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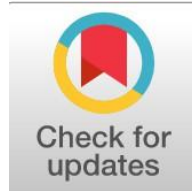
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An Open-Data Diagnostic Index of Productive Employment Across Uzbekistan's Regions

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Abstract

General Background: Employment and unemployment rates remain essential macroeconomic indicators but often fail to capture the qualitative dimensions of labor, such as stability, income adequacy, and productivity. **Specific Background:** While Uzbekistan achieved notable reductions in poverty and unemployment between 2020 and 2025, these national improvements masked significant disparities in labor market quality across different regions. **Knowledge Gap:** Existing regional statistics lack the necessary depth to measure productive employment comprehensively, as routine monitoring predominantly focuses on aggregate job creation numbers. **Aims:** This research constructs a transparent open-data diagnostic index for 14 territorial units, evaluates its sensitivity to methodological choices, and proposes a pathway toward an integrated administrative data system. **Results:** By normalizing employment growth, average wages, and per capita income, the study reveals sharp territorial divides; Tashkent city and Navoi emerged as top performers, whereas Namangan and Surkhandarya recorded the lowest indices, a pattern that remained robust despite varying weighting schemes. **Novelty:** The study introduces a reproducible eight-dimension architecture that bridges statistical gaps, offering a diagnostic tool that advances regional assessment from simple job counts toward concrete evidence of labor quality. **Implications:** These findings underscore the necessity for tailored regional labor policies that prioritize industrial specialization, professional certification, and infrastructure modernization over one-size-fits-all national frameworks.

Highlights:

- The diagnostic index reveals territorial labor market disparities that aggregate national statistics fail to display.
- Regional performance rankings maintain high stability even when income components or weighting models are adjusted.
- The proposed multi-dimensional architecture links labor expansion with poverty reduction and formal job quality metrics.

Keywords: Productive Employment, Regional Labor Markets, Open Data Index, Human Capital, Uzbekistan Economic Development

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1. Introduction

An increase in employment is typically celebrated as a sign of progress on the economic front. But the social and economic value of that increase is contingent upon what it represents in behind-the-number terms. In one region, fewer workers experience seasonal, informal or low paying activities; in another employment grows slower because firms are more capital-intensive (i.e. they have high asset per worker ratios), pay higher wages and have formal employment contracts that protect jobs. These are situations that count workers alone will not tell apart. Productive employment: it is not enough that people work, but whether their work promotes sustainable income, allows them to use capabilities and contributes to value creation.

This more comprehensive understanding resonates with the International Labour Organization underlining fair income, security and solidarity, social protection, rights at work, opportunities for personal development [1]. Human-capital theory accounts for how education, health, experience, and professional skills can improve productivity and earnings [2–4]. Institutional theory contributes an condition that is particularly relevant in the practice: these capabilities yield returns only when contracts are enforceable, social insurance holds up, credentials are acknowledged and conditioned on workers and employers's trust of the norms governing mutuality of labor [5]. Economic activities that lead to productive employment are thus formed at the crossroads of worker capabilities, job design, enterprise organization, and public institutions.

Technological change means we need to rethink this intersection, not abandon it. Automation can also take away routinized work and increase wage differentials in the absence of upwards demand for new complementary labour à la [6]. However, artificial intelligence does the opposite of what is said to threaten judgment, communication, diagnosis and practical expertise that underpins it [7]. The worker's worth is more and more that of a learner, a co-ordinator, an adapter and an executor [8] in fast-changing production environments. For that, workplace skill-job matching and technological quality, as well as continuous training should be brought inside any meaningful measurement of productive employment.

Conclusion Evidence at the firm level is consistent with this. Skills only lead to productivity and wage growth when enterprises make effective use of them [9]. A worker educated level above the firm he is working in might be given less demanding jobs, or even work under conditions discouraging learning resulting in lower returns than implied by the formal schooling. Training, wages and job security also require a social dialogue to foster commitment to productivity goals amongst all stakeholders [10]. Post-transition labor markets demonstrate that adjustment happens not only through employment and unemployment changes but also due to wages, hours, mobility, informality and non-standard work [11]. As a result, research on employment quality considers stability, purchasing power, working conditions and job satisfaction to be complements of labor productivity [12].

The difficult side to this is most pronounced in Uzbekistan. Demographic pressure, migration flows, industry specialization and the unequal distribution of access to high productivity sectors make that national averages can hide very diverse local labor markets. It has achieved to reduce unemployment and poverty, increase nominal wages, and expand formalization of work policies in terms of support for the employer and a national vocational training program with emphasis on regional development. Finally, Uzbek research highlights the importance of digital skills [13], continuous adaptation to changing environments and better integration of education with employers [14–16] as prerequisites for translating human capital into economic potential. However, official surveillance still focuses particularly on the amount of employees, unemployment charges and documented job creation.

This leads to what is known as the measurement problem, which is not merely theoretical but practical instead. A regional index would extend the concept of formality, job quality, adequacy of income, social protection coverage, skilljob matching and labor productivity with occupational safety and professional development but also with the contribution employment makes to poverty reduction. Some of these variables are still not published consistently across all territories. Not measuring until we can measure perfectly would mean relegating regional policy to the status of a comparative tool in search of a diagnosis. Thus, a limited open-data module is helpful if its scope stated unambiguously and it is treated as the first layer in an overall information system.

This article poses a couple of first examples: the Open Productive Employment Index (OPEI). It integrates the employment increase, median monthly wages and per capita income across 14 territorial units. The analysis initially situates the regional statistics within national labor-market transformation from 2020 to 2025. It next tests whether the ranking is robust to different weighting schemes, the dropping of one overlapping income indicator, and the extreme size of Tashkent city. Finally, the last section of the paper translates those findings into a multi-dimensional administrative-data architecture. The aim is not to suggest that three variables comprise a complete account of productive employment but rather to advance regional assessment from job counts toward concrete evidence of variation in the returns and quality of work.

2. Methods

Research design. The first type measures change in labour-market status over time, the second compares regions at one point in time. National trends cover 2020–2025. For the Republic of Karakalpakstan, 12 regions, and Tashkent city regional wages and income are in reference: 2025; employment growth — from 2020 to 2025. The design is descriptive and diagnostic. It finds where there are differences in observable conditions, but it does not assign that difference to a specific reform. But the selection of 2020 has to come with a caveat as in some labour markets COVID-19 shocks have made for an unusually low base. A future issue should examine these results against a consistent 2019 baseline or a multi-year average, when comparable regional employment series are fully available.

Conceptual framework. In this analysis the phrase productive employment means work that is registered, relatively stable (above 6 hours), well-paid, officially protected against risk, skill-appropriate and feasible in terms of occupational safety and health; work that creates value-added on a regional basis and can contribute to productivity growth, professional advancement and poverty reduction. It combines perspectives from human-capital, institutional, decent-work and productivity. The full architecture suggested here includes eight quantifiable aspects: (a) formality, (b) stability, (c) adequacy of earnings, (d) social protection, (e) skill-job matching, and as a result productivity of labour force by occupation, which lead to differences in occupational safety hazard exposures and in turn guide the occupational accident outcome; and finally last but not least, (f)(g)(h): poverty-reduction effect through employment. As a result, professional development is not treated as a separate endpoint but felt across multiple of these dimensions simultaneously — most notably matching, productivity and job stability.

Data sources. National indicators were compiled using both statistical and administrative series included in the dissertation on which this report is based and National Statistics Committee of the Republic of Uzbekistan publications. They consist of the unemployment rate, average monthly nominal accrued wages, poverty and informal employment. Three regional inputs were selected because they are available on a comparable basis: employed population growth (2020–2025); average monthly nominal salary accrued (measured in the thousand soum)(average for 2025); and total income per capita at constant prices (average for 2025). References 17–19 (Official publications and <https://doi.org/10.7759/cureus.58391>) are permanent addresses of the source where these data were collected or original sources.) Where 2025 data is treated as tentative by the statistical authority, the analysis attaches a similar caveat.

Normalization. Since all three indicators are measured by different units, the simple addition is not acceptable to add them. Thus, min–max normalization was applied to each value and transformed into a 0–100 scale: $z_{ij} = 100 \times (x_{ij} - \min x_j) / (\max x_j - \min x_j)$, where x_{ij} is the value of indicator j in region i ; values always higher are weighted more favorable for all three components. This method is simple to execute and interpret, but it is relative to the observed sample. Since the scale is defined by the highest and lowest region, a strong outlier can thereby squeeze the scores for all other territories. This means the index would need to be recast whenever the underlying regional data are revised, and Tashkent City's effect is tested in a separate chart.

Index construction. The baseline index is $OPEI_i = 0.35z_wage + 0.35z_income + 0.30z_employment$ growth. Wages and income receive slightly more weight than employment growth because an expansion of low-paid, unstable, or low-productivity work can raise employment without improving the economic quality of jobs. The wage component reflects remuneration in employee work, while income per capita gives a wider view of household economic capacity. Employment growth captures the ability of a region to expand labor demand. These weights are normative, not statistically estimated, and are reported openly so that users can challenge or revise them. Because wages also contribute to household income, the two monetary variables may overlap. The analysis addresses this concern through correlation tests and a specification that removes total income altogether.

Sensitivity and robustness analysis. The baseline was compared with four possibilities. The first one gives equal weights for all components. This utilizes employment growth with a weight of 0.50, wages and income with a weight of 0.25 each for the second measurement (Barclay Group Ltd.) The third is excluding total income and combines employment growth (0.45) and wages (0.55). The fourth discards Tashkent city and re-normalizes the other 13 regions with respect to the ones present in the baseline weights. Pearson correlation measure the overlap at wage and income level; Spearman correlation include not only their ordering, but also this alternative regional rankings. These ranks were based on unrounded scores. This is a rounding to one decimal, strictly for presentation that avoids false ties.

Interpretation and policy classification. The OPEI is intended not as a comprehensive job quality rating but an early warning and benchmarking tool. The score is combined with the qualitative typology presented in the dissertation to connect numbers and policy, producing four categories: (1) high-income industrial and service centres; (2) populous labour surpluses; (3) low-income seasonal or informal work exposed territories, and (4) smaller or transitional labour markets. This classification aims to avoid the imposition of a single national policy envelope over very diverse regional issues.

Ethics and reproducibility. Methodology: This analysis relies on aggregate statistics and administrative data. Since it does not include interviews, medical data and personal identifiers or individual employment records, ethical approval or informed consent was not required. The definitions of the formulas, transformation rules, weights and robustness specifications are provided in detail so another researcher or public agency can reproduce the computations.

3. Results

3.1. National labor-market transition, 2020–2025

The national indicators moved in a favorable direction, but not at the same pace. Unemployment fell from 10.5% in 2020 to 4.9% in 2025, a decline of 5.6 percentage points. Average monthly nominal wages rose from 2.67 million to 6.38 million soum, or 138.5%. Poverty increased temporarily in 2021 and then declined to 5.8% in 2025. Informal employment also decreased, from 42.8% to 37.1%. Taken together, these figures describe a recovery accompanied by higher nominal earnings and lower vulnerability. They also show the remaining scale of the challenge: even in 2025, more than one worker in three was employed informally.

Table 1. National labor-market indicators in Uzbekistan, 2020–2025

Year	Unemployment rate, %	Average monthly wage, thousand soum	Poverty rate, %	Informal employment, %
2020	10.5	2,673.3	11.5	42.8
2021	9.6	3,214.8	17.0	43.8
2022	8.9	3,882.2	14.0	39.6
2023	6.8	4,561.9	11.0	39.0
2024	5.5	5,360.9	8.9	37.9
2025	4.9	6,376.7	5.8	37.1
Change, 2020–2025	–5.6 pp	+138.5%	–5.7 pp	–5.7 pp

Note: pp = percentage points. Wages are nominal. Poverty estimates may reflect methodological refinements across years. **Sources:** National Statistics Committee and administrative series used in the dissertation [17–19].

These trends should not be interpreted as a complete account of productive employment. Nominal wage growth says little about real purchasing power unless inflation and regional prices are considered. A lower poverty rate does not establish that every newly employed person obtained stable work, and the reduction in informality, although important, was gradual. The remaining 37.1% informal share is a strong reason to add contract status, social contributions, and employment duration when the administrative-data version of the index is built [17].

3.2. Regional open-data index

Regional differences are much sharper than the national trend suggests. Tashkent city reached 100.0 because it had the highest value for all three components. Navoi followed at 56.1, but for a different economic reason: high wages and income are closely connected with industrial specialization and large enterprises. The 43.9-point distance between the two leaders is therefore not simply a statistical gap. It reflects the exceptional concentration of finance, services, administration, higher education, and other high-income activities in the capital.

Table 2. Open Productive Employment Index by region, 2025

Ran k	Region	Employment growth, 2020–2025, %	Monthly wage, thousand soum	Per-capita income, thousand soum	OPEI, points
1	Tashkent city	23.2	10,753.8	73,910.5	100.0
2	Navoi	18.4	7,871.6	44,694.2	56.1
3	Khorezm	17.3	5,052.4	31,136.0	29.4
4	Andijan	15.1	5,238.6	26,275.9	23.3
5	Tashkent region	8.7	5,967.7	29,830.9	18.1
6	Samarkand	13.6	4,737.6	24,471.0	16.6
7	Syrdarya	12.6	5,119.1	23,339.5	16.2
8	Karakalpakstan	13.9	5,003.1	20,656.0	16.1
9	Kashkadarya	13.8	4,476.7	23,517.5	14.9
10	Bukhara	6.6	5,093.1	35,176.2	13.0
11	Fergana	10.9	4,730.2	24,582.7	11.8
12	Jizzakh	11.0	4,786.0	22,907.4	11.2
13	Namangan	8.1	4,751.3	21,304.6	4.7
14	Surkhandarya	7.3	4,481.8	22,572.2	2.6

Note: OPEI = Open Productive Employment Index. The index uses min–max normalization and weights of 0.35 for wages, 0.35 for per-capita income, and 0.30 for employment growth. Rankings are based on unrounded index values; displayed scores are rounded to one decimal place. **Sources:** author’s calculations from regional employment, wage, and income data [17–19].

Khorezm’s third place illustrates how the components interact. Strong employment growth offset a substantially weaker wage position. Andijan followed a similar, though less pronounced, path. In both cases, employment expansion improved the score but did not remove the need for higher productivity and remuneration. Tashkent region and Bukhara show the reverse pattern: relatively stronger wages or household income were accompanied by modest employment growth. Their challenge is to widen access to productive jobs, not only to improve conditions for those already employed.

Samarkand, Syrdarya, Karakalpakstan, and Kashkadarya occupy the middle of the ranking for different combinations of growth and income. Several achieved respectable employment expansion but remained limited by wages or per-capita income. Namangan and Surkhandarya were at the lower end because all three observable conditions were comparatively weak. A low OPEI score should not be read as a judgment that workers in these regions are unproductive. It indicates that the regional economy currently converts employment into wages and household income less effectively than the leading territories [18], [19].

The robustness tests show that this broad territorial pattern is not an artifact of one set of weights. Equal weighting produced a Spearman correlation of 0.991 with the baseline and moved no region by more than one place. Giving greater weight to employment growth reduced the correlation to 0.921, while the labor-market-only version produced 0.908; in both cases the largest movement was four positions. Removing Tashkent city and re-normalizing the remaining regions yielded a correlation of 0.945. The top four remained stable across weighting models, and Surkhandarya remained last. Wages and income were very strongly related in levels (Pearson $r=0.963$), but their rank correlation was lower (Spearman $\rho=0.648$). The two monetary indicators therefore overlap, yet they do not tell exactly the same regional story.

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Table 3. Robustness of regional rankings under alternative specifications

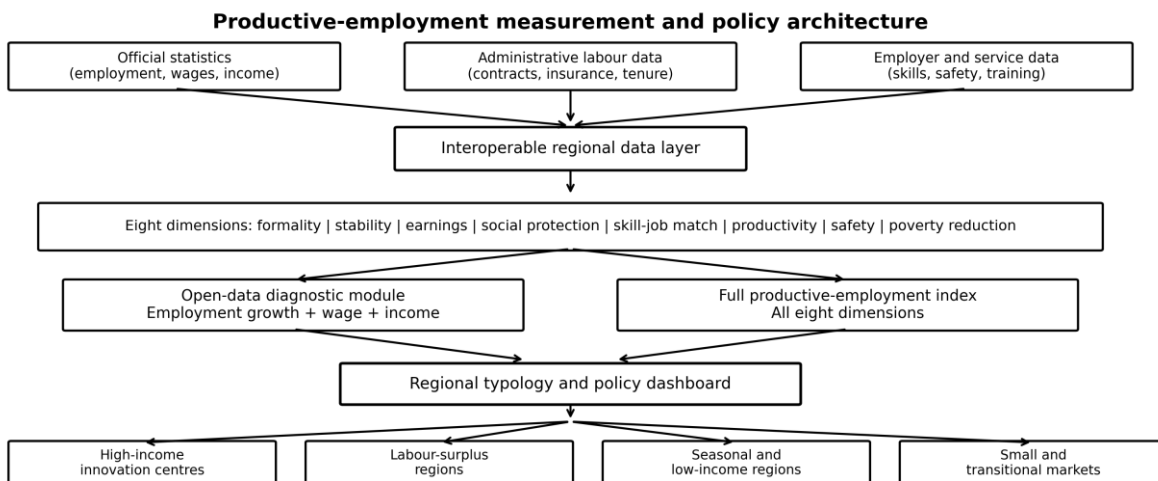
Specification	Weights: growth / wage / income	Spearman ρ with baseline	Maximum rank shift	Interpretation
Baseline	0.30 / 0.35 / 0.35	1.000	0	Reference specification
Equal weights	0.333 / 0.333 / 0.333	0.991	1	Ranking is almost unchanged
Growth-heavy	0.50 / 0.25 / 0.25	0.921	4	Labor-surplus regions gain weight
Labor-market-only	0.45 / 0.55 / 0.00	0.908	4	Tests overlap by excluding total income
Tashkent city excluded	Baseline weights; 13 regions re-normalized	0.945	4	Capital-city outlier affects scale more than broad order

Note: Spearman coefficients are calculated from unrounded scores. For the Tashkent-excluded test, the coefficient compares the baseline and re-normalized order of the remaining 13 regions. Source: author's calculations.

3.3. From an open module to a full productive-employment system

The three-indicator module can be calculated now because all of its inputs are published regularly. It answers a limited but useful question: where is employment growth accompanied by stronger wages and household income? It cannot reveal whether jobs are covered by written contracts, social insurance, stable tenure, occupational protection, or an appropriate match between qualification and occupation. Figure 1 places the open score inside a larger system in which public statistics are combined with administrative labor records and employer-level information.

Figure 1. Productive-employment measurement and policy architecture



Source: developed by the author.

Measurement and intervention are deliberately separated in this architecture. Two regions can receive similar scores for entirely different reasons and should not automatically receive the same policy response. The diagnostic results are first translated into a regional labor-market type. Measures are then selected according to economic specialization, demographic pressure, informality, and the local capacity to generate value added. Used in this way, OPEI becomes a management tool for identifying constraints rather than a league table that rewards or penalizes regions [20].

4. Discussion

The results present two realities at the same time. Uzbekistan made clear national progress through lower unemployment and poverty, higher nominal wages, and gradual formalization. Yet those improvements did not remove regional inequality in the capacity to create jobs that generate adequate income. This is exactly where human-capital and institutional explanations meet: skills raise earnings only when productive opportunities exist, and those opportunities depend on contracts, incentives, organization, and enforcement [21].

The open index adds value because it is deliberately modest about what it measures. It separates employment expansion from the economic conditions attached to that expansion. It also exposes the weighting choices instead of hiding them inside a composite score that policy users cannot reproduce. Most importantly, the index is designed as a provisional module of a larger system. In a setting where open statistics are improving but administrative databases remain fragmented, this staged approach is more useful than either claiming completeness or waiting indefinitely for perfect data.

Tashkent city and Navoi should not be treated as the same model of success. Tashkent's score is driven by agglomeration: finance, business services, public administration, higher education, trade, and technology-intensive activity are concentrated

there. Navoi's advantage is rooted more strongly in industrial specialization and large enterprises. The policy task in both territories is therefore not simply to preserve a high rank. It is to sustain productivity, prevent widening spatial inequality, expand professional certification and lifelong learning, and spread productive practices to neighboring regions. Technologies that complement workers rather than displace them should be a central part of this agenda.

The populous labor-surplus regions of Fergana, Samarkand, Andijan, and Namangan face a different constraint. Their labor supply and entrepreneurial potential are large, but demand for high-income formal jobs may grow more slowly. A workable package would combine industrial cooperation, upgrading of small firms, women's and youth employment, formalization, and vocational programs tied to verified employer demand. The regional professional-qualification balance proposed in the dissertation can coordinate these instruments by comparing expected occupations, existing skills, training capacity, vacancies, placement by specialty, and the number of jobs that become formal. In this setting, training should be managed as an input into regional productivity, not only as a social service.

Kashkadarya, Surkhandarya, Jizzakh, and Karakalpakstan require policies that reduce dependence on seasonal, low-income, and informal activity. The most direct route is to extend local value chains. Agricultural work creates more stable income when it is connected with processing, storage, packaging, logistics, equipment repair, digital marketing, and exports. Self-employment support should also have a progression logic: training, finance, cooperation, market access, tax advice, and social insurance should help a household move toward a sustainable enterprise. Registration by itself may improve administrative statistics without improving income stability or protection.

Smaller and transitional labor markets need selective specialization rather than a broad copy of national programs. Khorezm combines rapid employment growth with moderate wages, which points to upgrading opportunities in tourism, services, agro-processing, and small manufacturing. Syrdarya can build on industrial zones, logistics, and proximity to major markets. Bukhara has relatively strong per-capita income but slower employment expansion; its central question is how to connect tourism and industrial revenues more widely with local labor demand. The policy logic differs in each case even when aggregate scores appear close.

A full productive-employment index will require administrative-data interoperability. Formality can be observed through electronic contracts, labor records, and social contributions. Stability can be measured through tenure, repeated employment spells, and turnover; social protection through insurance coverage; skill matching through occupation and qualification codes; productivity through value added per worker; safety through injury and compliance records; and poverty reduction through aggregated household outcomes. This does not require an unrestricted central repository of personal data. Common identifiers, role-based access, aggregation, and privacy safeguards can connect the indicators while limiting access to individual information.

Recent policy measures create a favorable setting for this transition. Presidential Decree No. DP-126 of 4 August 2025 strengthens labor relations, vocational training, employer incentives, occupational safety, and cooperation between employment bodies and enterprises. Presidential Resolution No. RP-49 of 5 February 2026 places stable jobs, higher incomes, poverty reduction, formalization, and regional specialization at the center of territorial development. The proposed measurement architecture converts these priorities into indicators: DP-126 provides the employment-relations and employer dimension, while RP-49 provides the regional and poverty-reduction dimension.

The dashboard should have a public and an administrative layer. The public layer can display the three open indicators and OPEI. Authorized users would access the second layer, which adds the eight full dimensions and helps identify why a region performs weakly. Regional programs could then be judged by durable formal placement, median employment duration, wage growth relative to local benchmarks, training completion, qualification match, social-insurance coverage, safety, and movement of working households out of poverty. This would shift accountability from reporting activities to observing results.

The sensitivity analysis has an additional policy message. Regional asymmetry remains visible under equal weights, a growth-heavy preference, removal of total income, and re-normalization without the capital. It is therefore unlikely to be the product of one arbitrary specification. Still, movements of as many as four places among middle-ranked regions show that weights should not be treated as permanent. Employers, workers' representatives, regional authorities, and researchers should participate in periodic review. Once a fuller dataset is available, analytic hierarchy, factor analysis, or benefit-of-the-doubt methods can be tested alongside the transparent baseline.

The wage-income correlation also requires a balanced interpretation. Tashkent city strongly influences the high Pearson coefficient because its monetary values are far above the rest of the sample. The lower Spearman coefficient shows that wages and total income do not order all regions in the same way. Total income captures remittances, transfers, entrepreneurial earnings, and property income in addition to wages, whereas the wage measure is more directly tied to formal employee remuneration. Retaining both indicators broadens the diagnosis, and the labor-market-only test confirms that the main territorial pattern persists when income is removed.

The limitations are substantial and should remain visible. OPEI contains only three indicators and does not directly observe formality, stability, social protection, skill matching, productivity, safety, or employment duration. Nominal wages ignore regional price differences, so later versions should use real wages, regional deflators, or ratios to minimum consumption where possible. Per-capita income includes non-labor sources and partly overlaps with wages. The 2020 base may capture post-pandemic recovery rather than a normal growth path. Min-max normalization is sample-dependent, and Tashkent city acts as an influential upper bound. Finally, the analysis is descriptive and cannot establish that a specific policy caused the observed change. These are reasons to expand the information architecture, not reasons to abandon a transparent interim measure.

Within those limits, the open module is immediately usable. It can be recalculated each year, included in regional employment reports, and used to flag places where job growth is not accompanied by sufficient earnings. It also creates an institutional demand for better data. As the full index develops, regional funding and employer incentives can be linked increasingly to formal job retention, income progression, qualification use, productivity, safety, and poverty reduction. This aligns worker welfare, enterprise performance, regional development, and public expenditure within a common results framework.

5. Conclusions

The article has shown that Uzbekistan's favorable national labor-market trend coexists with a pronounced regional divide. Between 2020 and 2025, unemployment and poverty fell, nominal wages more than doubled, and informal employment decreased. The regional calculations nevertheless reveal very different combinations of employment growth, wages, and household income. Tashkent city and Navoi lead for distinct economic reasons, while several populous and southern regions remain constrained by weaker income conditions. The same broad pattern survives alternative weights, exclusion of total income, and re-normalization without the capital.

The main methodological lesson is straightforward: employment growth alone is not a sufficient measure of regional labor-market success. OPEI is useful precisely because it is transparent and limited. It identifies where visible economic conditions are strong or weak, while the proposed full architecture adds formality, stability, earnings adequacy, social protection, skill-job matching, productivity, safety, and poverty reduction. The objective is not to establish a permanent ranking of regions, but to identify the mechanisms that prevent labor participation from becoming sustainable income and value creation.

Implementation can proceed in stages. The three-indicator module can first be published annually with full disclosure of data and weights. The Unified National Labor System, social-insurance records, vocational-training databases, occupational-safety information, and regional statistics can then be connected at an aggregated level. Regional policy packages should be tailored to economic specialization and labor-market type. Finally, program financing should depend increasingly on durable formal placement, wage and income progression, productivity, qualification matching, safety, and poverty reduction. Such a system would move employment policy away from counting jobs and toward managing the quality and economic return of work.

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Conflict of Interest Statement

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Data Availability Statement

The regional input values, baseline scores, unrounded rankings, and robustness specifications are reported in Tables 1–3 and in the formulas in the Methods section. An editable calculation file is available from the corresponding author upon reasonable request. Additional aggregated administrative materials used to develop the wider conceptual framework may be shared subject to the disclosure rules of the institutions that produced them.

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