Journal DOI: 10.36713/epra1013 | SJIF Impact Factor (2026): 8.748 ISSN: 2347-4378
EPRA International Journal of Economics, Business and Management Studies (EBMS)
Volume: 13 | Issue: 4 | April 2026 -Peer-Reviewed Journal

PRIORITY DIRECTIONS FOR IMPROVING CONSUMER PRICE INDEX COMPILATION: THE CASE OF UZBEKISTAN

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ABSTRACT
This paper examines key directions for enhancing the compilation of the consumer price index (CPI) in Uzbekistan. It focuses on improving price observation, integrating multi-source data within a unified methodological framework, updating the weighting system, applying aggregation methods consistently, and strengthening validation procedures. The study argues that CPI quality depends on the coherence of observation, processing, and aggregation stages rather than isolated technical improvements. A comprehensive organizational and methodological approach for national practice is proposed.
KEYWORDS: *Consumer Price Index (CPI), Price Observation, Multi-Source Data, Aggregation Methods, Validation, Weighting System, Modernization*

INTRODUCTION

The consumer price index (CPI) constitutes a fundamental macroeconomic indicator that underpins the assessment of inflationary dynamics, the formulation of monetary policy, the evaluation of real income trends, and the design of socio-economic policies. The reliability and analytical relevance of the CPI are not determined solely by the choice of the final aggregation formula; rather, they critically depend on the methodological coherence and integrity of the entire statistical production process, including price observation, data collection, averaging procedures, weighting schemes, and aggregation stages [2; 9; 10].

Contemporary methodological approaches conceptualize CPI compilation not as a set of isolated technical operations, but as an integrated and continuous statistical system. Within this framework, the frequency and design of price observations, the quality and representativeness of data sources, the timeliness and relevance of weighting structures, the appropriate selection of index formulas, and the robustness of validation mechanisms collectively determine the accuracy, consistency, and stability of the index. In the context of Uzbekistan, the ongoing modernization of the national statistical system has elevated the importance of refining these components to align with international best practices and to enhance the credibility of official statistics [1; 2; 3; 4; 5; 10].

The primary objective of this study is to identify and systematize the priority directions for improving the organization of CPI compilation processes in Uzbekistan. Specifically, the paper aims to examine the theoretical and methodological foundations of CPI construction, assess practical challenges within the national context, and develop a comprehensive organizational and methodological framework tailored to domestic statistical practice. Based on this analysis, the study formulates a set of scientifically grounded conclusions and policy-oriented recommendations aimed at enhancing the quality, reliability, and institutional efficiency of CPI estimation.

LITERATURE REVIEW

The international literature on CPI compilation consistently emphasizes several key areas of methodological advancement, including the optimization of price observation systems, the refinement of weighting structures, the selection and application of aggregation formulas, and the strengthening of data quality assurance mechanisms. Foundational methodological sources identify substitution bias, outdated expenditure weights, limitations in survey design, and inconsistencies across data sources as major factors adversely affecting CPI accuracy. Furthermore, recent research has increasingly focused on the integration of high-frequency data—such as scanner data, transactional records, and digital price information—into CPI production frameworks, reflecting broader trends in data-driven statistical modernization [2; 8; 9; 10; 11; 12; 13; 14; 15].

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In the case of Uzbekistan, existing practical recommendations highlight the necessity of extending observation coverage, incorporating multi-source data, updating the weighting system, and revisiting aggregation methodologies as part of CPI modernization efforts. However, the current body of research remains limited in its treatment of these elements as components of a unified and internally consistent methodological system. In particular, insufficient attention has been paid to the interdependencies among observation, data processing, weighting, aggregation, and validation stages.

The contribution of this article lies in advancing a systemic perspective on CPI quality, wherein the index is interpreted not as the outcome of discrete methodological choices, but as the result of an integrated statistical process characterized by strong internal coherence. Building on this premise, the study proposes a holistic organizational and methodological approach specifically adapted to the institutional and statistical context of Uzbekistan, thereby contributing to both the theoretical discourse and practical advancement of CPI compilation methodologies [1; 3; 4; 5].

RESEARCH METHODOLOGY

This study employs a comprehensive methodological framework grounded in a systems approach, comparative analysis, time-series statistical analysis, methodological synthesis, and secondary data processing techniques. The empirical foundation of the research is based on electronic datasets derived from official CPI bulletins covering the period 2020-2025. These datasets include monthly CPI series, December year-on-year indices, regional disaggregations, and dynamic indicators across major consumption categories [16].

Based on this dataset, a set of key analytical indicators was constructed, including: the average monthly level of the aggregate CPI, monthly volatility measures, the dynamics of December year-on-year indices, interregional dispersion ranges, and sectoral volatility differentials across food, non-food, and services categories. The evaluation process incorporates standard deviation analysis, comparative dynamic assessment, and interregional differentiation metrics to ensure methodological robustness and comparability [16].

A distinctive feature of the adopted methodology is its systemic orientation toward CPI quality assessment. Rather than treating the index as a purely final statistical output, the study evaluates its quality through the internal coherence of its constituent stages namely observation, data processing, averaging, weighting, aggregation, and validation. Accordingly, statistical quality is conceptualized not merely as a numerical result, but as an operational manifestation of methodological consistency and institutional alignment within the statistical production process [2; 6; 16].

To further strengthen the empirical dimension of the study, a secondary analysis of CPI bulletin data for 2020-2025 was conducted. The dataset encompasses six years of monthly index series, regional disaggregation across 13 administrative units based on December indicators, and monthly dynamics across key consumption categories. This enabled a unified analytical assessment of temporal volatility, sectoral heterogeneity, and interregional dispersion based on a consistent set of methodological criteria [16].

Table 1. Key Indicators Characterizing the Analytical Design of CPI Modernization in Uzbekistan

Indicator	Value	Methodological Significance
Observation interval	25 days	Reduces intra-month random fluctuations and stabilizes average price estimates
Structure of the consumption basket	13 categories	Ensures alignment of classification, weighting, and aggregation processes
Share of alternative data sources (national level)	≈55%	Reflects the practical implementation of a multi-source data model
Validation stages	3 stages	Ensures consistency across primary, regional, and central quality control levels
Core formula set	2 formulas	Enables parallel use of official and analytical indicators

Source: Compiled by the author based on dissertation materials and empirical assessments [1; 3; 4; 5].

The indicators presented in Table 1 collectively illustrate that CPI modernization in Uzbekistan is being operationalized through a structurally integrated and methodologically coherent framework rather than through isolated technical adjustments. Each parameter reflects a specific dimension of statistical quality, yet their combined effect lies in reinforcing the internal consistency of the entire CPI production process.

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The adoption of a 25-day observation interval plays a critical role in enhancing temporal representativeness by smoothing intra-month price fluctuations. This design reduces the influence of short-term shocks and seasonal spikes, thereby improving the stability of monthly average prices. In parallel, the 13-category consumption basket structure ensures a balanced alignment between classification, weighting, and aggregation stages, which is essential for preserving the economic interpretability of the index.

A particularly notable feature is the ≈55% share of alternative data sources, which signals a transition toward a multi-source statistical model. This reflects the increasing integration of administrative, transactional, and digital data into CPI compilation. While this enhances data coverage and timeliness, it simultaneously raises methodological requirements for harmonization and validation.

Table 2. Dynamics, Volatility, and Interregional Dispersion of the Aggregate CPI in Uzbekistan (2020–2025)

Year	Average Monthly CPI (%, month-on-month)	Monthly Volatility (std, p.p.)	December Year-on-Year CPI (%, relative to previous December)	Interregional Range in December (max–min, p.p.)
2020	100.89	0.67	111.14	0.34
2021	100.80	0.53	109.98	0.69
2022	100.97	0.44	112.25	0.27
2023	100.70	0.49	108.77	0.20
2024	100.78	0.76	109.80	0.35
2025	100.59	0.44	107.30	0.30

Source: Author's calculations based on official CPI bulletins for 2020–2025 [16].

The empirical evidence presented in Table 2 reveals several important trends in the dynamics, volatility, and regional dispersion of the aggregate CPI in Uzbekistan over the period 2020–2025.

First, the average monthly CPI remains relatively stable, fluctuating within a narrow range of 100.59–100.97%, which indicates a moderate and controlled inflation environment. However, this apparent stability at the aggregate level masks underlying variations in volatility and regional dispersion.

Second, monthly volatility (standard deviation) exhibits noticeable fluctuations across the period. While volatility declined from 0.67 in 2020 to 0.44 in 2022 suggesting increased short-term price stability it rose sharply to 0.76 in 2024 before returning to 0.44 in 2025. This pattern indicates that inflation dynamics are not uniformly stable and may be influenced by episodic shocks, particularly in specific sectors such as services or regulated prices.

Third, the December year-on-year CPI demonstrates a gradual downward trend after peaking at 112.25% in 2022, declining to 107.30% in 2025. This reflects a relative easing of inflationary pressures in the later years of the period, potentially associated with macroeconomic stabilization measures and improved policy coordination.

Finally, the interregional dispersion (max–min range) provides insight into spatial heterogeneity in price dynamics. The relatively low dispersion values (ranging from 0.20 to 0.69 percentage points) suggest a generally consistent inflation pattern across regions. However, the peak in 2021 (0.69 p.p.) indicates that regional disparities can intensify under certain economic conditions, possibly due to differences in market access, logistics, or local demand structures.

Table 3. Monthly CPI Volatility by Main Categories in Uzbekistan (2020–2025, Standard Deviation)

Year	Aggregate CPI	Food	Non-food	Services
2020	0.67	1.42	0.22	0.22
2021	0.53	1.12	0.20	0.42
2022	0.44	0.86	0.30	0.33
2023	0.49	0.88	0.25	0.39
2024	0.76	1.23	0.24	3.98
2025	0.44	0.87	0.39	1.48

Source: Author's calculations based on official CPI bulletins for 2020–2025 [16].

The empirical results indicate that the monthly volatility of the food component consistently exceeded that of the non-food component by approximately 2.2 to 6.4 times over the period under review. At the same time, the services sector exhibited a sharp increase in volatility, with the standard deviation reaching 3.98 percentage points

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in 2024 and 1.48 percentage points in 2025. This pattern suggests that one-off adjustments in regulated services and housing and коммунal tariffs require enhanced monitoring and careful interpretation within the aggregate CPI framework [16].

The temporal organization of price observation represents a foundational stage that directly affects CPI quality. When observations are confined to narrow time windows within a month, particularly for seasonal and highly volatile goods, significant portions of intra-month price dynamics may remain unobserved. This reduces the representativeness of average monthly prices and amplifies the influence of random fluctuations on the final index [2; 10].

The adoption of a 25-day observation window mitigates these limitations by capturing a broader spectrum of price changes throughout the month. This approach reduces the impact of short-term shocks and seasonal spikes, thereby enhancing the stability and reliability of average price estimates. Its practical significance is particularly pronounced in segments such as food products, fresh produce, and frequently consumed services [1; 2; 3; 4].

In modern price statistics, data are increasingly derived from multiple sources, including traditional surveys, administrative records, transactional datasets, digital platforms, and online price information. While this diversification improves data coverage and timeliness, the absence of a unified methodological framework may lead to internal inconsistencies in the resulting index [2; 5; 10; 11].

To address this challenge, it is essential to integrate multi-source data based on a unified averaging principle. This ensures that all data streams adhere to common statistical standards, enhances internal comparability, and preserves methodological consistency across the aggregation chain. Consequently, disparate data sources are transformed from fragmented inputs into coherent components of a unified CPI system [2; 10; 11].

From a practical perspective, this approach increases the reliability of CPI estimates, facilitates the management of cross-source discrepancies, and provides a robust methodological foundation for incorporating high-frequency and digital data into official statistical production [5; 11; 12; 15].

The choice of aggregation formulas plays a critical role in CPI construction. The modified Young formula links price changes to the structure of household expenditures, thereby strengthening the economic interpretability of the index. It represents a practical, consistent, and transparent solution for generating official CPI estimates [2; 3; 4; 14].

In contrast, the geometric Young approach is particularly effective in environments characterized by high dispersion in price relatives. It mitigates the influence of extreme values, thereby stabilizing the aggregate index and enhancing its analytical robustness [2; 8; 14].

Accordingly, the parallel application of the modified Young formula as the official indicator and the geometric Young formula as an analytical and validation tool is methodologically justified. This dual-framework approach ensures both economic relevance and statistical stability, thereby improving the overall quality and credibility of CPI measurement [2; 8; 14].

Table 4. Priority Directions for the Effective Organization of CPI Compilation

Priority Direction	Content	Expected Outcome
25-day observation	Broader coverage of intra-month price fluctuations	Improved stability of average monthly prices
Unified averaging	Integration of multi-source data under a common methodological standard	Enhanced statistical consistency and coherence
Young formula	Official indicator weighted by expenditure shares	Strengthened economic interpretability of the index
Geometric Young	Mitigation of extreme value effects	Increased analytical robustness
Validation and audit	Multi-stage control and verification procedures	Higher reliability of the final index

Source: Developed and systematized by the author.

The regular updating of the weighting system is essential to ensure alignment between the CPI and the evolving structure of household consumption, thereby reinforcing its economic relevance. Structural shifts in consumption patterns, the emergence of new goods and services, and the increasing role of digital channels limit the methodological adequacy of outdated weights [1; 2; 14].

At the same time, strengthening regional representativeness is equally critical. Differences in market conditions, logistics, and consumption behavior across regions of Uzbekistan necessitate a differentiated approach to the selection of observation points. This enhances the accuracy of regional aggregation and improves the overall representativeness of the index [1; 10].

A multi-stage validation system serves as an institutional guarantee of CPI quality. Logical checks, interregional comparisons, and dynamic consistency controls enhance data reliability and reduce the likelihood of errors in the final index. Consequently, the alignment of updated weights, adequate regional coverage, and robust validation mechanisms constitutes a key prerequisite for improving CPI quality [5; 6; 7].

The findings of the study indicate that improving the CPI cannot be reduced to partial updates of individual technical elements. Instead, index quality fundamentally depends on the integrated functioning of observation, data processing, averaging, weighting, aggregation, and validation as a unified methodological system. Empirical evidence strongly supports this conclusion: fluctuations in aggregate index volatility during 2020–2025, relatively higher variability in the food segment, and sharp increases in services inflation in certain years all highlight the necessity of a process-oriented approach to CPI compilation [16].

In comparison with international practices, the distinctive feature of Uzbekistan's experience lies in the simultaneous implementation of modernization across multiple dimensions. Improvements in observation frequency, the use of multi-source data, the refinement of aggregation formulas, and the strengthening of validation mechanisms are being carried out in parallel. This, in turn, increases the importance of methodological coordination, internal consistency, and process integration [3; 4; 5].

Thus, the study confirms that CPI reliability is not achieved through isolated technical innovations, but through their coherent interaction within a unified methodological framework [2; 6; 7; 9; 10; 14].

The scientific contribution of this article is threefold. First, it conceptualizes CPI quality not as the result of discrete technical operations, but as an outcome of an integrated system encompassing observation, processing, averaging, weighting, aggregation, and validation stages. Second, the study proposes a comprehensive organizational and methodological model that combines a 25-day observation framework, unified averaging of multi-source data, parallel application of Young and geometric Young formulas, systematic updating of weights, and multi-stage validation mechanisms. Third, the research provides empirical evidence based on official CPI bulletins for 2020–2025, including calculations of volatility and dispersion across aggregate, sectoral, and regional dimensions.

CONCLUSION

The effective organization of CPI compilation requires more than the implementation of isolated technical measures; it necessitates the restructuring of the entire observation–processing–aggregation chain as an integrated methodological system. In this context, CPI quality is determined by the coherence of observation frequency, data averaging procedures, the relevance of weighting structures, the selection of aggregation formulas, regional coverage, and validation mechanisms.

The findings demonstrate that, in the context of Uzbekistan, key priority directions include the adoption of a 25-day observation framework, the integration of multi-source data through unified averaging, the combined application of modified Young and geometric Young formulas, the регуляр updating of weights, the strengthening of regional representativeness, and the implementation of multi-stage validation systems. These measures collectively enhance both the accuracy and stability of the CPI.

Empirical analysis based on official CPI bulletins for 2020–2025 confirms these conclusions through observed patterns in aggregate index dynamics, sectoral volatility differentials, and regional dispersion. In particular, the high variability in the food segment and the pronounced fluctuations in services in certain years underscore the need for improved organization of observation, averaging, and validation processes [16].

Therefore, the practical effectiveness of CPI modernization is reflected not only at the level of methodological recommendations but also in measurable statistical outcomes. In this regard, the article can be considered a comprehensive scientific contribution that integrates organizational-methodological foundations, empirical analysis, and policy-relevant recommendations tailored to the national context of Uzbekistan.

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