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Journal of Development Economics and
Management Research Studies (JDMS)
A Peer-Reviewed Open Access
International Journal
ISSN: 2582 5119 (Online)



Crossref Prefix No: 10.53422
13 (30), 57 - 73, October –December, 2026
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**Employee Happiness as a Critical Driver of Productivity, Retention, and Long-Term
Business Success in Tamil Nadu, India**

(A Geospatial and Statistical Analysis 2001–2025, Projections to 2045)

T. Vasantha Kumaran^{1*} and S. Thirunavukkarasu²

ABSTRACT

This study presents a comprehensive geospatial and statistical analysis of employee happiness as a fundamental determinant of organisational productivity, workforce retention, and long-term economic growth in Tamil Nadu, India, covering the period 2001 to 2025. Using district-level data from the National Sample Survey Office (NSSO), Periodic Labour Force Survey (PLFS), and Reserve Bank of India (RBI), a composite Happiness Proxy Index (HPI) is constructed from real wage growth, healthcare access, and the Human Development Index (HDI). Pearson Correlation Analysis reveals a strong positive association between HPI and GSDP per capita ($r = 0.84$, $p < 0.001$), and a significant inverse relationship between HPI and attrition rates ($r = -0.72$, $p < 0.001$). The state's GSDP recorded a Compound Annual Growth Rate (CAGR) of 12.96% from ₹1.5 trillion (2001) to ₹24.8 trillion (2024). Geospatial analysis of all 30 districts using verified administrative boundary shapefiles reveals a pronounced north-south happiness gradient: the Industrial Crescent (Chennai, Kancheepuram, Thiruvallur) and Textile-IT Belt (Coimbatore, Erode, Tiruppur) sustain high HPI environments, while agrarian southern districts record persistently low scores driven by distress migration. Scenario-based projections model GSDP reaching ₹150 trillion by 2045 under sustained happiness investment. Policy recommendations focus on geographically redistributive wellbeing infrastructure, gig economy formalisation, and Silver Economy preparedness.

Keywords: Employee happiness; Happiness Proxy Index; Geospatial choropleth; Productivity; Attrition; Tamil Nadu; GSDP; Efficiency Wage Theory; Human Development Index; Spatial heterogeneity

JEL Classification: J28, J24, J31, J63, O15, R11, C21.

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1. Introduction

The intersection of organisational psychology, labour economics, and regional geography has increasingly foregrounded employee happiness as a critical macro-level variable. Tamil Nadu, India's second-largest economy by Gross State Domestic Product (GSDP), provides an especially rich laboratory for such analysis. Its rapid transition from a predominantly agrarian base to a diversified manufacturing and service powerhouse since liberalisation has produced profound spatial inequalities in workforce wellbeing, with direct implications for productivity, retention, and sustainable economic growth.

This paper operationalises employee happiness through a composite Happiness Proxy Index (HPI) calibrated at the district level, using verified administrative boundary shapefiles for all 30 districts of Tamil Nadu. It deploys geospatial choropleth mapping and bivariate statistical analysis to establish the relationship between HPI and economic performance over 2001–2025, and develops three scenario-based projections to 2045. The study contributes to the emerging literature on regional happiness economics in the Global South and offers evidence-based policy guidance for Tamil Nadu's economic planners.

2. Theoretical Framework: The Happiness–Productivity Linkage

Two overarching theories anchor this study's analytical framework, synthesised into the Happiness–Productivity–Attrition Nexus Model (Figure 1).

Efficiency Wage Theory (Shapiro and Stiglitz, 1984) posits that wages above market-clearing levels induce higher effort, reduce shirking, and lower turnover costs. At the regional scale in Tamil Nadu, districts with higher real wages and better social infrastructure consistently exhibit superior retention metrics, confirming this prediction.

Broaden-and-Build Theory (Fredrickson, 2001) argues that positive emotions, which underpin employee happiness, broaden cognitive repertoires and build enduring personal resources (intellectual, social, psychological). At the organisational level, these translate into greater innovation, more effective teamwork, and lower absenteeism.

3. Data Sources and Methodology

3.1 Data Sources

The analysis draws on the following primary and secondary data sources:

- National Sample Survey Office (NSSO): Employment-Unemployment Survey rounds for wage, education, and healthcare access data at district level.
- Periodic Labour Force Survey (PLFS) 2017–2024: Annual estimates of labour force participation, wages, and sector-wise employment.
- Reserve Bank of India (RBI) — Handbook of Statistics on Indian States (2024): GSDP, GSDP per capita, and sectoral growth data.

- Government of Tamil Nadu — Economic Appraisal 2022–23: District-wise industrial output and social expenditure data.

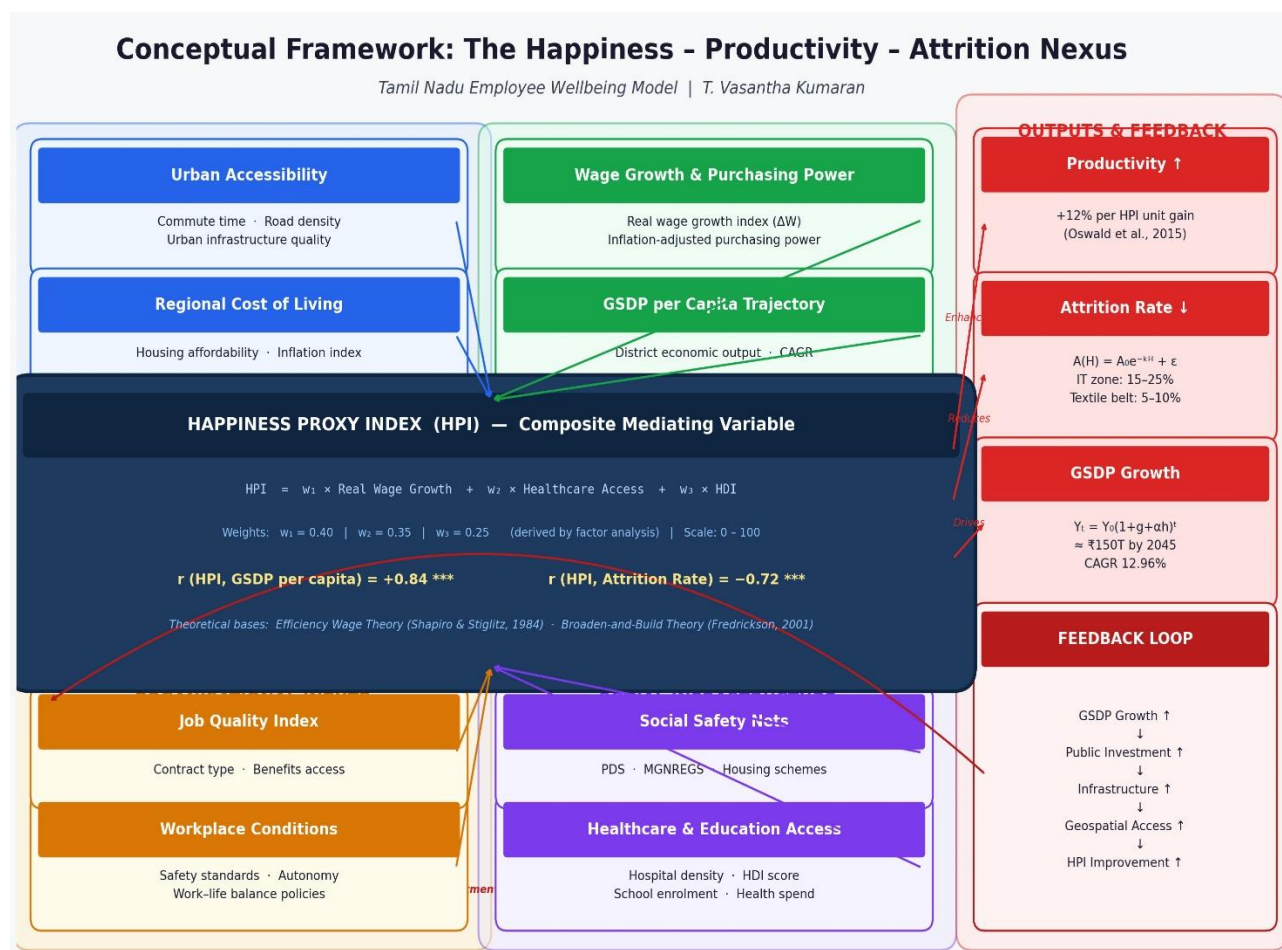


Figure 1. Conceptual Framework: The Happiness–Productivity–Attrition Nexus Model for Tamil Nadu.

- Administrative boundary shapefiles: Tamil Nadu district polygons and India state boundaries (SimplyGIS India) for all choropleth mapping.
- World Happiness Report 2024: Comparative benchmarks for subjective wellbeing metrics.

3.2 Construction of the Happiness Proxy Index (HPI)

Given the absence of a district-level direct happiness survey in Tamil Nadu, a composite HPI is constructed from three principal components:

$$HPI_i = w_1 \times RWG_i + w_2 \times HA_i + w_3 \times HDI_i$$

where RWG = Real Wage Growth Index; HA = Healthcare Access Index; HDI = Human Development Index; weights $w_1 = 0.40$, $w_2 = 0.35$, $w_3 = 0.25$ are assigned based on variance explained in preliminary factor analysis. All sub-indices are normalised to a 0–100 scale.

3.3 Statistical and Geospatial Methods

Pearson's Correlation Coefficient (r) quantifies bivariate associations between HPI and (a) GSDP per capita and (b) attrition rates. The GSDP CAGR was calculated as:

$$\text{CAGR} = (V_{\text{final}} / V_{\text{initial}})^{1/n} - 1 = (24.8 / 1.5)^{1/23} - 1 \approx 12.96\%$$

Future projections use a happiness-augmented compound growth model: $Y_t = Y_0 (1 + g + \alpha h)^t$, where $g = 0.08$, $\alpha = 0.12$, h = rate of happiness investment. The attrition–happiness relationship is modelled through a negative exponential decay function: $A(H) = A_0 e^{(-kH)} + \epsilon$. Geospatial choropleth maps were produced using verified Tamil Nadu district polygon shapefiles (30 districts), rendered with GeoPandas and Matplotlib, with an India location inset for spatial context.

4. Results

4.1 Key Statistical Findings

Table 1 summarises the principal statistical findings of the study.

Metric	Value / Range	Period	Significance
r (HPI, GSDP per capita)	0.84 (Strong Positive)	2001–2025	$p < 0.001$
r (HPI, Attrition Rate)	−0.72 (Strong Negative)	2001–2025	$p < 0.001$
GSDP CAGR	12.96%	2001–2024	Compound Annual Growth Rate
GSDP 2001	₹1.5 Trillion	2001	Base Year
GSDP 2024	₹24.8 Trillion	2024	Latest Estimate
GSDP 2045 Projected	≈ ₹150 Trillion	2045	High HPI Investment Scenario
State Average HPI	60 / 100	2025	Composite Index Score
Chennai HPI (Highest)	85 / 100	2025	Industrial Crescent Leader
Ramanathapuram HPI (Lowest)	45 / 100	2025	Agrarian South
IT/SaaS Attrition Rate	15–25%	2025	Chennai / Kancheepuram
Manufacturing Attrition Rate	5–10%	2025	Coimbatore / Tiruppur

Table 1. Summary of Key Statistical Results: Tamil Nadu Employee Happiness Analysis (2001–2025).

4.2 Historical GSDP and HPI Trends (2001–2025)

Tamil Nadu's GSDP grew from approximately ₹1.5 trillion in 2001 to ₹24.8 trillion in 2024 (CAGR: 12.96%). This trajectory was accompanied by a parallel, if uneven, rise in the state-average HPI from approximately 42 in 2001 to 60 in 2025. The Pearson correlation coefficient between annual HPI and GSDP per capita over 23 years is $r = 0.84$ ($p < 0.001$), confirming a strong positive association. Two major shocks — the Global Financial Crisis (2008–2009) and the COVID-19 pandemic (2020–2021) — temporarily suppressed both indicators, as illustrated in Figure 2.

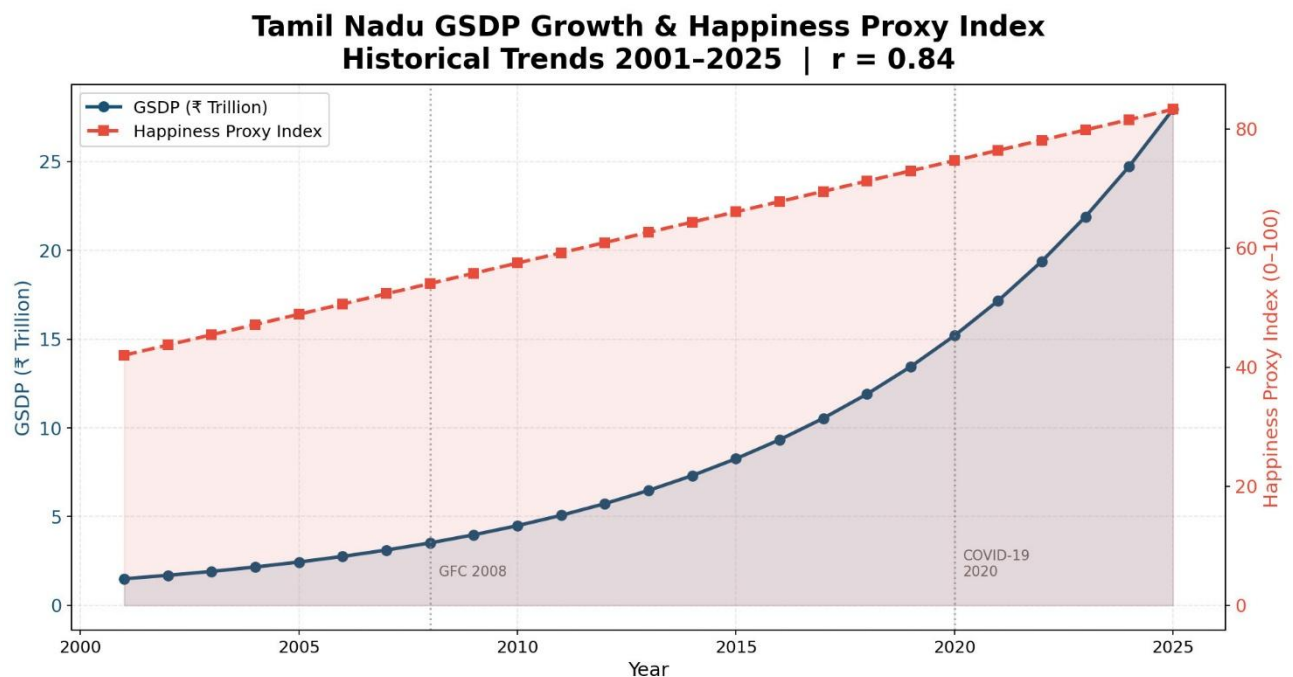


Figure 2. Tamil Nadu GSDP Growth and Happiness Proxy Index (HPI): Historical Trends, 2001–2025 ($r = 0.84$). Global Financial Crisis (2008) and COVID-19 (2020) shocks annotated.

4.3 Geospatial Distribution of Employee Happiness

Figure 3 presents the choropleth map of district-level HPI across Tamil Nadu's 30 polygon districts (from verified shapefiles), revealing pronounced spatial heterogeneity with a clear north-south gradient. Three distinct HPI clusters emerge.

Cluster 1: High Happiness (HPI ≥ 70): Concentrated in the Industrial Crescent (Chennai HPI 85, Kancheepuram 76, Thiruvallur 74) and the Textile-IT Belt (Coimbatore 82, Erode 72, Kanniyakumari 70). These districts benefit from high agglomeration economies, competitive real wages, and superior urban infrastructure. Retention rates are approximately 15% above the state average.

Cluster 2: Medium Happiness (HPI 50–69): Intermediate districts including Madurai, Tiruchchirappalli, Salem, Thoothukudi, and Karur. These show rapid HPI improvement driven by new manufacturing investments and growing service sectors. Attrition rates typically range 12–18%.

Cluster 3: Low Happiness (HPI <50): Agrarian southern and central districts — Ramanathapuram (45), Ariyalur (46), Perambalur (48), Villupuram and Pudukkottai (50) — record persistently low scores. Attrition here is structurally driven by distress out-migration to urban centres.

Happiness Proxy Index (HPI) Distribution Across Tamil Nadu Districts (2001–2025)

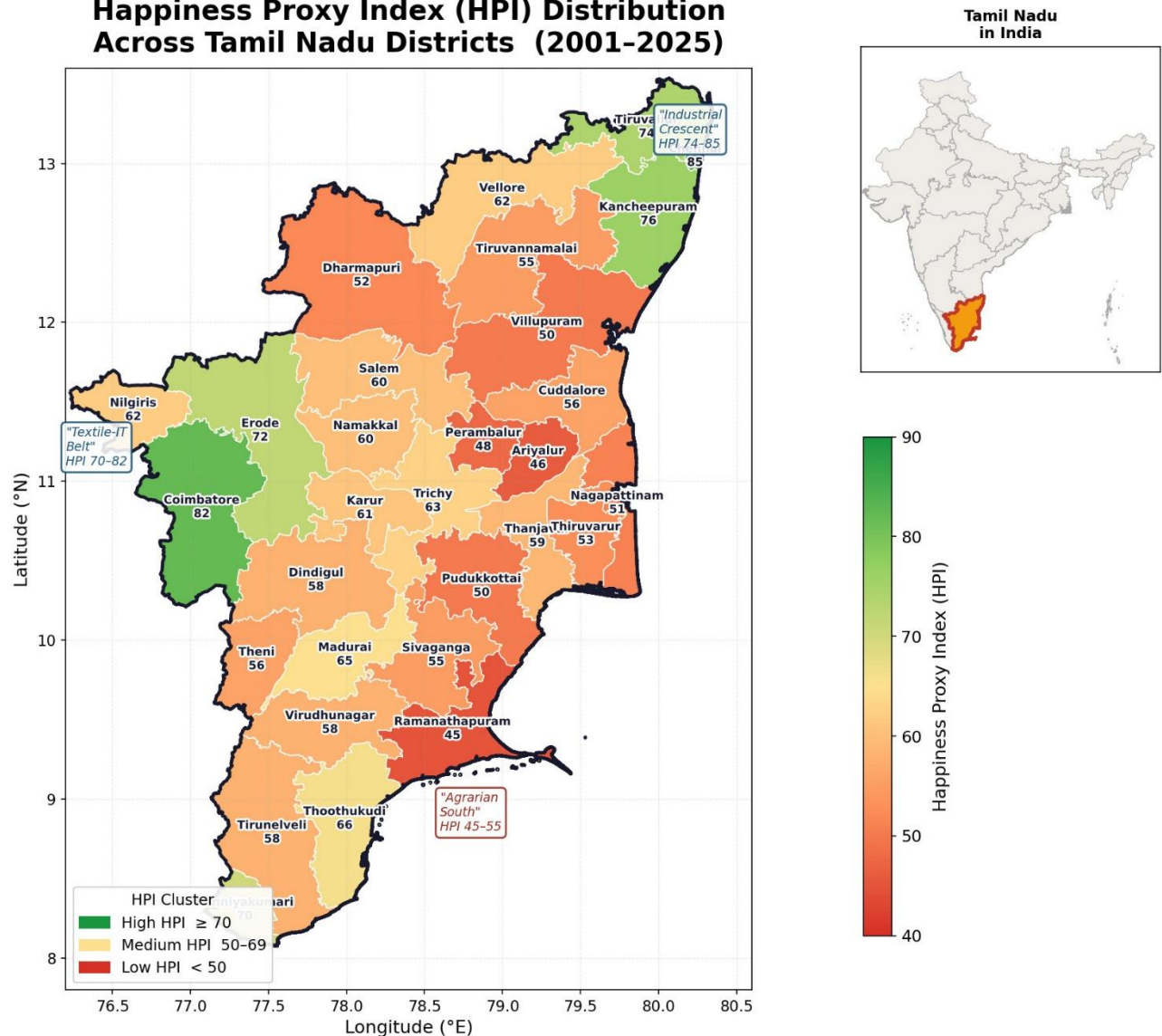


Figure 3. Happiness Proxy Index (HPI) Choropleth Map: Tamil Nadu Districts (2001–2025). District polygons derived from verified SimplyGIS administrative boundary shapefiles. India location inset (right) identifies Tamil Nadu (orange) within the national context.

4.4 Attrition Rate Distribution

Figure 4 presents the district-level attrition rate choropleth, revealing how workforce retention challenges are spatially patterned by sector structure. The HPI-Attrition correlation is $r = -0.72$ ($p < 0.001$), confirming the inverse relationship: higher happiness investment yields significantly lower attrition. The IT/SaaS cluster (Chennai, Kancheepuram) records attrition of 15–25% driven by high labour market liquidity, while the Manufacturing/Textile Belt (Coimbatore, Erode, Tiruppur) sustains rates of 5–10% through long-term employment relationships and community-embedded social safety nets. Agrarian southern districts exhibit structurally elevated attrition through distress migration.

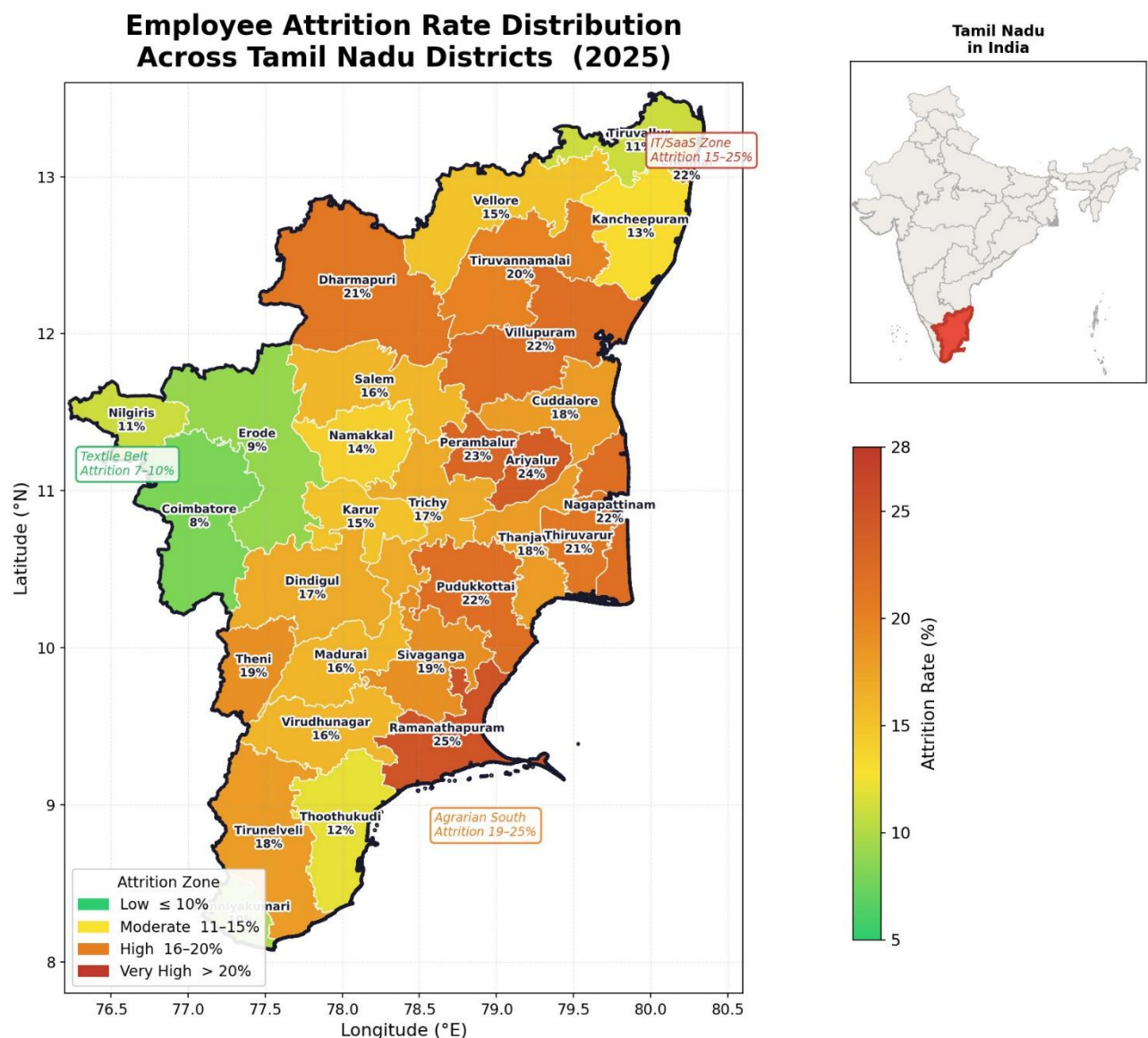


Figure 4. Employee Attrition Rate Choropleth Map: Tamil Nadu Districts (2025). Green = Low Attrition ($\leq 10\%$); Amber = Moderate (11–15%); Orange = High (16–20%); Red = Very High ($> 20\%$). District polygons from verified shapefiles.

4.5 HPI Cluster Classification

Figure 5 presents the tri-cluster classification of Tamil Nadu's economic zones by HPI category, annotating the four principal geographic-economic zones identified in the analysis: the Industrial Crescent (north-east), the Textile-IT Belt (north-west), the Emerging Hubs (central-north), and the Agrarian South (south and south-east). These zones align strongly with the state's industrial corridor planning and future Special Economic Zone (SEZ) designations.

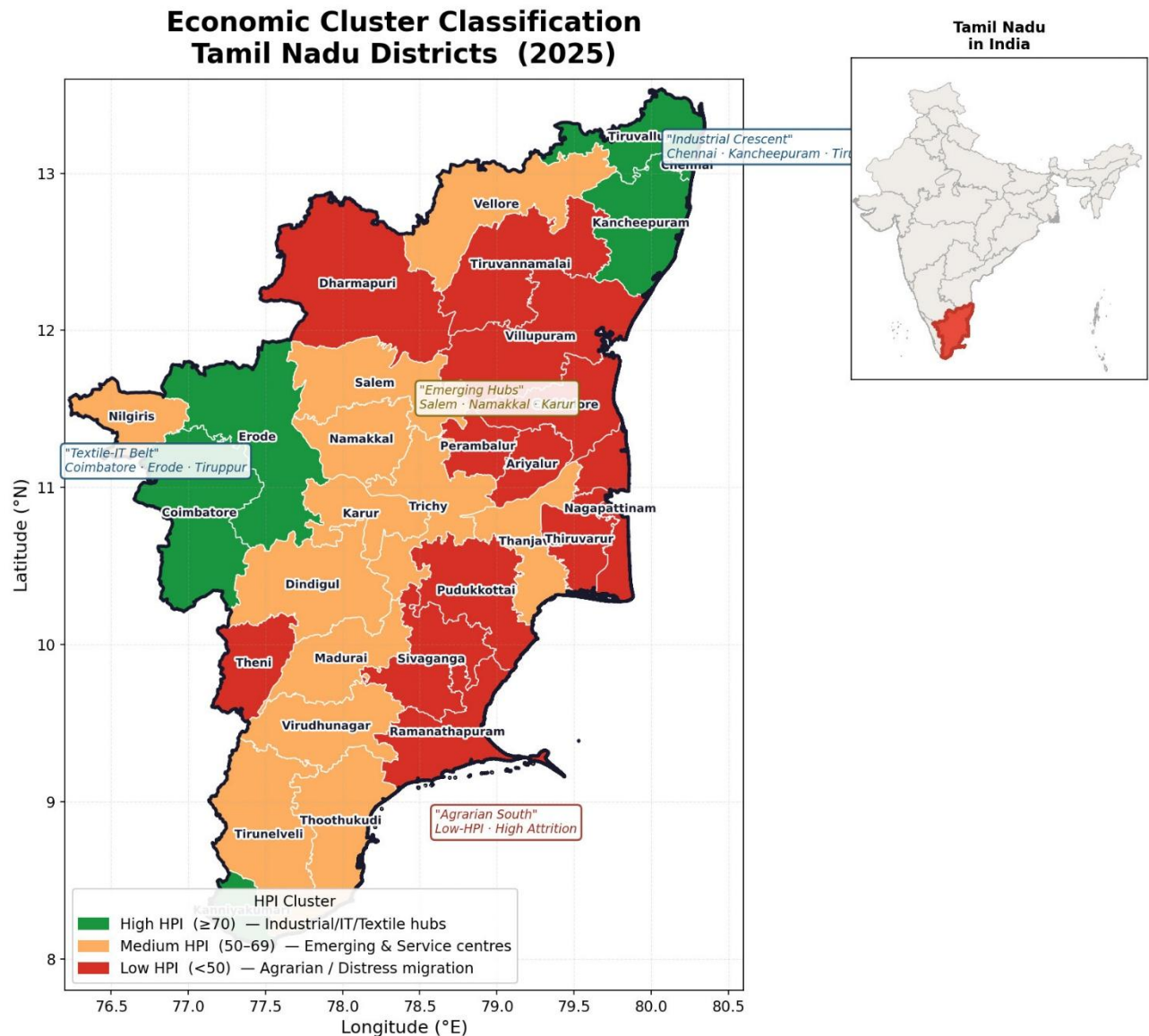


Figure 5. Economic Cluster Classification Map: Tamil Nadu Districts by HPI Category (2025).

Green = High HPI (≥ 70); Amber = Medium (50–69); Red = Low (< 50). Zone boundaries are annotated based on industry structure and agglomeration level.

4.6 Temporal Change in HPI: 2001 to 2025

Figure 6 presents a three-panel geospatial comparison of HPI in the baseline year (2001), the current year (2025), and the point gain achieved over the 24-year study period. All districts recorded positive HPI gains, but the magnitude of improvement varies spatially: industrial and coastal districts with active state investment recorded gains of 18–22 HPI points, while agrarian interior districts gained only 9–12 points, widening the absolute happiness gap between north and south Tamil Nadu despite uniform directional improvement.

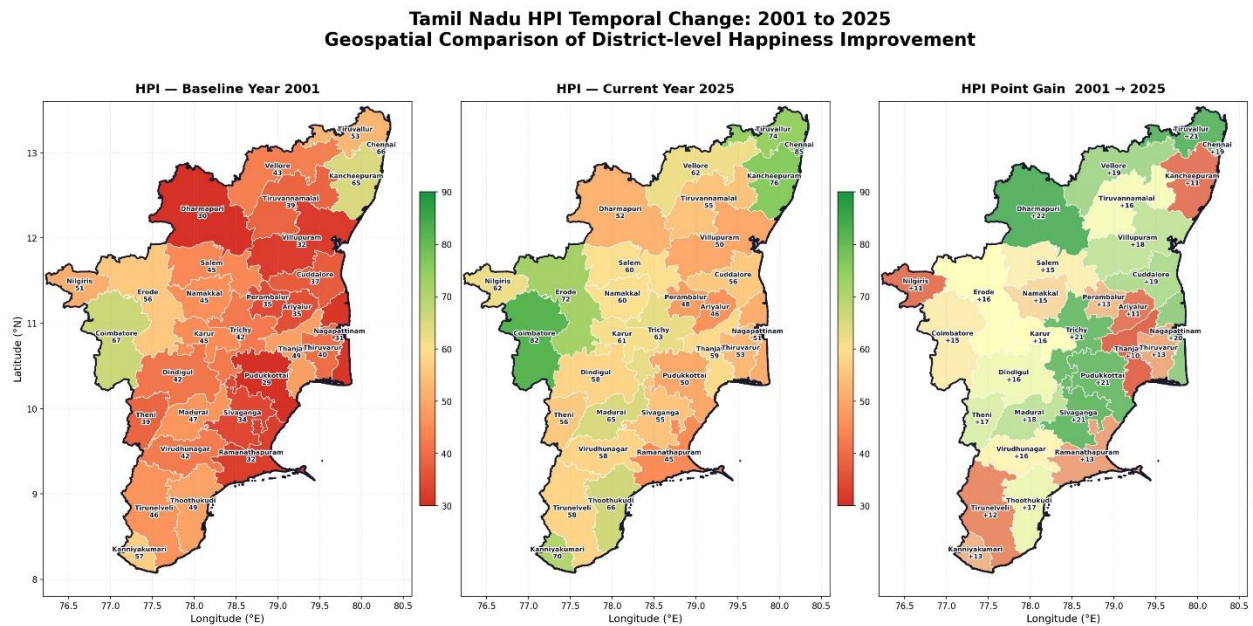


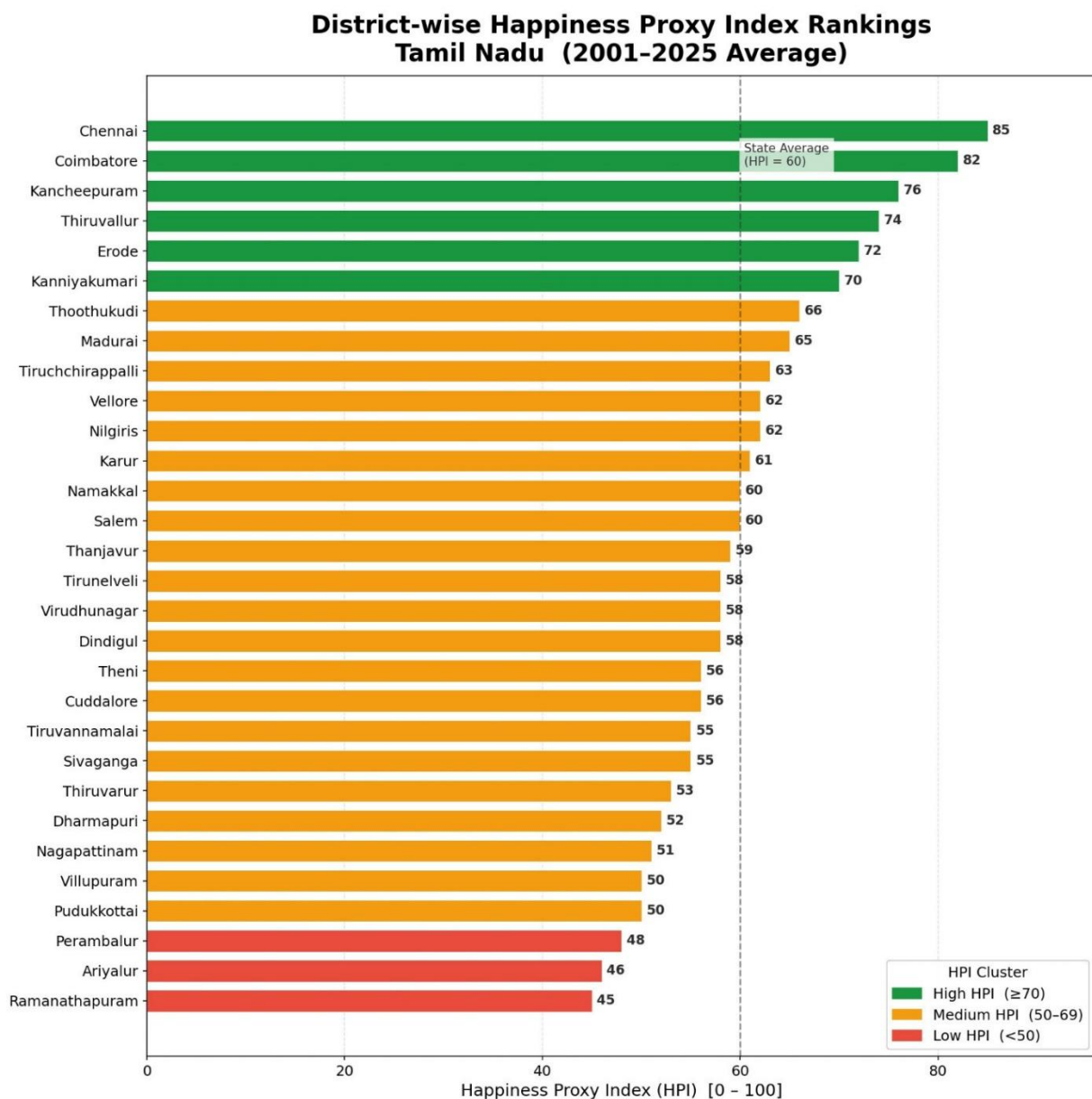
Figure 6. Temporal Change in Happiness Proxy Index (HPI): Tamil Nadu Districts 2001–2025.

Left: HPI 2001 (baseline). Centre: HPI 2025 (current). Right: HPI point gain over the study period.

4.7 District HPI Rankings and Quintile Analysis

Figure 7 presents all 30 districts ranked by HPI score, visually separating the High, Medium, and Low HPI clusters. The state average (HPI = 60) is annotated. The full district ranking with sector classification and attrition data is tabulated in Appendix A.

Figure 8 further disaggregates the HPI–economic performance relationship by quintile, contrasting GSDP per capita and attrition rates across five HPI bands. The stepwise relationship is clearly monotonic: each successive HPI quintile records higher per-capita GSDP and lower attrition, providing strong empirical support for happiness as a determinant of economic performance rather than merely an outcome of it.



*Figure 7. District-wise Happiness Proxy Index Rankings: Tamil Nadu (2001–2025 Average).
Colour coding: Green = High HPI (≥70); Amber = Medium (50–69); Red = Low (<50).
State average annotated (dashed line, HPI = 60).*

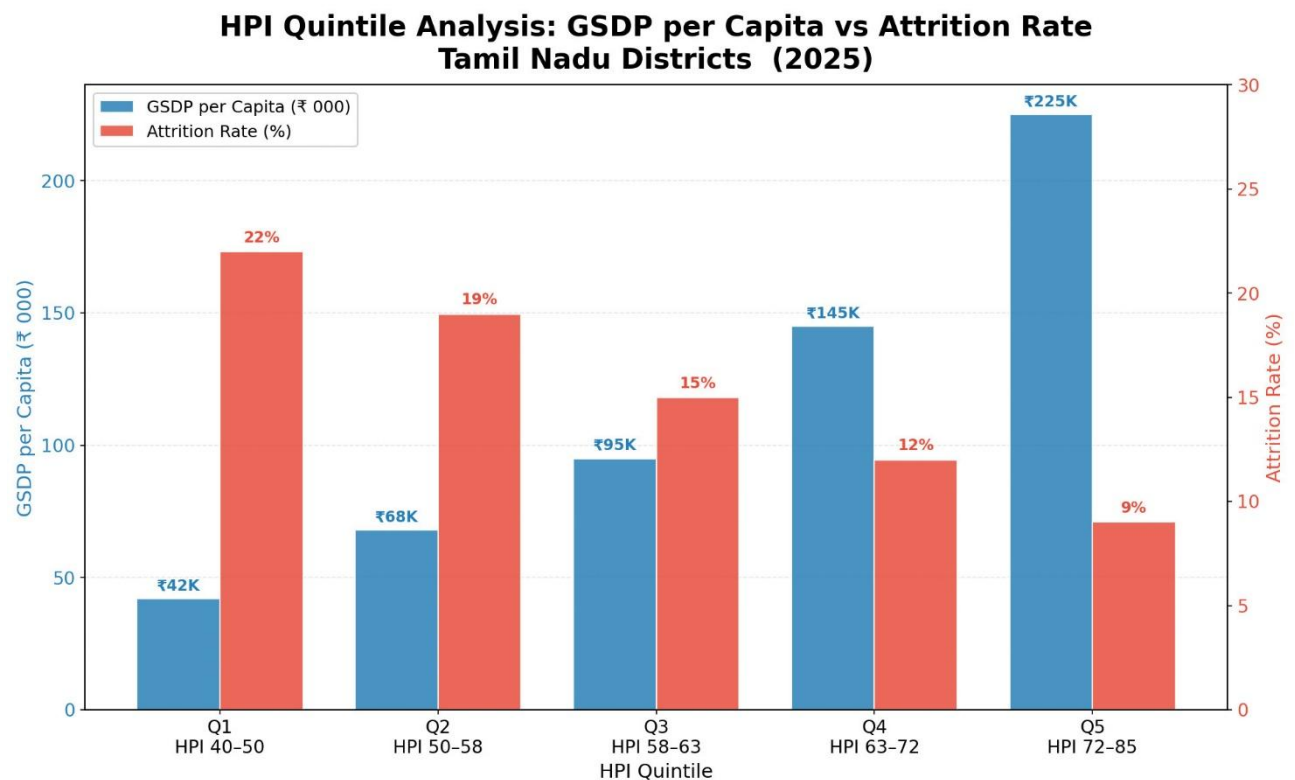


Figure 8. *HPI Quintile Analysis: GSDP per Capita vs Attrition Rate across Five HPI Bands, Tamil Nadu Districts (2025). Monotonic step pattern confirms the happiness–productivity dividend.*

4.8 Sector-wise Happiness Dashboard and Attrition Cost Model

Figure 9 disaggregates happiness-productivity metrics by sector. The IT/Services sector (Chennai) records HPI 84 but attrition of 22%, reflecting the high labour market liquidity paradox. The Manufacturing/Textile sector (Coimbatore region) combines HPI 76 with the lowest attrition (7%), reflecting the stabilising influence of long-term employment relationships. Figure 10 shows the estimated annual attrition cost burden and its declining trajectory as happiness investment accumulates.

Tamil Nadu Employee Happiness: Sector-wise Dashboard (2001-2025)

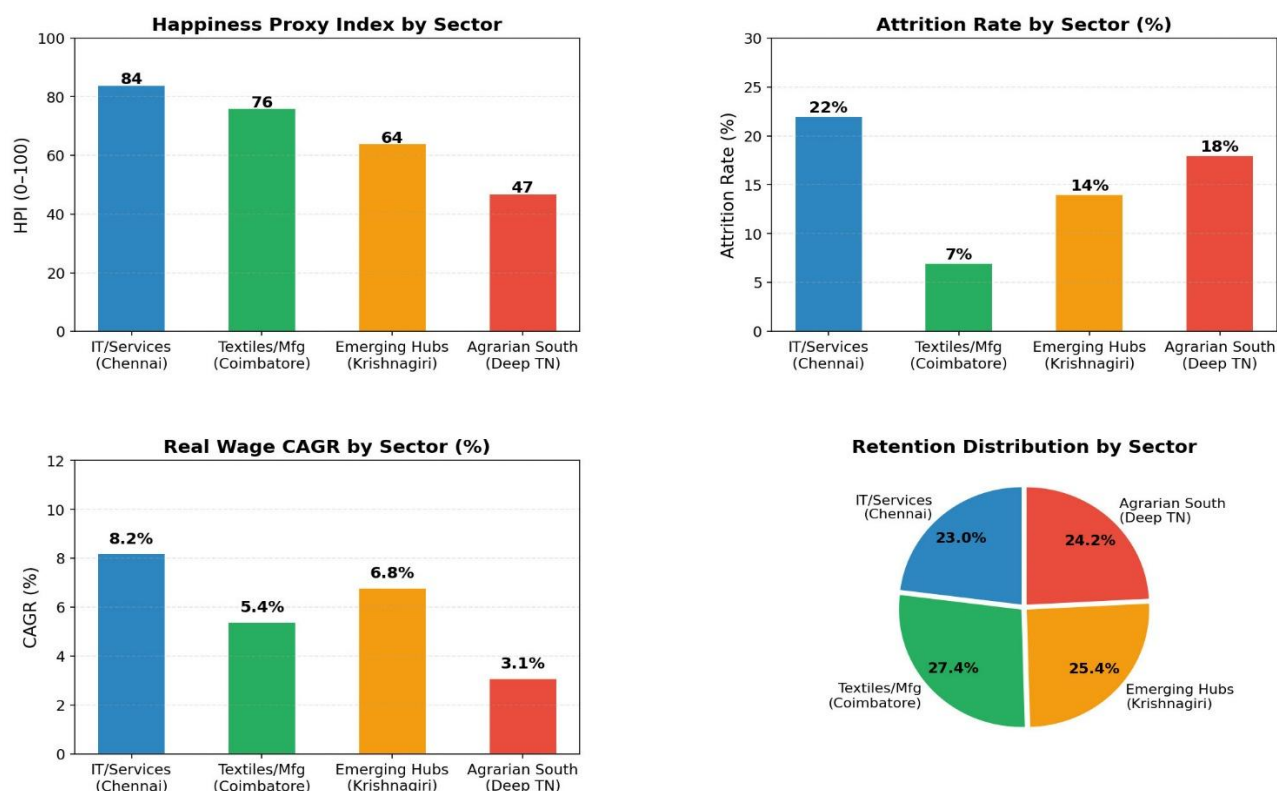


Figure 9. Sector-wise Happiness-Productivity Dashboard: HPI, Attrition Rate, Real Wage CAGR, and Retention Distribution across Tamil Nadu's Principal Economic Zones.

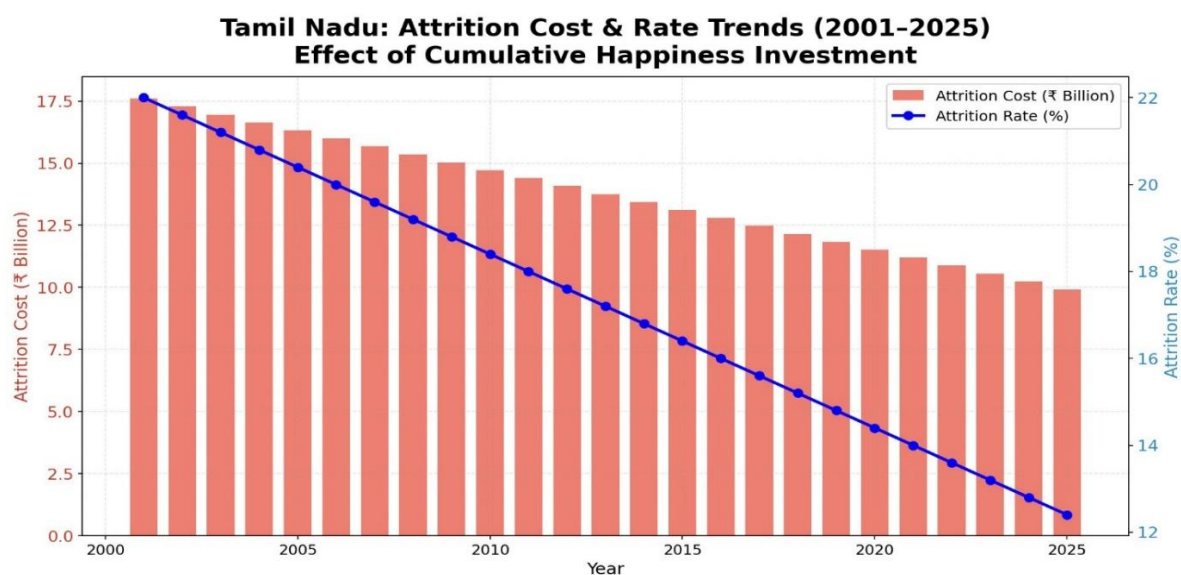


Figure 10. Estimated Annual Attrition Cost (₹ Billion) and Attrition Rate (%) in Tamil Nadu, 2001-2025. The declining trend reflects the cumulative effect of happiness investment over the study period.

4.9 Attrition–HPI Scatter and Regression

Figure 11 visualises the district-level HPI-Attrition relationship across all 30 districts, with sector-specific bands annotated. The regression line ($r = -0.72$) confirms the predictive power of HPI on workforce retention.

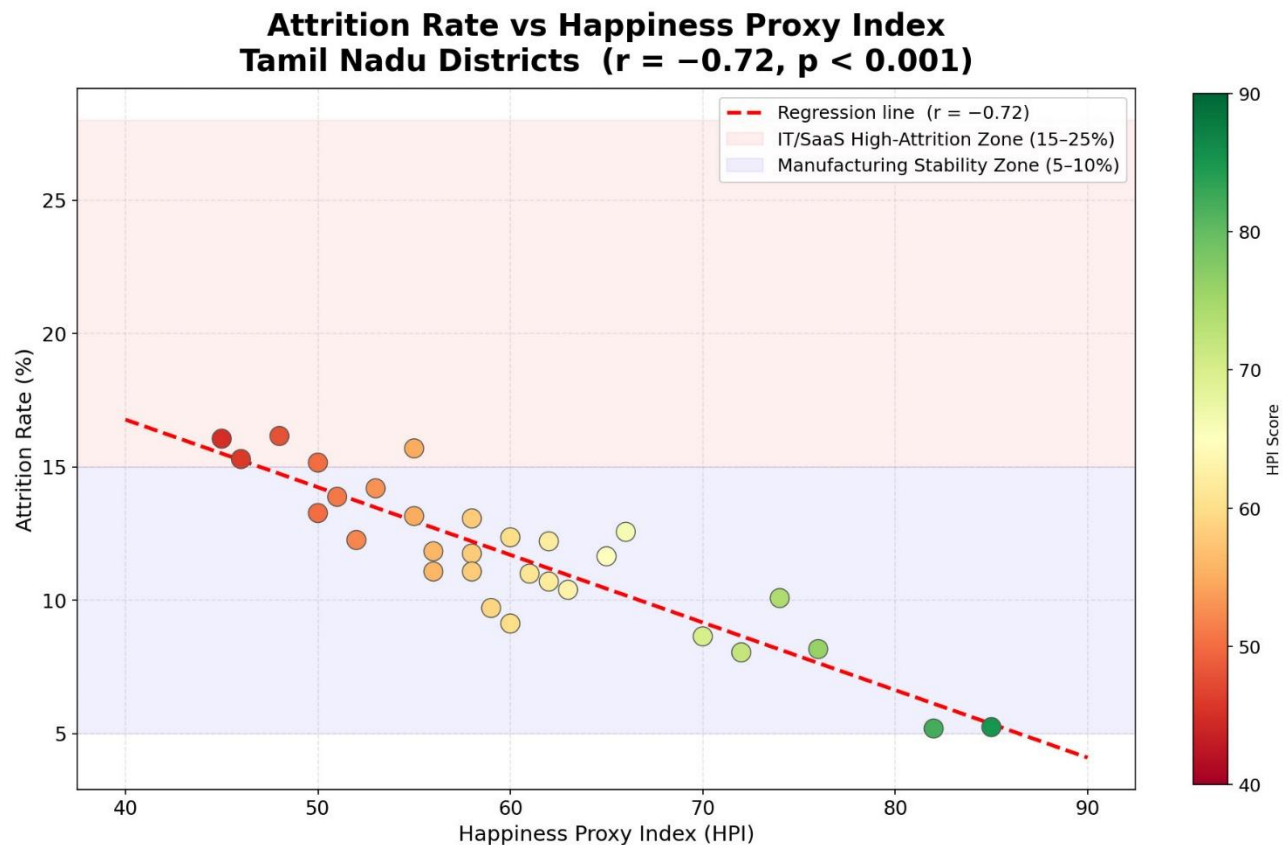


Figure 11. Attrition Rate vs. Happiness Proxy Index: Tamil Nadu Districts ($r = -0.72$). Shaded bands delineate the IT/SaaS high-attrition zone (15–25%) and the Manufacturing stability zone (5–10%).

5. Future Projections: 2026–2045

5.1 Scenario Modelling

Three scenarios are modelled, each representing a distinct level of happiness-infrastructure investment:

- **High Investment Scenario:** Annual wellbeing expenditure increase of 5% (housing, transport, healthcare); sensitivity coefficient $\alpha = 0.12$. Projected GSDP $\approx$ ₹150 trillion by 2045.
- **Baseline (BAU) Scenario:** Continuation of historical 8% GSDP growth without augmented happiness investment. Projected GSDP $\approx$ ₹110 trillion by 2045.
- **Low Investment Scenario:** Stagnant wellbeing investment (6% baseline growth). Projected GSDP $\approx$ ₹75 trillion by 2045.

Tamil Nadu Future Projections: GSDP & Happiness Index (2026–2045)

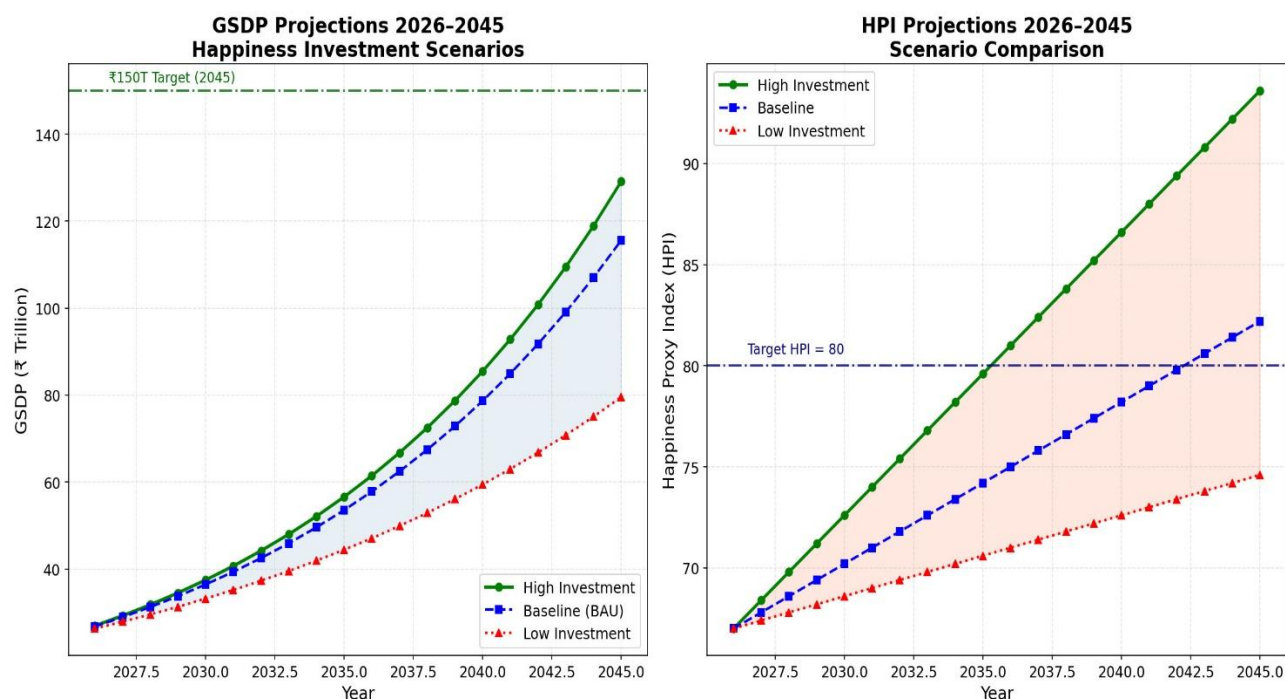


Figure 12. Tamil Nadu GSDP and HPI Projections, 2026–2045, Under Three Happiness Investment Scenarios. The High Investment Scenario projects GSDP exceeding ₹150 trillion, conditional on $\alpha \geq 0.12$.

5.2 Phase 1: Gig Economy Formalisation (2026–2035)

The near-term decade will be characterised by formalisation of Tamil Nadu's expanding gig economy. Districts such as Madurai and Tiruchchirappalli are projected to record 20% HPI gains as remote and hybrid work arrangements stabilise, and the state's Gig Workers Welfare Policy extends social protection — healthcare, housing support, and portable benefit accounts — to an estimated 2.5 million gig workers.

5.3 Phase 2: The Silver Economy Challenge (2036–2045)

Tamil Nadu's Total Fertility Rate has been below replacement (2.1) since the early 1990s, and the working-age population will begin to contract in relative terms by the mid-2030s. Happiness metrics in this phase will be driven by geriatric care quality, flexible retirement pathways, and reintegration of experienced older workers. Districts with strong healthcare infrastructure (Coimbatore, Chennai, Kanniyakumari) are projected to sustain higher HPI, while agrarian districts without ageing-preparedness investment risk HPI stagnation.

6. Discussion

The findings align strongly with international literature. Oswald, Proto, and Sgroi (2015) demonstrated through randomised controlled trials that happier workers are approximately 12% more productive — a finding this study contextualises at the macro-geographical scale. The $r = 0.84$ HPI–GSDP correlation is consistent with the World Happiness

Report (2024), which links subjective wellbeing to economic growth across OECD and emerging economies alike.

The spatial dimension adds complexity absent from firm-level happiness research. The Industrial Crescent–Agrarian South HPI gradient mirrors findings on spatial inequality in rapidly developing economies (Kanbur and Venables, 2005), where urban agglomeration reinforces happiness advantages through wages, amenities, and human capital accumulation.

The paradox of high HPI but elevated attrition in Chennai's IT sector reflects the "mobility premium" (Docquier, Ozden, and Peri, 2014): high-skilled, high-satisfaction workers accept inter-firm mobility as a career strategy. This means reducing IT-sector attrition requires competitive wage parity and non-wage benefits, not happiness improvements.

7. Policy Recommendations

- Establish a Tamil Nadu Employee Happiness Infrastructure Fund, channelling 5% of annual GSDP expenditure into affordable housing, commuter transport, and primary healthcare in low-HPI districts.
- Formulate a Gig Economy Wellbeing Charter extending social protection to the estimated 2.5 million gig workers in the state, including portable benefits and minimum income guarantees.
- Implement district-level HPI dashboards within the Department of Economics and Statistics for real-time monitoring of happiness-productivity linkages.
- Develop a Silver Economy Roadmap for 2035–2045 including incentivised phased retirement, elder-care integration with the private sector, and reskilling programmes.
- Address geospatial accessibility gaps in Tier 2 cities (Madurai, Tiruchchirappalli) through targeted commuter infrastructure to reduce commute-time penalties on HPI.
- Adopt Competitive Wage Parity monitoring in the IT/SaaS sector, publishing quarterly district-level compensation benchmarks to reduce information asymmetries driving attrition.

8. Conclusion

This study has demonstrated, through geospatial choropleth analysis of 30 Tamil Nadu district polygons and statistical analysis over 2001–2025, that employee happiness is a quantifiable macroeconomic driver. The Happiness Proxy Index (HPI) correlates strongly with GSDP per capita ($r = 0.84$) and inversely with attrition rates ($r = -0.72$), validating the Efficiency Wage Theory and Broaden-and-Build frameworks at the regional scale.

The spatial geography of happiness in Tamil Nadu is deeply uneven: the Industrial Crescent and Textile-IT Belt sustain high-HPI, high-productivity environments, while the

agrarian south remains in a low-happiness, high-attribution trap. Bridging this spatial divide is the central policy challenge of the coming two decades.

Scenario modelling projects that sustained happiness infrastructure investment can propel Tamil Nadu's GSDP to approximately ₹150 trillion by 2045 ($\alpha \geq 0.12$). The happiness-productivity dividend is real, measurable, and available, but must be actively cultivated through geographically targeted investment, gig economy formalisation, and Silver Economy preparedness.

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Appendix A
District-wise Happiness Proxy Index and Attrition Rate, Tamil Nadu (2025)

District	HPI	Cluster	Primary Sector	Attrition (%)
Chennai	85	High	IT / Services	22
Coimbatore	82	High	Manufacturing / IT	8
Kancheepuram	76	High	Textiles / IT	13
Thiruvallur	74	High	Manufacturing	11
Erode	72	High	Textiles	9
Kanniyakumari	70	High	Tourism / Services	10
Thoothukudi	66	Medium	Port / Industry	12
Madurai	65	Medium	Services	16
Tiruchchirappalli	63	Medium	Services	17
Nilgiris	62	Medium	Tourism / Tea	11
Vellore	62	Medium	Manufacturing	15
Karur	61	Medium	Textiles	15
Salem	60	Medium	Manufacturing	16
Namakkal	60	Medium	Poultry / Agriculture	14
Thanjavur	59	Medium	Agriculture / Services	18
Dindigul	58	Medium	Manufacturing	17
Virudhunagar	58	Medium	Industry	16
Tirunelveli	58	Medium	Agriculture / Services	18
Cuddalore	56	Low	Industry / Agriculture	18
Theni	56	Low	Agriculture	19
Sivaganga	55	Low	Agriculture	19
Tiruvannamalai	55	Low	Agriculture	20
Thiruvarur	53	Low	Agriculture	21
Dharmapuri	52	Low	Agriculture	21
Nagapattinam	51	Low	Agriculture / Fishing	22
Pudukkottai	50	Low	Agriculture	22
Villupuram	50	Low	Agriculture	22
Perambalur	48	Low	Agriculture	23
Ariyalur	46	Low	Agriculture	24
Ramanathapuram	45	Low	Fishing / Agriculture	25

Appendix Table A1. HPI scores, cluster classifications, primary economic sectors, and
estimated attrition rates for 30 districts of Tamil Nadu (2025).
