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Beyond the Binary: Towards a Novel Methodological Understanding of the Urban–Rural Continuum in Post-2000 South Africa

Andre Brand*

Statistics South Africa, 0001 Pretoria, South Africa

* Correspondence: Andre Brand (andre.brand.6703@gmail.com)

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Abstract: This paper advanced a new methodological framework for understanding and classifying the urban–rural continuum in post-2000 South Africa. The abolition of administrative distinctions through the Municipal Systems Act in 2000 rendered traditional definitions of "urban" and "rural" obsolete, thus creating a conceptual gap in spatial classification. Drawing on the international frameworks, the study proposed a functionally grounded approach that transcends the urban–rural binary. Using a positivist design and quantitative spatial modelling, the research introduced the Dominant Impact Factor (DIF), a composite indicator integrating population size, participation of labour force, and economic production, to assess relative municipal dominance. Municipalities were subsequently categorized through a quartile-based classification into urban, mixed, and rural types, and further refined using geo-referencing and a spatial grid for fine-scale spatial differentiation. Findings revealed pronounced demographic and economic concentration in a small number of highly urbanized municipalities, contrasted with extensive and sparsely populated rural territories. The framework reconceptualized settlement systems as dynamic, relational, and functionally interlinked rather than dichotomous. The study aligns the spatial classification practice in South Africa with globally methodological standards, to offer a robust, transparent, and scalable tool for evidence-based planning, governance, and formulation of policy.

Keywords: Urban–rural continuum; South Africa; Dominant Impact Factor; Spatial classification; Urbanization; Functional methodology; Post-2000 governance

1 Introduction

The classification of rural and urban areas in South Africa underwent a significant shift in 2000 with the enactment of the Municipal Systems Act [1], which introduced the notion of "wall-to-wall" municipalities and post-apartheid system, where municipal boundaries were redrawn to cover the entire country. This legislative reform rendered obsolete the prevailing definition of urban areas, which had relied on the presence of some forms of municipal governance as the defining criterion. The removal of this criterion created a conceptual and statistical gap in distinguishing between urban and rural spaces.

The issue has continued to hold importance, particularly in the light of government programmes and a growing array of policy initiatives depending on reliable distinctions between urban and rural contexts. Integrative planning processes, as well as explicit requests from other organizations, further underscored the necessity of establishing definitions that are both conceptually robust and practically useful. These dynamics have clarified the urgency to reformulate definitions of rural and urban in a way that aligns with evolving governance and developmental landscape in South Africa.

The South African experience is not unique. Internationally, definitional reform has often followed significant institutional or demographic changes. India, for instance, employs a hybrid definition of "urban" based not only on statutory governance but also on population thresholds, composition of workforce, and density indicators to reflect the uneven administrative structures in a country [2]. In contrast, the United States has adopted a statistical approach, with the United States Census Bureau [3] delineating "urban areas" according to minimum population densities and settlement contiguity, independent of political or administrative boundaries. European countries, under the influence of Eurostat and the Organization for Economic Cooperation and Development (OECD) [4], increasingly emphasize functional criteria such as commuting flows and economic integration to distinguish between rural and urban zones, recognizing that traditional municipal boundaries no longer adequately reflect patterns of settlement and interaction.

These international examples highlight two key trends. First, definitional frameworks have moved away from purely administrative criteria towards multidimensional indicators that combine demographic, economic, and spatial characteristics. Second, the growing adoption of functional approaches underscores the recognition that rural-urban distinctions are not static categories, but relational constructs shaped by development dynamics. Against this backdrop, the need to reformulate definitions is part of a broader global trajectory that seeks to ensure urban–rural classification. This remains relevant for policymaking, planning, and governance in rapidly changing spatial contexts.

The research aims to provide a robust and refined system for classifying urban and rural areas in South Africa, reflecting the institutional changes introduced by the Municipal Systems Act [1] in 2000. It establishes a scientific and transparent foundation for municipal classification and offered a systematic and standardized approach to distinguishing the types of settlement. The framework provides a standardized conceptual and analytical basis that enables empirically grounded, rigorous, and comparable assessments of municipal diversity, thereby contributing to scientific research targeted at strengthening the understanding and application of the urban-rural continuum.

2 Literature Review

The conceptualization of the urban–rural continuum has evolved significantly over the past century and this reflects broad theoretical and methodological transformations in development research, urban studies, and spatial analysis. Traditional binary classifications, which divide space simply into “urban” or “rural”, have been heavily criticized for their failure to capture the complex, transitional, and relational nature inherent in the settlement systems [5, 6]. These critiques spurred the development of the urban–rural continuum, which posits that rurality and urbanization exist along a gradient. This gradient is shaped by varying degrees of infrastructure provision, social interaction, population density, and economic activity [7].

Early formulations of the continuum primarily focused on occupational and demographic transitions, particularly in the industrializing contexts. However, subsequent academic work argued that such quantitative indicators were insufficient on their own, thus prompting calls for multidimensional frameworks that integrate socio-economic, functional, and spatial dimensions [8, 9]. Functional approaches, promoted notably by the OECD and Eurostat, define settlements based on accessibility of services, economic linkages, and commuting flows, rather than relying solely on administrative boundaries [4, 10]. This shift reflects an increasing recognition that urban and rural dynamics are co-constitutive within broader regional systems and that spatial relationships extend beyond jurisdictional boundaries.

Conceptually, the continuum is increasingly understood through a system lens, situating urbanization within wider territorial processes of development and transformation. Rather than viewing urban and rural spaces as discrete entities, this perspective recognizes them as dynamically interlinked components of a single settlement system. This system is characterized by continuous flows of goods, people, information, and services [11, 12]. Understanding this relation could provide the foundation for contemporary calls to redefine the urban-rural dichotomy in both policy and research, especially within contexts experiencing rapidly spatial and demographic changes.

Further literature enriched this relational view, with Bengs and Schmidt-Thomé [13] highlighting functional linkages, networked flows, and cross-boundary interdependencies as key shapers of regional development. In addition, Wandl et al. [14]] expanded analytical frameworks beyond traditional dichotomies by introducing the concept of “territories-in-between”, which emphasized transitional, peri-urban, and morphologically mixed landscapes.

In developing regions, the urban-rural continuum is a crucial analytical tool for understanding territorial integration, migration, and spatial inequality. Empirical studies in sub-Saharan Africa showed that the continuum was often characterized by fluid and hybrid settlement patterns, influenced by uneven infrastructure distribution, governance reforms, and historical legacies [15, 16].

South Africa serves as a key example of this complexity. The combined effects of the apartheid spatial legacy and post-2000 governance reforms, such as the Municipal Systems Act [1], have blurred conventional urban and rural distinctions [17]. The introduction of “wall-to-wall” municipalities effectively erases the administrative foundation for urban classification. This development necessitates a strategic shift toward functional and statistical criterion that better reflect patterns of economic activity and population concentration.

Recent scholarship has underscored the need to integrate spatial analytics and data to accurately capture intra-municipal variation in the dynamics of settlement [18, 19]. Techniques like geo-referenced socio-economic indicators, satellite imagery, and gridded population mapping have become central to identifying varying gradations of urbanization.

These methodological developments align with international initiatives aimed at harmonizing definitions across different contexts. The Degree of Urbanization Framework (DEGURBA), for instance, offers a globally comparable and scalable approach to distinguishing cities, rural areas, and towns. Eurostat and OECD [4] formalized this method, grounding it in population grid cells, density thresholds, and commuting flows to enable harmonized global classifications. Other works, such as that by Copus et al. [20], advanced rural typology by focusing on structural economic change, socio-economic diversification, and peripheralization dynamics, to underscore the inherent heterogeneity of rural areas. Hopkins and Copus [21] reinforced the need for flexible, data-driven, and context-sensitive typologies capturing small-town dynamics and hybrid spaces. More recently, Venter et al. [22] introduced the Multi-Source Classification Matrix, which integrated both conventional and unconventional datasets such as Census data, LandScan, tax records from the South African Revenue Service and National Treasury (SARS-NT), and the Visible Infrared Imaging Radiometer Suite (VIIRS) nightlight data to statistically assess consistency and rank stability across the population and economic indicators.

Collectively, the literature demonstrated a global convergence toward classification systems that are multidimensional, spatially explicit, and functionally grounded. The methodological framework centred on the Dominant Impact Factor (DIF) was designed to build upon these theoretical and empirical advances by operationalizing the urban–rural continuum through quantifiable indicators of demographic weight, economic production, and labour force participation. This approach helped situate the classification practice of South Africa within the wider international trajectory toward evidence-based, relational, and scalable definitions of urban and rural space.

3 Research Methodology

The proposed methodology for the DIF established a rigorously scientific foundation that enhanced the credibility and validity of the findings. The study adopted a positivist methodological paradigm [23], underpinned by the collection and analysis of quantitative data obtained primarily from census data. Positivism is inherently aligned with quantitative approaches, which emphasize measurable and objective phenomena. Statistical models were employed to test hypotheses and discern underlying patterns and relationships [24]. This methodological stance ensured the production of replicable and generalizable findings, particularly advantageous in socio-economic research contexts.

The research design was structured around spatial modelling, simulation, and mapping, which were further elaborated in the Result section. To ensure methodological rigor in the quantification, the study offered a transparent framework that explicitly outlined the procedures undertaken and the rationale guiding each step.

3.1 Dominant Impact Factor (DIF): Step 1

The DIF was employed as a composite indicator to distinguish between urban and rural municipalities. The calculation of DIF was undertaken for each municipality in relation to all others, in order to ensure that the measure reflected relative rather than absolute performance. This relational approach captured the functional dominance of each municipality within the national system by considering its comparative position on selected determinants. The DIF thus provided a consistent basis for assessing spatial hierarchies and served as the foundation for subsequent classification into urban and rural categories. The DIF was derived from three key determinants:

a. Population size (demographic weight of the municipality);
b. Workforce participation (labour force engagement); and
c. Economic production (gross domestic product (GDP)/gross value added (GVA) contribution).

Applying population size, workforce participation, and economic production as key determinants of dominance is essential because together these indicators capture the fundamental dimensions of spatial strength and influence. Population size provides the baseline magnitude against which labour and production dynamics are contextualised; workforce participation adjusts this demographic base to reflect effective economic involvement; and economic production weighs areas according to their relative contribution to economic generation. The resulting formulation ensures that areas with similar population size but differing levels of labour participation or economic output are distinctly differentiated. Considered jointly, these indicators provide a holistic measure of functional dominance, highlighting not only the scale of a place but also its productivity and socio-economic vitality. This integrated approach enables more accurate comparisons between areas. The DIF for each municipality is calculated using Eq. (1). This combined measure captures both the relative economic intensity and the overall productive contribution of each municipality:

$$\text{DIF}_i = \frac{\text{Labour}_i/\text{Population}_i}{\text{Total Labour}/\text{Total Population}} \times \frac{\text{Economic}_i}{\text{Total Economic}} \tag{1}$$

where, i denotes an individual municipality.

3.2 Quartile-Based Classification of Municipalities: Step 2

A quartile function was applied to the DIF distribution to assess its spread, central tendency, and overall variability, hence providing a systematic basis for comparing municipalities. The resulting quartiles grouped municipalities into relative levels of functional dominance: The upper quartile captured the most urbanized and economically influential areas; the middle quartiles represented intermediate or semi-urban municipalities with mixed characteristics; and the lowest quartile identified the least dominant, predominantly rural areas. This classification ensured that urban-rural distinctions were grounded in relatively functional significance rather than arbitrary thresholds, i.e., distinctions were based on context-dependent outcomes, rather than predetermined cutoff points. Importantly, the quartile-based approach reduced sensitivity to extreme values and non-normal data distributions, resulting in a more stable and reliable composite indicator.

To further refine this differentiation, quartiles derived from the DIF distribution were used to capture relatively functional dominance, while population thresholds were applied as complementary scale criteria. Together, these two dimensions allowed municipalities with similar levels of functional dominance but differing demographic magnitudes to be differentiated more precisely along the urban–rural continuum.

3.3 Municipality Classification: Step 3

While the quartile function offered a more robust classification method, it did not always provide clear distinctions among municipalities with mixed functional characteristics. To address the limitation, the approach was further refined into five distinct classes (Table 1), using both population size and the DIF as key differentiating criteria.

Table 1. Municipal classes

Category	Range of Population	Dominant Impact Factor (DIF)
Strong Urban	≥1,000,000 inhabitants	Above the 3rd quartile
Moderate Urban	300,000–1,000,000 inhabitants	Between the 1st and 3rd quartile, or above the 3rd quartile
Mixed Urban	300,000–500,000 inhabitants	Between the 1st and 3rd quartile
Mixed Rural	100,000–500,000 inhabitants	Below the 1st quartile, or between the 1st and 3rd quartile
Rural	≤100,000 inhabitants	Below the 1st quartile

Such classification is important because it establishes a systematic and standardized framework for differentiating the types of settlement, thereby creating a shared conceptual and analytical instrument through which the diversity of municipalities can be understood and compared. By moving beyond the reductive binary of “urban” versus “rural”, it advances a nuanced continuum of settlement categories that more accurately captures demographic realities and functional dynamics. In doing so, it provides a rigorous foundation for empirical analysis and spatial comparison.

3.4 Spatial Integration: Step 4

Once calculated, the municipal classes were spatially integrated into a common spatial frame to enable consistent comparison across areas. The process began by allocating geo-points, where the density and distribution of geo-points served as proxies for levels of development and the extent of the built environment. This supported the selection of an appropriate spatial frame for producing a harmonized layer that accurately reflected the distribution and patterning of functional classes, i.e., urban, rural, or mixed. Two spatial framing approaches could be applied: a Basic Spatial Unit (BSU) frame, represented as a uniform grid, or an Enumeration Area (EA)-based frame aligned with official statistical reporting boundaries. Integrating the classification output into either frame facilitated the transfer of functional attributes and enabled scalable and comparable analyses across different spatial extents.

Through this spatial overlay, each BSU or EA was attributed to one of the five municipal classes based on the underlying distribution of municipal classification. This procedure ensured alignment between municipal-level functional significance and fine-grained geographic representation, thus enabling the operationalization of urban–rural distinctions at the most granular spatial scale available. In the refined spatial configuration, the delineated BSUs or EAs corresponded to genuinely urbanized zones, effectively distinguishing functionally dominant urban cores from moderate, transitional, and rural zones within a municipality.

Lastly, although not part of the formal methodological steps, the soundness of the approach could be validated by examining the sample size allocation of the Community Survey. This process, to be discussed in detail in Section 4.2, provides supporting evidence that the methodological design is both coherent and empirically robust.

4 Results

The empirical evidence supported the validity of the proposed methodology. It was based on systematically collected and measurable data, including sources such as census datasets, and represented a core component of the scientific method. The evidence was primarily quantitative, and its rigor was ensured through the application of systematic steps.

4.1 Classification Results of Municipalities

The DIF combined with the quartile function and municipal classification, provided a composite measure for distinguishing between urban and rural municipalities (Table 2, Figure 1, and Figure 2). The calculation indicated that 37.26% of the national population was concentrated in the most dominant urban municipalities (Strong Urban), which comprised only 2.82% of all municipalities. The results confirmed the disproportionately demographic and economic concentration within a relatively small group of municipalities, thus underscoring their position at the apex of the municipal hierarchy and affirming their role as the most urbanized nodes in the national spatial system. This finding was further substantiated by their levels of population density, averaging 1,370 people per km², and by their limited spatial coverage of only 1.38% of the national territory, which highlighted the intensity of the settlement and economic activity within these areas.

Table 2. Dominant Impact Factor (DIF) combined with the quartile function and municipal classification

Category	Municipalities (%)	Population Share (%)	Persons per km²	Percentage of National Area (%)
Strong Urban	2.82	37.26	1,370	1.38
Moderate Urban	22.54	30.09	89	17.14
Mixed Urban	4.23	5.26	111	2.4
Mixed Rural	57.73	25.85	23	57.71
Rural	12.68	1.54	4	21.37

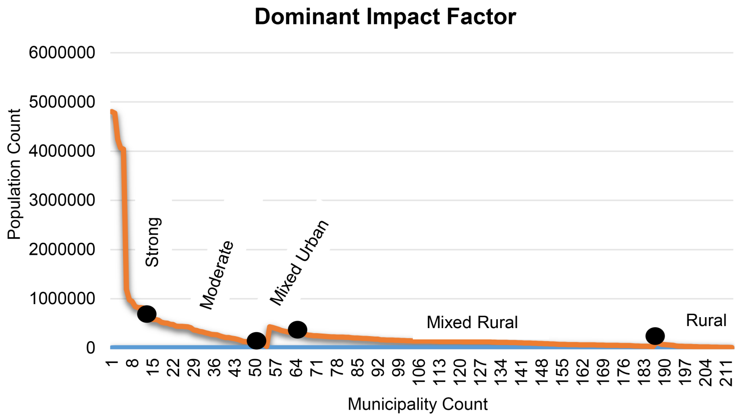

Figure 1. Distribution of municipalities ranked by the Dominant Impact Factor (DIF)

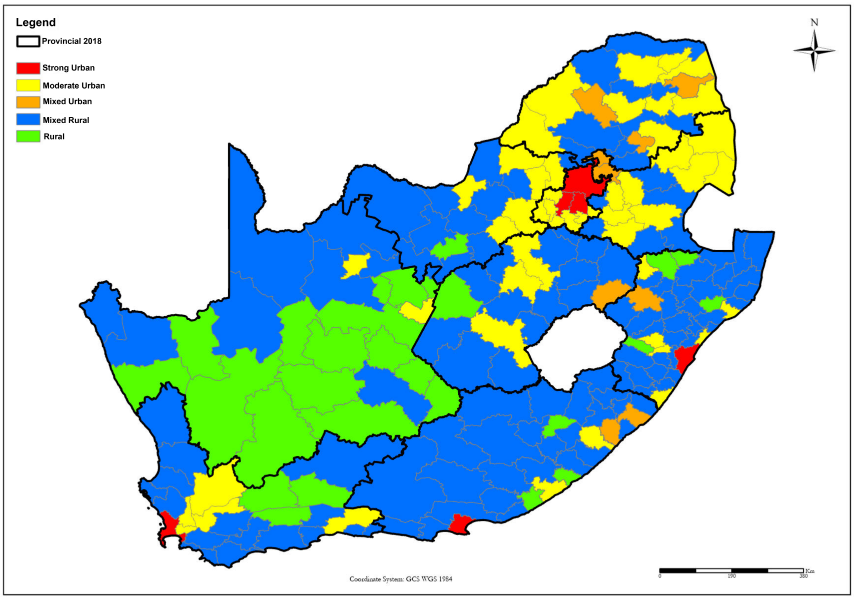

Figure 2. Municipal classification distinguishing between urban and rural municipalities

Moderate Urban areas, which constituted 22.54% of all municipalities, were likewise positioned within the upper tier of the urban hierarchy. Their aggregate demographic weight, accounting for 30.09% of the national population, combined with their relatively limited spatial coverage of only 17.14% of the national territory, reinforced their elevated status within the municipal hierarchy and affirmed their role as pivotal urban nodes in the national settlement system.

Mixed Urban municipalities, constituting 4.23% of all municipalities, represented a transitional zone within the settlement hierarchy and functioned as intermediaries between predominantly rural areas and the more consolidated urban centers. By contrast, Mixed Rural and Rural municipalities, which together accounted for 70.41% of all municipalities, exhibited an overall rural character. This was reinforced by their extensive spatial coverage of close to 80% of the national territory, combined with relatively small populations and low population densities. Taken together, these two classifications could be regarded as predominantly rural in nature, in order to underscore the extent to which the national settlement system remained territorially dispersed despite strong urban concentrations.

Table 1 and Figure 2 illustrate the level of urbanization, i.e., the extent to which the population of a region resides in urban areas, expressed as the percentage of people living in cities relative to the total population. The results indicated that municipalities classified as Strong Urban to Moderate Urban centers accommodating 67.35% of the population within only 18.52% of the total land area. This concentration reflected the highest degree of urbanization.

While the classification of municipalities and the DIF provided a robust metric for distinguishing between urban and rural municipalities at an aggregate level, its utility was constrained by the municipal scale of analysis. Extending this differentiation to a finer spatial resolution required the incorporation of spatial data at the micro level. This was operationalized by linking geo-referenced points to a spatial frame and aligning these with the functional dominance of their corresponding municipalities. In doing so, a harmonized urban–rural spatial layer was constructed that captured intra-municipal granularity. The methodological implementation of this integration is detailed in Step 4.

To substantiate the methodological design, an independent Community Survey dwelling-unit sample size allocation at the local municipal level was integrated with the classification outcomes of the urban–rural continuum. This triangulation allowed an empirical assessment (Table 3 and Figure 3) of whether the derived categories behaved in a manner consistent with theoretical expectations of the DIF. The descriptive statistics revealed clear and meaningful distinctions across the five classes, with systematic differences in magnitude, distribution, and internal variability. These patterns reflected the graded nature of settlements and demonstrated how the process of sample allocation captured the inherent variability across the urban-rural continuum.

Table 3. Descriptive statistics of central tendency and variability for municipal classes

Category	Mean	Median	Standard Deviation	Coefficient of Variation	Interpretation
Strong Urban	7,689	8,400	1,853	0.241	Highest values overall
Moderate Urban	1,909	1,698	941	0.493	Moderate values
Mixed Urban	1,839	1,831	510	0.278	Similar to moderate urban but slightly higher median
Mixed Rrural	1,032	962	319	0.309	Lower range
Rural	710	660	107	0.151	Lowest range

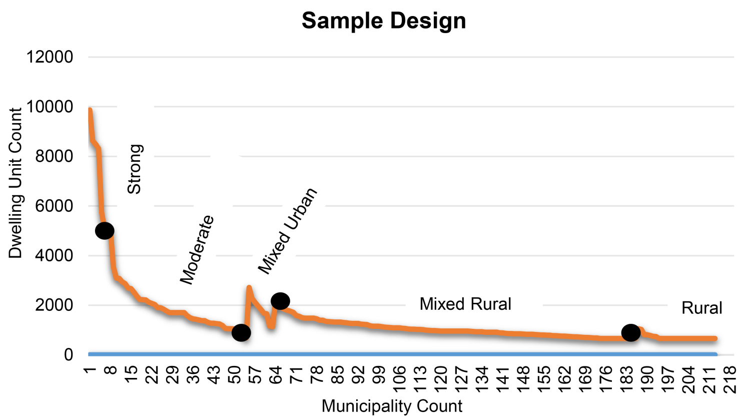

Figure 3. Distribution of central tendency values across municipal classes

The variables formed distinguishable value clusters with Strong Urban to represent the upper extreme, via displaying substantially higher mean and median values than all other categories. Although observations within this category were relatively sparse, the values indicated that the underlying phenomenon manifested at significantly elevated levels in highly urbanized areas. Moderate Urban and Mixed Urban constituted a mid-range cluster characterized by moderately central values. Despite their similarity in magnitude, Moderate Urban exhibited the highest coefficient of variation, pointing to considerable internal heterogeneity and reflecting the diverse conditions typical of environments with intermediate density. Mixed Rural and Rural formed the low-value cluster, with Rural recording the lowest mean and median values. Rural also had the smallest coefficient of variation, suggesting a relatively uniform pattern across observations consistent with the homogeneity found in the landscapes of low-density settlement.

Overall, the clustering observed across central tendencies and measures of variation confirms that the sample size allocation approach effectively differentiates settlement types in a manner consistent with theoretical expectations of the urban–rural continuum. The alignment between the statistical output and the conceptual logic of the classification provides strong evidence that the design of the methodology is both coherent and empirically robust.

4.2 Spatial Distribution of the Urban–Rural Continuum at Fine Scale

This step enabled scalable analysis and comparability across spatial extents by constructing a harmonized urban–rural spatial layer that captured intra-municipal granularity, thereby addressing the limitations of aggregation at the municipal scale.

To corroborate the functional character of each municipality, geo-points were first allocated to establish a direct link between levels of development and the functional dominance of the corresponding municipalities. This approach rested on the assumption that higher degrees of urbanization were indicative of more advanced stages of development (Table 4). The allocation of geo-points further reflected the understanding that greater levels of urbanization were typically associated with smaller and more spatially compact extents.

Table 4. Coverage and geo-points

Category	Population	Land Area Covered (km²)	Geo-Points	Geo-Points Share (%)
Strong Urban	23,113,511	16,871	4,077,623	29
Moderate Urban	18,663,915	209,218	4,475,823	32
Mixed Urban	3,264,394	29,287	798,346	6
Mixed Rural	16,033,462	704,514	4,333,313	31
Rural	952,224	260,942	306,042	2
Total	62,027,506	1,220,832	13,991,147	100

At the developmental level, the spatial distribution of EAs corroborated the underlying assumption. Strong Urban and Moderate Urban municipalities registered the highest concentration, i.e., 8,553,446 (61%) geo-points, whereas Mixed Rural and Rural municipalities recorded substantially lower values, i.e., 4,639,355 (33%) geo-points. This differentiation affirmed the relationship between functional dominance and stages of development, while simultaneously highlighting the disproportionately demographic and economic weights of urban municipalities, when considered against their comparatively constrained spatial extent. The values for Mixed Urban areas comprising a population of 3,264,394, a spatial coverage of 29,287 km^2, and 798,346 (6%) geo-points clearly illustrated their roles as transitional zones towards urban centers.

From a spatial perspective, Strong Urban and Moderate Urban municipalities occupied significantly smaller average areas (approximately 226,089 km^2) compared to Mixed Rural and Rural municipalities (approximately 965,456 km^2). This highlighted an inverse relationship between urbanization and spatial extent, whereby the smallest territorial units accommodated the majority of the population and economic significance.

From the allocation of the geo-points, functional classes including urban, mixed, and rural were assigned to a spatial frame, the lowest level of aggregation. For the purpose of the study, an EA frame was selected. In this way, the harmonized spatial layer reflected fine-grained functional distinctions within municipalities. A harmonized spatial layer was generated to reveal nuanced functional distinctions within municipalities. In this refined spatial configuration, the delineated EAs corresponding to the genuinely urbanized zones were exemplified in Gauteng Province (Figure 4). Gauteng Province was employed as a case study, owing to its high development intensity and pronounced functional dominance within the national settlement system.

The analysis also revealed that the municipal classification presented in Table 5 highlights clear inter-provincial differences within South Africa's settlement system. Although Gauteng Province comprises only 4.23% of municipalities, it reflected Strong Urban to Moderate Urban character.

In contrast, provinces with a larger share of municipalities—such as KwaZulu-Natal, Eastern Cape, and the Northern Cape—exhibit more dispersed settlement patterns and predominantly Mixed Rural or Rural profiles. Provinces such as the Western Cape, Free State, North West, and Mpumalanga occupy intermediate positions, combining Moderate Urban centres with Mixed Rural areas, thereby reflecting varied development intensity. Overall, the classification demonstrates that population size alone does not determine spatial dominance.

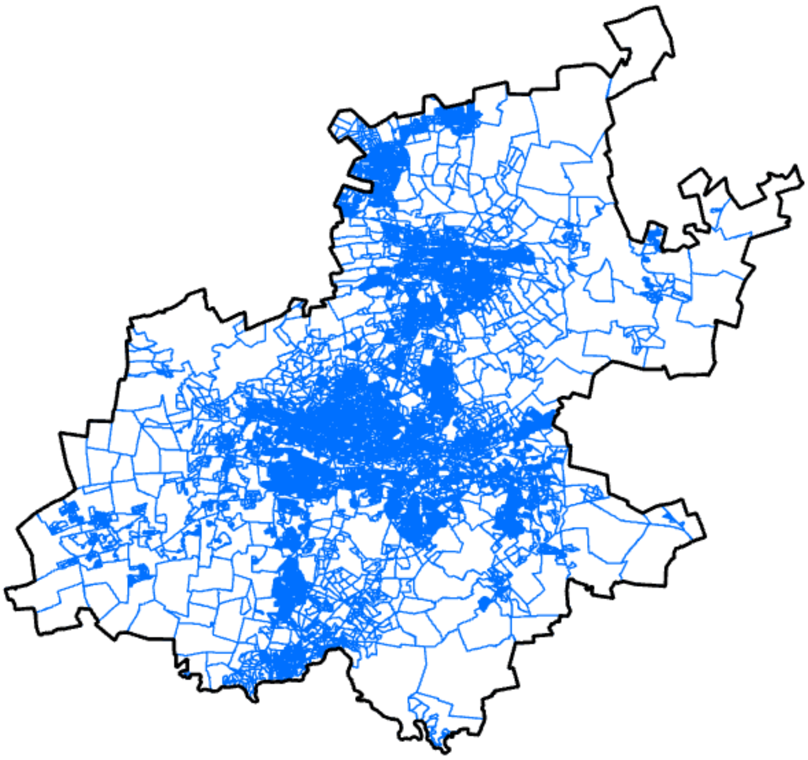

Figure 4. Gauteng's genuinely urbanized zones-at EA level

Table 5. Provincial-level municipal composition and predominant classifications

Province	Population	Total Municipalities	Municipalities Share (%)	Predominant
Gauteng	15,099,421	9	4.23	Strong Urban to Moderate Urban
KwaZulu-Natal	12,423,908	44	20.66	Mixed Rural
Western Cape	7,433,022	25	11.74	Moderate Urban to Mixed Rural
Eastern Cape	7,230,204	33	15.49	Mixed Rural
Limpopo	6,572,720	22	10.33	Moderate Urban
Mpumalanga	5,143,326	17	7.98	Moderate Urban
North West	3,804,546	18	8.45	Moderate Urban to Mixed Rural
Free State	2,964,411	19	8.92	Moderate Urban to Mixed Rural
Northern Cape	1,355,948	26	12.21	Rural
Total	62,027,506	213	100	

5 Discussion

The empirical results revealed two interrelated yet analytically distinct dimensions of the settlement system in South Africa: the degree of urbanization and the extent of the built environment. Urbanization represents a dynamic process driven by demographic transition, structural economic change, and spatial reconfiguration through which populations and productive activity concentrate in specific localities. Constituting the spatial manifestation of this process, urban areas denote territories with intensified human activity, high population density, and diversified economic structures. The interplay between these two dimensions underscores the dual nature of spatial transformation: one processual and the other morphological.

The classification outcomes based on the DIF demonstrated that the post-2000 settlement landscape of South Africa was highly polarized. A small proportion of municipalities, categorized as Strong Urban and Moderate Urban centers, accommodate the majority of the population and economic production within a relatively constrained spatial footprint. Conversely, extensive rural territories, though dominant in land area, exhibit low demographic density and limited economic activity. This pattern confirms the persistence of structurally and spatial asymmetry, with developmental potential concentrated in a limited number of functionally dominant urban nodes.

The methodological framework provides a functionally grounded mechanism for defining urban, mixed, and rural spaces:

- **Urban areas** are characterized by high levels of functional dominance, dense populations, strong economic concentration, and advanced developmental indicators.
- **Mixed areas** occupy an intermediate position, blending urban and rural characteristics and serving as transitional zones within the national hierarchy.
- **Rural areas** exhibit low demographic density, limited economic activity, and weaker functional integration within the broader system.

This relational classification moves beyond static administrative boundaries, to offer a dynamic depiction of the urban–rural continuum that more accurately reflects the spatial economy in South Africa, particularly tailored to its governance and spatial realities. It emphasizes functional interdependencies such as labour mobility, service flows, and market linkages rather than jurisdictional separation. However, its effectiveness is constrained by the availability and frequency of updates to the socio-economic data.

The findings also reaffirm that urbanization remains a key driver of spatial transformation in the post-apartheid era. The concentration of population and production within dominant municipalities illustrates the ongoing centralization of opportunity, while the persistence of vast and sparsely populated rural areas signals enduring territorial inequality. These dynamics highlight the critical importance of integrating functional classification into spatial planning, infrastructure investment, and regional policy. Future research should build upon this foundation by incorporating additional indicators such as migration flows, sectoral diversification, and network connectivity to further refine the understanding of spatial transformation as both a demographic and structural-economic process.

6 Conclusions

The study developed and validated a comprehensive methodological framework for understanding the urban–rural continuum of South Africa in the post-2000 governance era. By addressing the conceptual gap introduced by the Municipal Systems Act, the framework re-established a functional basis for differentiating the types of settlement using the DIF. As a composite measure of demographic weight, labour-force participation, and economic production, the DIF provided a statistically transparent and replicable mechanism for assessing municipal dominance. The quartile-based and five-category classification system further ensured that distinctions between urban, mixed, and rural municipalities were grounded in measurable and relational indicators rather than administrative convention.

Empirical results confirmed the validity and analytical value of the framework. The findings highlighted the structural concentration of population and economic activity within a small number of dominant urban municipalities, alongside extensive but sparsely populated rural territories. The incorporation of eo-referenced data at the BSU or EA level frame allows differences within municipalities to be identified and functional areas to be clearly defined. This fine-grained spatial layer strengthens the capacity to characterize development intensity, spatial hierarchy, and patterns of built environment with greater precision.

Conceptually, the framework contributes to ongoing global debates that call for moving beyond binary classifications of urban and rural spaces. By positioning municipalities along a functional continuum, the approach aligns South Africa's classification practices with international standards, while retaining sensitivity to national spatial realities. It reframes settlement systems as relational, dynamic, and products of demographic concentration, economic integration, as well as spatial interaction rather than discretely administrative zones.

The methodological and empirical insights offered in this study have direct implications for planning, governance, and policy. A functionally grounded urban-rural classification enhances the accuracy of spatial targeting, supports equitable resource allocation, and strengthens evidence-based decision-making in areas such as infrastructure investment, service delivery, and regional development. The framework also provides a robust foundation for future analytical extensions that may incorporate additional indicators, such as mobility patterns, structural economic changes, or network connectivity, thereby improving the capacity to monitor spatial transformation over a long period of time.

In sum, the DIF framework offers a scalable and transparent tool that advances the statistical and conceptual understanding of the evolving settlement system in South Africa. By articulating the urban-rural continuum through a functional lens, it contributes both to national spatial analysis and to broader international scholarship on urbanization, territorial inequality, and development trajectories.

Data Availability

The data used to support the research findings are available from the corresponding author upon request.

Conflicts of Interest

The author declares no conflicts of interest.

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