official statements by the Head of BPS Riau and from Katadata Databoks, which identifies BPS as its primary source. The authors recommend verifying these figures against official BPS publications before manuscript submission.

Analytical techniques include (a) trend analysis and comparisons across periods and regions; (b) disparity ratios and differences; (c) a sectoral relative productivity index (RPI), defined as the ratio of a sector's share of GRDP to its share of employment; and (d) estimated output per worker. Formally:

$$LP = \text{GRDP at 2010 constant prices} / L \quad \text{RPI}(s) = (Y(s)/Y) / (L(s)/L)$$

where LP denotes aggregate labour productivity, L is the number of employed persons, Y(s) is value added in sector s, and Y is total GRDP. An RPI below one indicates that a sector absorbs a greater share of workers than its contribution to output. Because GRDP data are quarterly whereas Sakernas data are semiannual, LP is calculated by dividing GRDP at 2010 constant prices for the first half of 2025 (the first and second quarters combined) by

average employment in February and August 2025, and then multiplying by two to annualize the estimate. This is an approximate magnitude estimate, not an official statistic.

RESULTS AND DISCUSSION

Human Capital Stock: Average Achievements Concealing Disparities

Table 1 shows that Riau's average human capital indicators slightly outperform the national figures. Riau's 2025 HDI of 76.31 exceeded Indonesia's 75.90 (BPS, 2025a; CNBC Indonesia, 2025; GoodStats, 2025), while mean years of schooling among residents aged 25 and older reached 9.55 years, 0.48 years above the national average of 9.07 (Databoks Katadata, 2026a). Nevertheless, Riau's HDI remained 4.22 points below that of the Riau Islands Province (80.53), a neighbouring province with a smaller economy but very high human development. Thus, Riau's economic ranking (sixth in GRDP) was higher than its human development ranking (tenth among the highest-HDI provinces).

Table 1. Selected human capital indicators for Riau and comparator regions, 2025

Indicator	Riau	Comparator	Difference / ratio
HDI (index)	76.31	Indonesia 75.90	+0.41 points
HDI (index)	76.31	Riau Islands 80.53	−4.22 points
Mean years of schooling (years)	9.55	Indonesia 9.07	+0.48 years
Highest vs. lowest district/municipal mean years of schooling	12.08 (Pekanbaru)	7.49 (Indragiri Hilir)	4.59 years; ratio 1.61

Source: CNBC Indonesia (2025); GoodStats (2025); Databoks Katadata (2026a, 2026b, 2026c, 2026d), based on BPS. Differences and ratios were calculated by the authors.

The provincial average conceals substantial within-province disparities. Figure 1 shows that Pekanbaru's mean years of schooling (12.08 years) corresponds approximately to completion of upper secondary education, whereas Indragiri Hilir's figure (7.49 years) falls short of completing lower secondary education. The ratio is 1.61 and the difference is 4.59 years, far exceeding Riau's 0.48-year advantage over the national average. Three observed districts—Indragiri Hulu (8.62 years), Kepulauan Meranti (8.13 years), and Indragiri Hilir—fall below both provincial and national averages. Kepulauan Meranti and Indragiri Hilir rank eleventh and twelfth, respectively, among Riau's 12 districts and municipalities (Databoks Katadata, 2026b, 2026c).

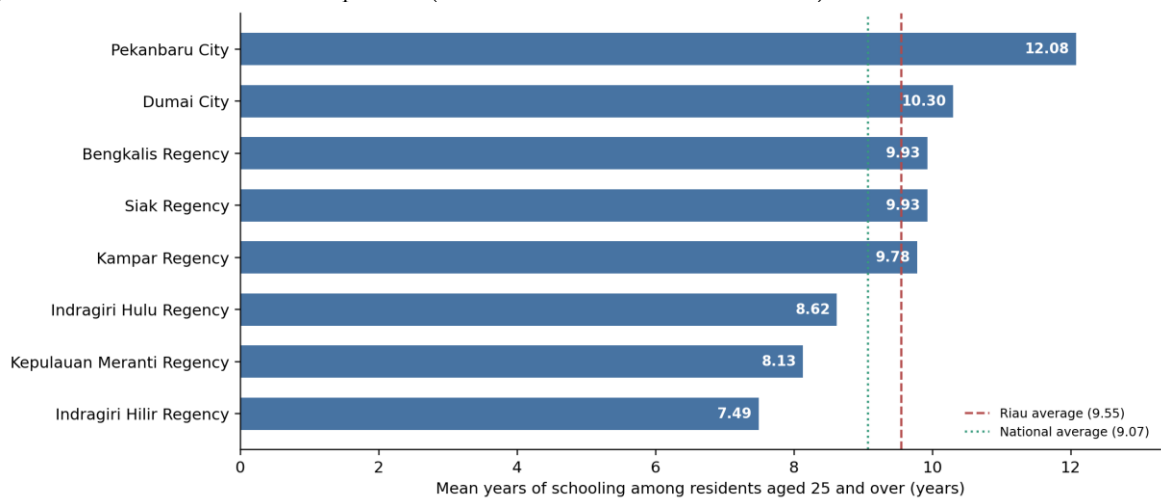


Figure 1. Mean years of schooling in selected districts and municipalities of Riau Province, 2025

Source: Databoks Katadata (2026a, 2026b, 2026c, 2026d), based on BPS; authors' calculations. Data were accessible for only eight districts and municipalities.

Two observations merit attention. First, the provincial mean is partly shaped by a compositional effect: Pekanbaru, the main service and education centre, has a large population and relatively high educational attainment, so the provincial figure of 9.55 years masks the circumstances of coastal and island districts. Second, a mean of

9.55 years indicates that Riau's adult population has completed approximately grade nine, or nine years of basic education. In an economy where manufacturing accounts for 30.45% of GRDP, such educational attainment may be insufficient to support a shift towards higher-value-added activities. This inference is indicative and consistent with P1, but remains untested because district-level productivity data were unavailable. The coastal and archipelagic geography of Indragiri Hilir and Kepulauan Meranti may increase education access costs; this hypothesis requires further investigation.

Workforce Utilization: Low Unemployment but Limited Job Quality

Table 2 indicates that Riau's open unemployment rate remained relatively stable at 4.1–4.3% during 2023–2026. In February 2025, unemployment increased by 0.27 percentage points from February 2024 to 4.12%, while LFPR decreased by 1.07 points to 64.68%. The Head of BPS Riau interpreted the declining LFPR as suggesting that some working-age residents chose not to enter the labour market, for example because they were studying or engaged in household responsibilities (Bisnis.com, 2025). By August 2025, LFPR had recovered to 66.55% and the labour force increased by 69,410 people to 3.35 million, although unemployment rose slightly to 4.16% (Metro Riau, 2025). The February 2026 figure was 4.09% (Tribunpekanbaru.com, 2026), placing Riau twentieth nationally (Databoks Katadata, 2026e).

Table 2. Labour market indicators in Riau Province, 2023–2026 (%)

Sakernas period	Unemployment rate	LFPR	Informal workers	Source
February 2023	4.25	65.18	n.a.	BPS Riau (2024)
August 2023	4.23	64.45	n.a.	BPS Riau (2024)
February 2025	4.12	64.68	52.79	Bisnis.com (2025); Cakaplah (2025)
August 2025	4.16	66.55	52.00	Metro Riau (2025)
February 2026	4.09	n.a.	n.a.	Tribunpekanbaru.com (2026)

Note: n.a. indicates figures not obtained by the authors from the sources consulted. Complete data for 2024 were not compiled in this table.

Table 3 compares Riau with national labour market indicators. Riau's unemployment rate was lower than the national rate: 4.16% versus 4.85% in August 2025 (BPS, 2025b), and 4.09% versus 4.68% in February 2026 (CNN Indonesia, 2026). The informal employment share in Riau (52.00%) was also below the estimated national share of 57.80%, calculated from the national formal employment share of 42.20% (InfoPublik, 2025). Thus, Riau performed relatively better on these two measures. Nevertheless, informal employment still accounted for over half of all workers, declining by only 1.93 percentage points over one year (Metro Riau, 2025). Informal employment typically involves uncertain earnings and limited labour protection, as noted by BPS Riau (Cakaplah, 2025); consequently, low unemployment does not necessarily imply good job quality.

Table 3. Comparison of labour market indicators in Riau and Indonesia

Indicator	Period	Riau	Indonesia	Difference (points)
Unemployment rate (%)	Aug 2025	4.16	4.85	−0.69
Unemployment rate (%)	Feb 2026	4.09	4.68	−0.59
Total LFPR (%)	Aug 2025	66.55	70.59	−4.04
Informal workers (%)	Aug 2025	52.00	57.80*	−5.80
Male LFPR (%)	Aug 2025 / Feb 2026**	84.68	84.57	+0.11
Female LFPR (%)	Aug 2025 / Feb 2026**	47.68	56.41	−8.73

Source: BPS (2025b); CNN Indonesia (2026); InfoPublik (2025); Metro Riau (2025); authors' calculations. The national informal employment share equals 100 minus the national formal employment share (42.20%). *Riau data from August 2025 are compared with national data from February 2026; the periods are not identical, so the comparison is indicative.

The most striking finding in Table 3 concerns gender. Riau's male LFPR (84.68%) was nearly identical to the national rate, while its female LFPR (47.68%) was 8.73 percentage points below the national rate. The overall participation gap of 4.04 points is largely associated with women's labour force participation. Within Riau, the gap between male and female participation was 37.00 points. From Becker's (1964) perspective, investment in women's

education that is not subsequently utilized in the labour market means that some human capital does not contribute to measured economic productivity. This finding is consistent with P3, although non-participation may be voluntary and the available data do not identify the underlying reasons.

Another dimension concerns the relationship between education and unemployment at the district level. Bengkalis recorded Riau's highest unemployment rate, at 5.88% in the 2024 data update (Tribunpekanbaru.com, 2026), although it had the third-highest mean years of schooling in the province (9.93 years in 2025). The coexistence of relatively high schooling and unemployment suggests that educational duration alone is insufficient; skills relevance and regional labour demand also matter. Possible explanations include skills mismatch or local employment sensitivity to sector-specific cycles, but these cannot be established using aggregate data. Consistently, BPS Riau highlighted unequal employment opportunities for young labour force entrants and the growing number of tertiary graduates (Bisnis.com, 2025), aligning with Hanushek and Woessmann's (2008) emphasis on skill quality over educational quantity.

Economic Structure and Labour Productivity

Table 4 summarizes output and sectoral structure. GRDP at 2010 constant prices was IDR 145.34 trillion in the first quarter of 2025 (Koran Jakarta, 2025) and IDR 147.55 trillion in the second quarter (detik, 2025), yielding IDR 292.89 trillion for the first half of 2025. Employment in February 2025 reached 3.09 million people (Bisnis.com, 2025). August 2025 employment was estimated by the authors at approximately 3.21 million, calculated as the 3.35-million labour force multiplied by one minus the 4.16% unemployment rate. Average employment across the two periods was 3.15 million.

Table 4. Output, employment absorption, and estimated productivity in Riau Province, 2025

Component	Value	Notes
GRDP at 2010 constant prices, Q1 2025	IDR 145.34 trillion	BPS (via Koran Jakarta)
GRDP at 2010 constant prices, Q2 2025	IDR 147.55 trillion	BPS (via detik)
GRDP at 2010 constant prices, H1 2025	IDR 292.89 trillion	Authors' calculations
Employed persons, February 2025	3.09 million	BPS Riau (via Bisnis.com)
Employed persons, August 2025	≈ 3.21 million	Authors' calculations
Output per worker per half-year	≈ IDR 93 million	Approximate estimate
Annualized output per worker	≈ IDR 186 million	Approximate estimate
Agricultural share of GRDP / employment	27.96% / 34.40%	DJPb Riau; Metro Riau
Agricultural RPI	0.81	Authors' calculations
Non-agricultural RPI (average)	≈ 1.10	Authors' calculations

Source: Koran Jakarta (2025); detik (2025); Bisnis.com (2025); Metro Riau (2025); Riau Regional Office of the Directorate General of Treasury (2026); authors' calculations. The GRDP share refers to the fourth quarter of 2025, whereas the employment share refers to August 2025; thus, the RPI is an approximation.

Applying the method described in Section 3, output per worker in the first half of 2025 was IDR 292.89 trillion divided by 3.15 million workers, or approximately IDR 93 million; the annualized estimate is roughly IDR 186 million per worker at 2010 constant prices. This figure should be interpreted as an order-of-magnitude estimate. It has not been benchmarked against other provinces, and the capital-intensive mining sector raises average value added, making the estimate unrepresentative of the productivity of a typical worker.

Sectoral analysis provides further insight. Agriculture employed 34.40% of workers (Metro Riau, 2025) but contributed only 27.96% of GRDP (Riau Regional Office of the Directorate General of Treasury, 2026), producing an RPI of approximately 0.81 (27.96/34.40). The remaining 65.60% of workers outside agriculture generated 72.04% of output, implying a mean RPI of approximately 1.10. Average productivity outside agriculture was therefore about 35% higher than in agriculture (1.10/0.81). This pattern aligns with Lewis (1954) and indicatively supports P2: more than one-third of workers remain in a below-average-productivity sector, so shifts towards higher-value-added activities could raise aggregate productivity. Such movement requires skills demanded by receiving sectors, directly connecting the finding to the human capital stock discussed in Section 4.1.

Mining contributed 15.03% of GRDP (Riau Regional Office of the Directorate General of Treasury, 2026). Mining is generally capital intensive; its substantial contribution to output is therefore not matched by employment

absorption of the same magnitude. Consequently, GRDP growth driven by mining does not necessarily create enough jobs for an expanding labour force.

Commodity exposure is also reflected in price dynamics. Bank Indonesia (2026) reported that year-on-year FFB price growth was 15.89% in the third quarter of 2025 but slowed to 0.23% in the fourth quarter, partly accounting for weaker economic growth at year-end. Bank Indonesia (2025) had also linked stronger household consumption in the third quarter of 2025 to incomes supported by crude palm oil and FFB prices. If growth is driven primarily by prices rather than improvements in skills and technology, welfare gains may be cyclical rather than a foundation for sustainable productivity. This argument is consistent with Sachs and Warner's (1995) concerns about primary-resource-dependent economies, although causal testing lies beyond this study's scope.

Synthesis: Three Paradoxes of Human Capital and Productivity in Riau

Three paradoxes emerge from these findings. First, the scale–quality paradox: the nation's sixth-largest provincial economy has not achieved a commensurate level of human development, as reflected in its HDI gap with the Riau Islands Province. Second, the average–distribution paradox: mean years of schooling exceed the national average, yet three districts lag behind it, and the within-province gap (4.59 years) is almost ten times Riau's advantage over the national mean. Third, the low-unemployment–job-quality paradox: below-average unemployment coexists with informality affecting over half of workers, low female participation, and more than one-third of employment in a relatively low-productivity sector.

Table 5. Indicative evaluation of research propositions

No.	Proposition	Evidence	Assessment
P1	Low educational attainment limits technology adoption and high-value-added jobs	Indragiri Hilir: 7.49 years vs Pekanbaru: 12.08; district-level productivity data unavailable	Indicated, not tested
P2	Concentration in agriculture and informality constrains aggregate productivity	Agricultural RPI 0.81; 34.40% of workers in agriculture; 52.00% informal	Indicatively supported
P3	Low female participation indicates underutilized human capital	Female LFPR 47.68% vs male 84.68%; 8.73 points below national female LFPR	Indicatively supported

Source: Authors' synthesis of Tables 1–4.

Policy Implications

Based on the findings, the following policy implications warrant consideration by regional policymakers:

Equitable access to secondary education. Affirmative interventions should prioritize districts with the lowest mean years of schooling (Indragiri Hilir, Kepulauan Meranti, and Indragiri Hulu), including expanded secondary school access in coastal and island areas and financial support for students' transportation and accommodation.

Vocational education linked to downstream industries. Vocational high school curricula and training centres should be aligned with manufacturing requirements, given the sector's 30.45% contribution to GRDP, so that longer schooling translates into marketable skills. Industrial partnerships and graduate tracer studies could reduce skills mismatch, as suggested by the Bengkalis case.

Increasing agricultural productivity. Training and certification for plantation workers and farmers, agricultural extension services, and technology adoption could raise the RPI of a sector employing more than one-third of the workforce.

Increasing female labour force participation. Childcare services, flexible work arrangements, and support for women's entrepreneurship could reduce the 37-percentage-point gender participation gap.

Employment formalization and worker protection. Expanding employment-related social security coverage and supporting microenterprises to scale up could reduce the informal employment share, which remains above one-half.

Improving data systems. Local governments should develop integrated district-level dashboards for education, employment, and productivity to monitor policy effectiveness periodically.

CONCLUSION

The study concludes that Riau's average human capital stock slightly exceeds the national level (HDI of 76.31 and mean years of schooling of 9.55 in 2025), yet lags behind its economic scale and displays considerable regional inequality, with a schooling ratio of 1.61 between Pekanbaru and Indragiri Hilir. Labour utilization is characterized by relatively low open unemployment (4.16% in August 2025), but informality remains at 52.00% and female labour force participation at only 47.68%. Agriculture employs 34.40% of workers with a relative productivity index of 0.81, while the approximate annual output per worker is IDR 186 million at 2010 constant prices. Overall, labour productivity in Riau appears constrained by the quality and distribution of human capital and the structure of employment, rather than by job scarcity alone.

This study has several limitations. Its descriptive design does not establish causality; some reference periods are not identical; certain figures are sourced from news reports and Databoks articles citing BPS; mean years of schooling are available for only eight of the twelve districts and municipalities; and the productivity estimate is approximate and has not been compared across regions. Future research should (1) use panel data for all twelve Riau districts and municipalities to estimate a human-capital-augmented Solow model (Mankiw et al., 1992); (2) use Sakernas microdata to estimate returns to schooling through the Mincer (1974) earnings equation; and (3) directly assess skills mismatch and educational quality, as recommended by Hanushek and Woessmann (2008).

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