Proposing an Analytical Framework for Impact-Analysed Integrated Urban Planning in Support of Sustainable Development and Social Progress in South Africa

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Abstract

The Integrated Development Planning (IDP) process is intended to be more than a legislative requirement; it is designed as a tool to measure the outcome and impact of development initiatives. However, development and social indicators are currently lacking in measuring the sustainable and long-run implications for growth, development, and social progress. The paper proposes a methodological approach comprising (1) the identification and development of relevant development and social progress metrics and (2) the development of an analytical framework capturing the integrated complexities of the urban planning environment. In follow-up research, the framework and set of indicators will be expanded into a quantifiable and analytical tool, allowing for customised and empirical impact assessments on the urban level. This paper develops a structured and methodological approach to support evidence-based integrated development planning and implementation by local government in South Africa.

Keywords: Integrated Development Planning, Systems Approach, Development Framework, Objective Criteria, Urban Development metrics.

1. Background

Urban regions are the engines of the 21st-century global economy. Generating an estimated 80% of global GDP and now home to 56% of the world's population, their significance is undeniable (Medeiros & Van der Zwet, 2020). Projections indicate that by 2050, seven out of every ten people will live in a city. Despite this rapid expansion, urban regions continue to grapple with chronic issues such as poverty, segregation, inequality, unemployment, and environmental degradation (McCann, 2015). The World Bank (2023) suggests that managing urbanisation effectively is key to sustainable development, as it can unlock greater efficiency, innovation, and social progress. This research proposes that such a vision can be realised globally through integrated urban development and data-driven planning, leading to improved living conditions, reduced inequality, and a more sustainable environment.

The concept of "integrated development" emerged in the late 1980s as a systematic strategy aiming to concurrently achieve economic growth, environmental sustainability, and social equity (WCED, 1987; Koshkalda et al., 2023). The Leipzig Charter on Sustainable European Cities (2007) further refines this, defining integrated urban development as the harmonisation of the geographical, sectoral, and

temporal dimensions of urban policy. Ferry et al. (2018) elaborated that for an integrated policy to be effective, it must operate on three levels: a strategic level to improve synergies within policy frameworks, a monetary level to combine diverse financing sources for place-based initiatives, and an operational level to execute integrated actions on the ground.

However, the concept of integrated development is both complex and contentious, primarily because it acknowledges the inherent interdependence and necessary trade-offs among social, environmental, and economic factors. The fundamental challenge lies in striking a balance between these pillars of sustainability at various scales to create the most effective strategy for a specific context (Van der Waldt et al., 2018). Successfully managing development across multiple territorial levels and among diverse stakeholders requires both multi-level governance and a place-based approach (European Commission, 2020). Consequently, the process is often slow and iterative, necessitating continuous learning and adaptation to achieve desired outcomes (UNDP, 2022).

A strong consensus among academics and policymakers holds that objective indicators are required to measure the performance of these complex processes and to distinguish success from failure (Davis et al., 2012; Kelley & Simmons, 2015; Babri, 2023). Yet, because integrated planning is multifaceted, decentralised, and context-specific, a uniform, objective method for measuring its impact remains elusive, and implementation is frequently subjective (ESPON, 2018). Consequently, much of the existing research on integrated development planning focuses on its contributions to institutional and governance frameworks rather than its direct effectiveness in fostering sustainability and social advancement (Oranje, M, & Van Huyssteen, 2011). This gap highlights the need for new instruments, such as a robust analytical framework, to assess progress toward these critical goals.

This research aims to address this methodological gap by proposing a framework for integrated development planning geared towards long-term sustainability and societal advancement. This framework advocates for a comprehensive, cross-sectoral, multi-level governance plan that spans numerous policy domains to better integrate diverse financing sources and implement a results-driven approach. A key outcome will be a comprehensive monitoring and assessment mechanism to promote long-term development and social improvement. Given the localised nature of integrated development planning, this paper will focus on South Africa as a case study.

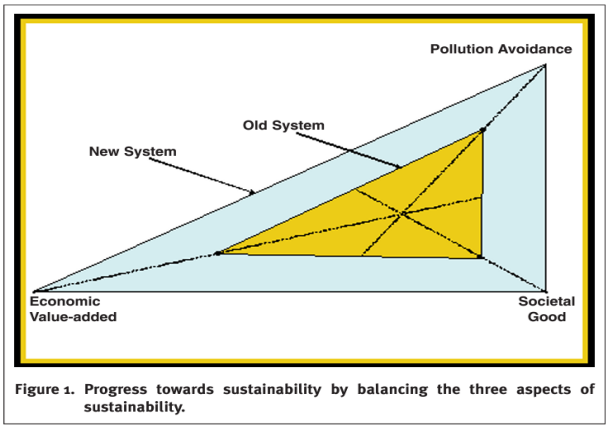
The study begins by briefly reviewing the relationship between integrated and sustainable development. It then highlights South Africa's efforts in integrated development, followed by the proposed methodology to create a framework for measuring its impact. Finally, the paper will conclude and offer recommendations based on the findings.

2. Theoretical Foundations and Metrics for Sustainable City Planning

For much of its history, urban planning operated under a modernist, top-down paradigm that emphasised centralised control and rigid spatial blueprints. However, the accelerated urbanisation of the last 50 years has increasingly exposed this model's profound shortcomings. Its bureaucratic inefficiencies, compartmentalised management, and disregard for local context led to significant failures, particularly within the complex environments of developing countries. Facing this crisis of relevance, urban planning began a necessary transition towards more flexible, integrated, and participatory methodologies. At the heart of this shift was the rise of sustainable development as a global imperative (Watson, 2009).

This new focus was cemented by pivotal global events, including the 1992 Earth Summit in Rio de Janeiro and the 2002 World Summit on Sustainable Development in Johannesburg. These summits brought sustainability into the mainstream policy discourse, laying the foundation for the

Millennium Development Goals (MDGs) and the subsequent Sustainable Development Goals (SDGs). In response, the United Nations began to advocate for decentralised, integrated planning models that were responsive to local socio-political conditions (Munzhedzi, 2020). This approach required planners to move beyond physical infrastructure and land use to incorporate a complex web of intersecting priorities. Effective planning now had to balance three core domains: environmental protection (ecosystem integrity), economic development (income and consumption), and social equity (well-being and justice), while also navigating local cultural, historical, and institutional dimensions (Maserumule, 2017; Villeneuve et al., 2017).



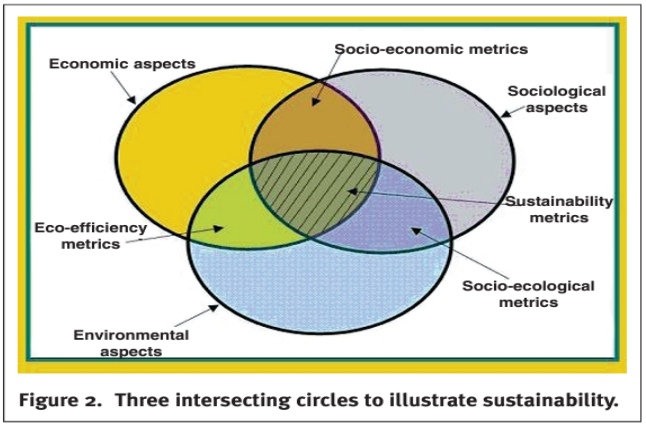


Figure 1: Triangle model of Sustainability. Source: Munasinghe, 1992, Intersecting Circle diagram on Sustainability, United et al., 2005).

The inherent complexity of balancing these goals created an urgent need for tools to measure and visualise progress. Early attempts produced influential but simple models. Munasinghe's (1992) Triangle Model, for example, offered a one-dimensional way to track changes across the three pillars over time. A widely adopted evolution was the Three-Circle Diagram, which better illustrated the overlaps and potential synergies between the social, environmental, and economic domains (United et al., 2005). However, a significant critique of these early frameworks was their largely qualitative nature and the lack of quantifiable methods to track progress meaningfully (Hawken et al., 1999).

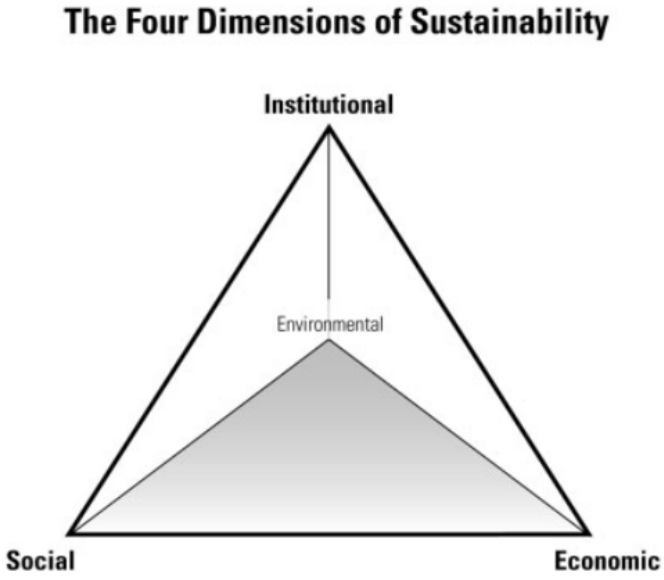


Figure 2: Prism of Sustainability. Source: Spangenberg, 2002.

Seeking to bridge the gap between these abstract models and institutional reality, Spangenberg (2002) introduced the Prism of Sustainability. This model incorporated a crucial fourth dimension: institutions. Spangenberg argued that governance structures, political decision-making, and societal norms fundamentally shape sustainability outcomes and cannot be ignored. While this was a conceptual leap forward, it introduced a new challenge: measuring institutional influence is inherently difficult, as political decisions have diffused, non-linear impacts that are hard to capture with simple indicators.

Ultimately, this evolution of thought highlights a persistent and critical gap in the field. Despite decades of work, no universally accepted methodology exists for assessing the integration of sustainability principles in urban areas (Koshkalda et al., 2023). Given that sustainability goals are mediated by diverse socio-political realities, universal metrics are difficult to apply uniformly (WCED, 1987; Kondepudi, 2014). This challenge is compounded by capacity constraints in many low- and middle-income countries, which hinder the consistent application of monitoring and evaluation systems (United Nations, 2023). This measurement gap limits the effectiveness of planning instruments like Integrated Development Plans (IDPs) and reinforces the need for new analytical frameworks. Recognising this, SDG Target 17.18 explicitly calls for increased statistical capacity in the Global South to ensure that sustainability data is disaggregated, timely, and reliable. The following section will explore the practical application of integrated development planning in South Africa, which forms part of the global South.

3. The South African Context to Integrated Planning

By the early 1990s, it became evident that the modernist, top-down planning model of the apartheid regime had become obsolete in addressing South Africa's deeply fragmented spatial and social landscape. Urban planners and policymakers recognised the urgent need for a more inclusive, context-sensitive strategy to drive spatial and administrative restructuring (Harrison, 2016). In response, the Local Government Transition Act (Act 209 of 1993) introduced a shift toward integrated development, paving the way for the Integrated Development Plan (IDP) in 1994. The IDP was designed to foster intergovernmental cooperation across national, provincial, regional, and local spheres. It also aimed to promote rural-urban integration, encourage cross-class social interaction, and redress poverty and inequality through resource redistribution (Binns & Nell, 2002).

This paradigm shift was further entrenched by the 1996 Constitution of the Republic of South Africa (Act No. 108 of 1996), specifically Sections 151–153, which institutionalised decentralisation. These provisions mandated that national and provincial governments support and strengthen municipalities to manage their own affairs effectively. Section 151(1) emphasised the imperative for local governments to operate transparently, democratically, and in a developmentally oriented manner, prioritising sustainable service delivery and community engagement.

Building on these constitutional foundations, the 1998 White Paper on Local Government advanced the concept of "developmental local government," outlining four key pillars: (a) enhancing social and economic development, (b) promoting intersectoral integration and coordination, (c) democratizing development processes, and (d) cultivating adaptive and learning institutions (Department of Provincial and Local Government, 1998; Van der Waldt, 2018). These principles have since guided the structural and operational transformation of municipal governance in post-apartheid South Africa (Munzhedzi et al., 2022).

The formal implementation of this new system began with the 2000 local government elections, after which municipal boundaries were reconfigured to integrate formerly segregated administrations. This consolidation reduced 1,262 racially divided local authorities to 284 unified municipalities

(Jeeva & Cilliers, 2021). Despite the intent to redistribute resources equitably, insufficient data and limited knowledge about functional integration strategies posed significant challenges.

The Municipal Systems Act (Act 32 of 2000), particularly Section 35, provided a legal definition of IDPs as participatory planning processes that integrate sectoral strategies and allocate resources across geographic areas, sectors, and population groups. This integration was intended to foster sustainable development, equity, and community empowerment (Van der Waldt et al., 2018). Consistent with international planning standards, IDPs were required to identify development challenges, establish measurable objectives, and outline actionable implementation plans.

The Act also mandated that IDPs articulate a long-term vision aligned with municipal stakeholder priorities, linking financial and institutional resources to implementation strategies (Munzhedzi & Phago, 2020). However, the participatory nature of IDPs often led to fragmented or competing demands, which were not consistently guided by clear, evidence-based indicators (Parnell & Poyser, 2020). To address this, the Department of Planning, Monitoring, and Evaluation (DPLG, 2000) introduced frameworks for public participation, but these lacked quantifiable metrics, making it difficult to assess the integrity or impact of implementation efforts.

A 2021 study by Marais, Human, and Botes found that development indicators were inconsistently applied across municipalities, resulting in significant variation in the quality and utility of IDP content. While some municipalities employed robust statistical analysis, others relied on anecdotal or outdated information. Compounding this issue, the National Development Plan (NDP): Vision 2030, despite a 74% alignment with the United Nations Sustainable Development Goals (SDGs), lacked a structured implementation framework to coordinate priorities such as poverty reduction, job creation, and inclusive economic growth. The Medium-Term Strategic Framework (MTSF) was introduced to fill this gap, yet it remains poorly aligned with provincial and municipal planning instruments such as the Provincial Growth and Development Strategy (PGDS) and IDPs (Geyer, 2006).

This misalignment has weakened the coherence and long-term adaptability of development planning across government spheres. As a result, the effectiveness of IDPs remains largely unverified (Valeta & Walton, 2008), reinforcing the need for measurable and objective indicators to assess performance, ensure accountability, and track progress toward sustainable outcomes (Marais et al., 2021).

The urgency of reform is further underscored by recent performance audits. In 2023, Zeeman reported that 229 of South Africa's 257 municipalities (89.1%) were deemed dysfunctional. The Auditor-General's 2022 report revealed material irregularities totalling R3.9 billion during the 2021–22 financial year, with R1.6 billion directly linked to governance failures (Lekabe, 2023). The financial viability of nearly 28% of municipalities was in such jeopardy that their ability to continue operations was in serious doubt (Auditor-General of South Africa, 2018).

According to Deputy President Paul Mashatile (2023), municipal failures stem from poor governance, inadequate institutional capacity, mismanagement of finances, and persistent political instability, all of which erode service delivery and public trust. These systemic issues suggest that the conceptual soundness of IDPs is often undermined by implementation deficiencies (Munzhedzi, Phago & Mubangizi, 2022).

Municipal practitioners cite a range of barriers, including limited access to data, insufficient technical skills, inadequate assessment frameworks, weak research support, political interference, and constrained financial resources (Marais et al., 2021; Valeta & Walton, 2008). Recommendations for addressing these challenges include improving participatory mechanisms, enhancing fiscal discipline

(especially regarding the Municipal Infrastructure Grant), fostering stronger interdepartmental coordination, and reinforcing feedback loops between planning and implementation.

While existing literature successfully identifies the need for integrated development and documents its failures in South Africa, significant gaps remain. Conceptually, there is a need for frameworks that move beyond identifying trade-offs to providing practical mechanisms for their resolution. Methodologically, the literature lacks dynamic models that link the quality of governance processes, like public participation, to tangible sustainability outcomes. Finally, in the South African context, there is a clear gap in providing municipalities with a replicable process to overcome the well-documented misalignment between local, provincial, and national plans. This research addresses these gaps by proposing a robust analytical framework that is not only a measurement tool but also a procedural guide for achieving genuine, data-driven, and vertically aligned integrated development. The following section will briefly discuss the methodology and findings of the study.

4. Methodology

This research proposes an analytical systems approach to urban planning, thereby integrating the spheres of sustainable development, i.e., economic, social, and environmental. The methodology incorporates the municipality's national, institutional, and development realities.

The objective is to enhance urban planning through dynamic, econometric-modelled impact analysis of the municipality's financial, capital, and strategic decisions. To achieve this, a sustainable development impact module (SIM) is developed as an interface with the suite of models. The SIM generates impact values of the development projects in terms of a set of economic, socio-economic, and environmental indicators for the municipality and a selection of key sub-regions and/or wards.

The impact indicators are part of a comprehensive framework that incorporates important planning considerations, including mayoral and policy priorities. This integration fosters interactive, participatory, and evidence-based decision-making within the municipality and district. To facilitate this process, the framework features a flexible and customisable weighting interface. By deliberately selecting weights, decision-makers and policymakers are provided the opportunity to align their municipal and policy priorities with the empirical results produced by the SIM.

5. Operationalising the analytical planning framework.

Given the complexity and the planning environment, a customised suite of econometric models is applied to populate a forward-looking, multi-dimensional and space-oriented analytical framework for assessing planning scenarios' dynamic and integrated impact in the long run. These models are developed to represent the unique structure and characteristics of the South African economy – qualitative and quantitative – and to capture and quantify the driving micro-macro linkages. The fundamental principle is to follow an integrated and multi-dimensional approach in quantifying the structural characteristics, specifically the planning environment's pricing structure, productive capacity, and structural impediments.

The objective is to provide constructive and evidence-based guidance for sustainable development planning. Figure 4 depicts a flow diagram of the main modelling framework's characteristics, including the interrelated decision-making behaviour between households, labour, industry, business, finance, government, and global role players. It furthermore captures the socio-economic profile and allows for the impact of exogenous shocks such as geopolitical conflict, extreme weather phenomena, and labour actions.

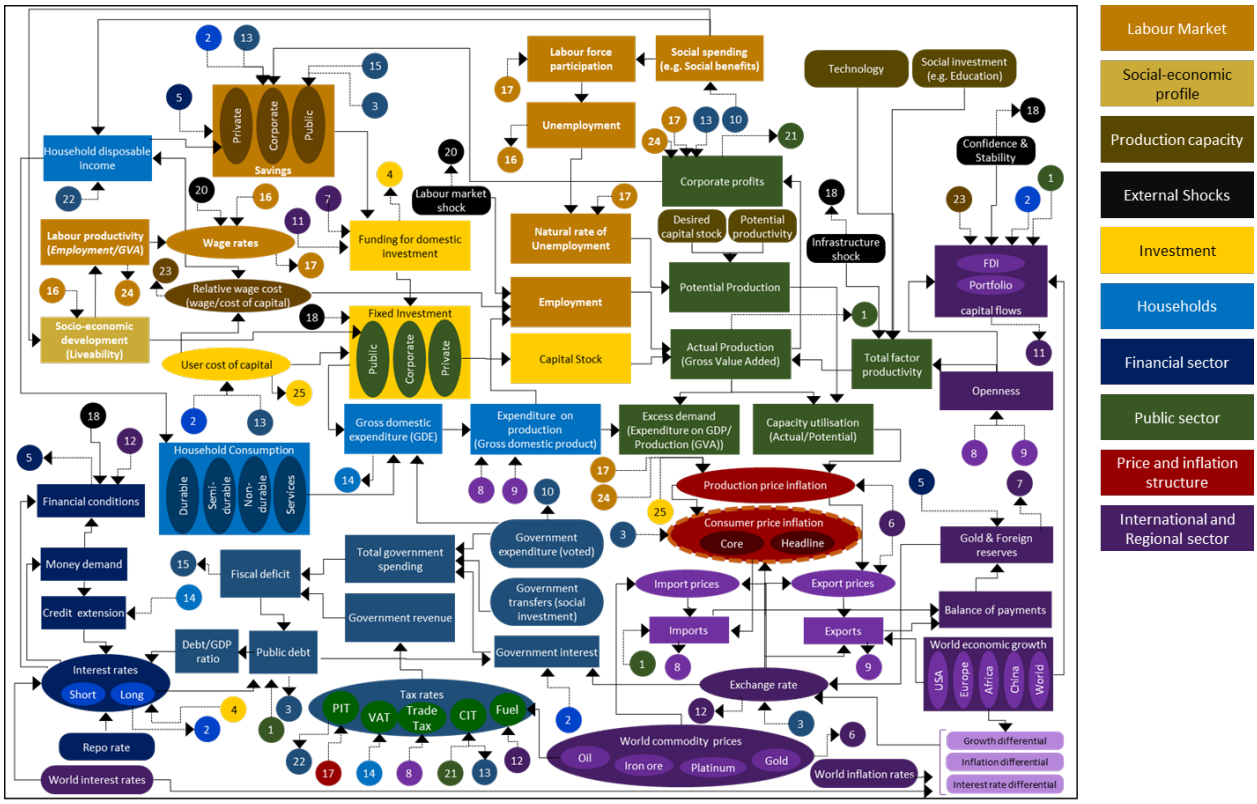


Figure 4: Flow diagram of the core modelling structure. Source: Author.

The modelling framework comprises the dynamic integration of a system of models. The basis of the system is a country-specific, macro-econometric model that combines the national, regional, and international realities (Figure 5). The core model is dynamically integrated with an industry model and a set of space-specific, disaggregated models.

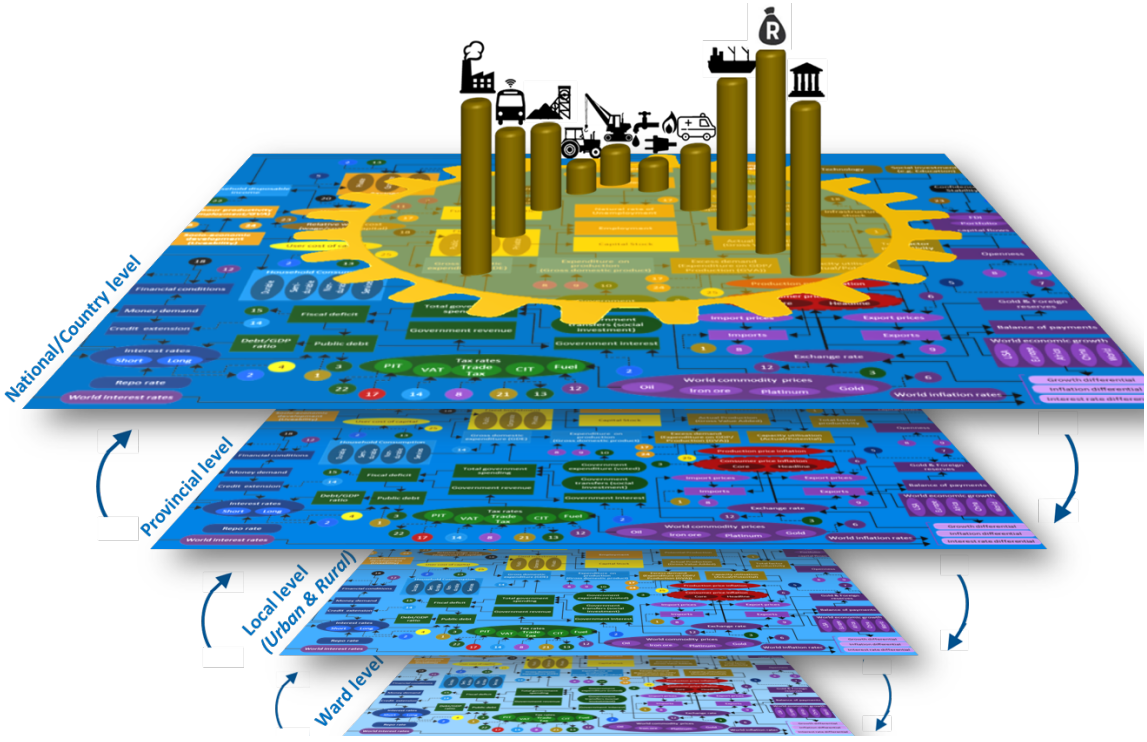


Figure 5: An integrated suite of space-specific, disaggregated models. Source: Author.

The suite of models is applied to generate an interrelated system of quantified economic multipliers that form the empirical interface with the sustainable development impact module (SIM).

An economic multiplier may be interpreted as a single value representing the full iterative, multi-dimensional and dynamic impact on an economy due to an initial intervention. These multipliers (system multipliers) are unique because they have been generated by a comprehensive and dynamic macro-econometric modelling process. Therefore, they capture all the iterative feedback effects over time between all economic agents within the structural and institutional characteristics of the modelled economy.

The system multipliers are estimated by submitting the interlinked macro- and industry models to a range of selected impact scenario simulations and calculating the net change on the response indicators of interest in terms of the system's exogenous or 'shocked' indicators.

Subsequently, the multipliers are mapped onto the municipality's spatial decomposition within the provincial and national context and integrated with a space-specific sustainable development impact module (SIM) as the empirical core and interface with the suite of models (Figure 6).

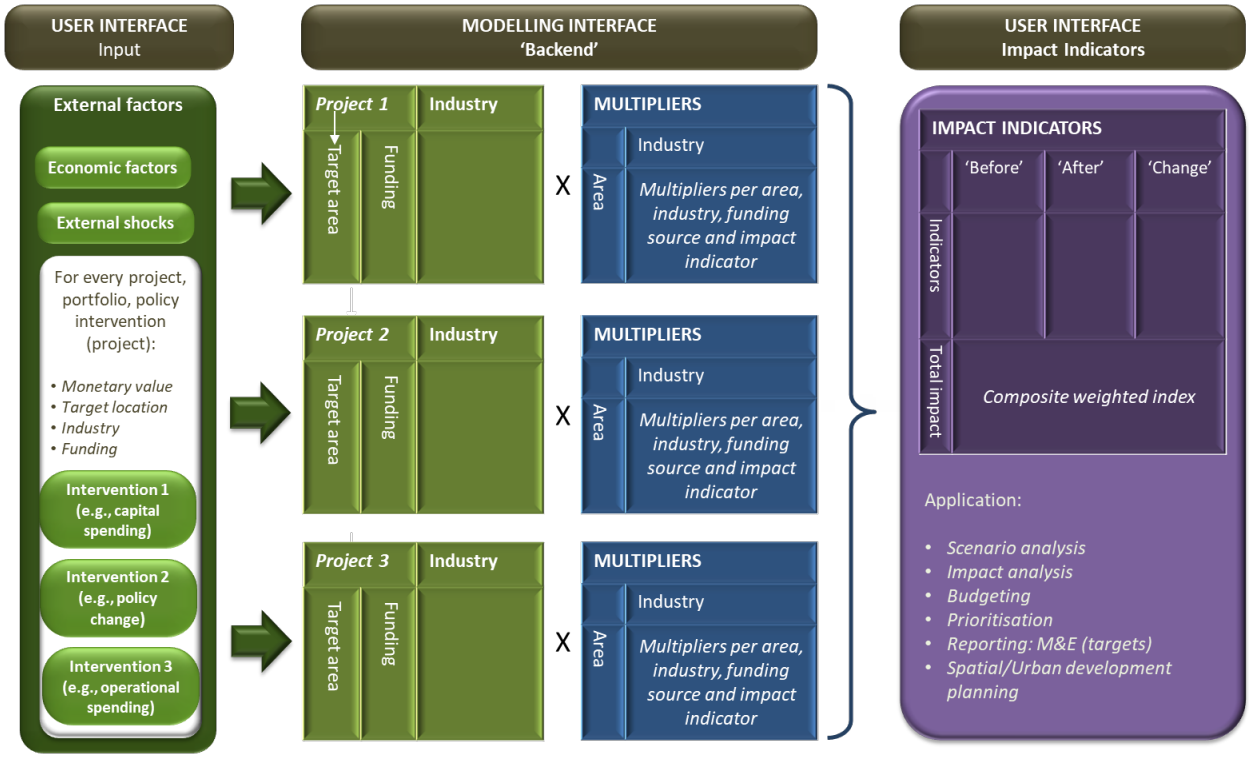


Figure 6: The Sustainable Development Impact Module – SIM. Source: Author.

The SIM may be integrated into existing digitised municipal planning systems or be developed into an independent, standalone simulator tool with a direct user interface capability. Irrespective of the operational interface, the SIM extracts input data from existing systems or allows users to provide inputs regarding the monetary value of selected interventions, such as capital infrastructure investment, operational expenditure, funding, and policy changes. The SIM also allows users to run various scenarios given expectations and/or the likelihood of external factors such as economic factors and external shocks. As such, the SIM is dynamic and considers the indirect, municipal-wide impacts of projects and interventions.

The SIM produces a set of singular, quantified numbers (impact indicators) capturing the consolidated and integrated impact responses to the interventions within the dynamic planning environment, which is represented through the suite of interlinked models. The impact indicators have strong analytical power since they break down the structural composition, causes, and effects throughout the economy under investigation.

The individual impact indicators are incorporated to construct a composite weighted index to provide a more comprehensive and holistic representation of the sustainable development impact.

Given the systems approach to developing SIM impact indicators, they are unique from those produced by static and singular-dimensional frameworks and methodologies such as Input-Output tables (I-O) and Social Accounting Matrices (SAM).

Furthermore, the SIM methodology allows for long-run, forward-looking analysis; provides contextual, i.e., system-wide analysis; historical performance insights ('before', 'after' and 'net change'); spatially integrated and industry-specific analysis.

6. Data Analysis

The SIM relies on the data from the projects and interventions, and economic, socio-economic, and environmental data from other sources. The back-end econometric modelling and the subsequent outputs are conducted and presented at a project-specific geographical level (applying official demarcated policy documents and data) and for the municipality and/or district.

All data are obtained from official sources, notably Statistics South Africa. The following South African statistical publications form part of the modelling and SIM database:

- Quarterly Labour Force Surveys (various)
- Latest Census statistics
- General Household Surveys (various)
- Quarterly Gross Domestic Product (various)
- Industry surveys
- Community surveys
- Quarterly financial statistics of municipalities
- International Energy Survey
- Environmental statistics and surveys
- Sustainable development indicators

The selection of sustainable development indicators must be relevant and representative of the national and urban context, in this case, South Africa. As such, the choice of impact indicators for planning purposes needs to take into consideration (1) the relevant national and other applicable policy objectives, (2) the relevant international standard for measurement of sustainable development, and (3) the interdependency with the system, both for each of the individual indicators and composite indices. (South Africa SDG country report, 2023)

Applying these principles to local government implies prior knowledge of the municipality's economic, development, and environmental profiles. The proposed systems methodology allows

for the scalability of reporting impact indicators representing different spatial constructs or sub-regions, e.g., ward level.

A set of appropriate, measurable, and representative indicators is selected according to the principles outlined in the previous sections. This set of indicators is to be customised to align with (1) the population's development and socio-economic profile, (2) the purpose of the analysis, and (3) the availability of quality data by including or excluding specific indicators (phenomena).

In this research, the following impact indicators and indices are generated as a minimum representative reporting structure:

Table 1: Sustainable impact indicators and indices

Sustainable Development Category	Indicators and Indices	Sub-indices/indicators	National	Urban
Economic impact	Weighted Economic Impact Index	Economic activity (Gross Domestic Product – GDP): industry-specific	X	X
		Domestic investment (Capital formation): industry-specific	X	X
		Employment: industry-specific	X	X
		Trade and Balance of Payments (Current account deficit as a percentage of GDP	X	
		Fiscal deficit as a percentage of GDP	X	X
		Corporate profits	X	
Development impact	Labor productivity	Labor productivity	X	X
	Unemployment rate (expanded)	Unemployment rate (expanded)	X	X
	Job creation	Job creation	X	X
	Equality	Income distribution (Gini coefficient)	X	X
	Liveability index	Poverty incidence	X	X
		Living conditions profile		X
		Travel conditions profile		X
		Income stress rate		X
	Poverty incidence	Disposable per capita income	X	X
		Potential savings rate (surplus income)	X	X
		Food expenditure ratio	X	X
		Housing expenditure ratio	X	X
		Transport expenditure ratio	X	X
	Living conditions profile	Type of settlement (dwelling)		X
		Access to municipal services		X
		Access to amenities (health, education, and security)		X
	Travel conditions profile	Travel distance and time		X
		Travel reliability		X
		Travel safety and security		X
	Income stress rate	Employment dependency ratio per household	X	X

Sustainable Development Category	Indicators and Indices	Sub-indices/indicators	National	Urban
Environmental impact	Environmental impact index	Carbon emissions	X	X
		Energy efficiency/intensity		X
		Waste management efficiency		X
		Water quality		X
		Water resources and availability		X

Source: Author

6.1 Index weighting

In this study, we adopt a transparent and methodologically straightforward approach by implementing an equal weighting scheme for our selected indices. While more complex methodologies—such as principal component analysis or factor analysis (Delchambre, 2014), regression-based weighting (Becker et al., 2017), and data envelopment analysis (Pourhabib Yekta et al., 2018)—can facilitate the derivation of statistically sophisticated allocations, they often entail intricate technical complexities and assumptions that are contextually specific.

Moreover, expert- and stakeholder-driven approaches, such as budget allocation (Greco, 2018), the analytic hierarchy process (Saaty, 1980), and conjoint analysis (Green et al., 1978), offer valuable insights that strive to balance subjective judgments with empirical rigour; however, these methods may inadvertently introduce normative biases that obscure objectivity.

In contrast, the adoption of an equal weighting scheme engenders a clear and impartial framework, whereby no single indicator is afforded undue preference absent a compelling rationale. This methodological choice is congruent with our commitment to clarity and accessibility in research practices, rendering the implementation of an equal weighting scheme not only valid but particularly appropriate for the objectives of our analysis.

6.2 Interactive and participative planning

The SIM impact indicators are incorporated into a weighted planning prioritisation framework to facilitate interactive and participative planning based on scientifically generated evidence. These interface weights are selected by decision-makers to align the empirical results of the SIM with the municipality's planning priorities. Figure 7 indicates a set of baseline decision-making criteria that may be included in the prioritisation framework. This quantified planning framework enables comparative analysis and planning by calculating a single number or score for each project, portfolio of projects, and policy intervention under consideration.

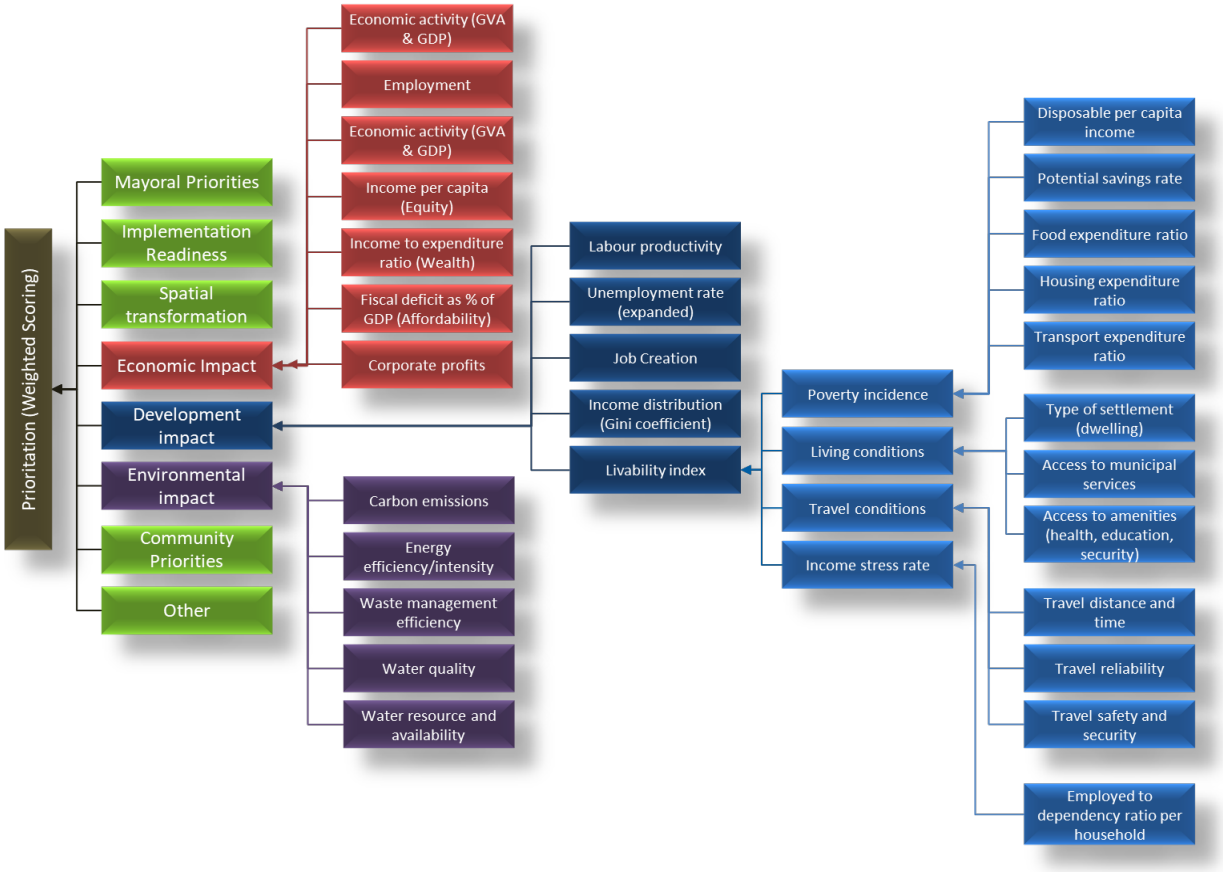


Figure 7: The Planning Prioritisation Framework. Source: Author.

7. Case Study Application: Impact Assessment of the 2024 Gauteng Provincial Budget on the City of Johannesburg

This section demonstrates the empirical application of the Social Impact Module (SIM) through a comprehensive assessment of the 2024 Gauteng Provincial Budget's economic and socio-economic effects on the City of Johannesburg (CoJ). The case study serves to validate the SIM's analytical capabilities whilst providing substantive insights into the transmission mechanisms of provincial fiscal policy at the municipal level.

7.1 Approach

Data Sources and Budget Disaggregation

The analysis utilises the 2024 Gauteng Provincial Budget as published by the Gauteng Provincial Government (2024). The provincial budget totals R168.15 billion, comprising national transfers (92.7%), provincial own revenue (4.8%), and provincial financing (2.6%). Table 2 presents the funding structure.

Functional expenditure allocation reveals the sectoral distribution of provincial resources, with education (39.7%) and health (39.1%) commanding the largest shares, followed by roads and transport (5.7%) and human settlements (3.5%). Table 3 details the functional spending breakdown.

Table 2: Gauteng Provincial Budget 2024/25 Funding Sources

Funding Source	Amount (R billion)	Share (%)
National Treasury: Equitable Share & Conditional Grants	155.883	92.7
Gauteng Provincial Treasury: Own Revenue	8.008	4.8
Provincial Financing: Loans	4.351	2.6
Less: Direct Charges	(0.089)	(0.1)
Total	**168.153**	**100.0**

Source: Gauteng Provincial Government (2024)

Table 3: Gauteng Provincial Budget 2024/25 Functional Spending

Function	**Amount (R billion)**	**Share (%)**
Education	65.843	39.7
Health	64.837	39.1
Roads and Transport	9.433	5.7
Human Settlements	5.767	3.5
Other	19.932	12.0
Total	165.812	100.0

Source: Gauteng Provincial Government (2024)

SIM Calibration and Impact Measurement

The SIM was calibrated specifically for the CoJ using the proportionate spending allocations derived from the provincial budget. The model employs six key performance indicators to capture multi-dimensional impacts:

1. **Gross Value Added (GVA) Impact**: Measures productive output generation per rand injected
2. **Gross Domestic Product (GDP) Impact**: Captures total income and expenditure effects
3. **Employment Creation**: Quantifies job generation per million-rand investment
4. **Additional Household Income**: Measures household income distribution effects
5. **Household Excess Income**: Assesses savings potential and wealth accumulation capacity
6. **Municipal Fiscal Impact**: Evaluates local government revenue and expenditure changes

Composite Index Construction

The composite impact index employs min-max normalisation to standardise indicators across different scales, followed by equal weighting to avoid bias towards specific dimensions. The mathematical formulation is:

Normalisation:

Composite Index:

Where Represents the normalised value for the indicator is the raw value, and equals the number of indicators (6).

7.2 Empirical Results

Impact Metrics

The SIM analysis yields the following empirical results for the 2024 GPB impact on the CoJ:

Table 4: SIM Impact Assessment Results

Indicator	SIM Value	Normalised Value	Weighted Contribution
GVA Impact	1.69	0.041	0.007
GDP Impact	2.40	0.063	0.011
New Jobs (per R1m)	20.2	0.625	0.104
Additional Income per Household	R32.1	1.000	0.167
Household Excess Income	R1.4	0.032	0.005
Municipal Fiscal Impact	R0.4	0.000	0.000
Composite Impact Index	-	-	0.293

Note: Normalisation range: 0.4 (minimum) to 32.1 (maximum)

The composite impact index of 0.293 (29.3%) indicates moderate overall effectiveness of the provincial budget injection into the CoJ economy.

Economic Multiplier Analysis

The empirical results suggest several noteworthy dynamics in terms of growth, employment, household welfare, and fiscal outcomes. The production or GVA impact multiplier of 1.69 indicates reasonable supply-side efficiency in converting public expenditure into productive activity. The GDP impact multiplier of 2.40, with the income multiplier exceeding the output multiplier by 0.71, highlights significant induced consumption effects. This indicates that the intervention not only stimulates direct production but also generates robust secondary demand, consistent with Keynesian expectations of multiplier effects in economies with underutilised capacity. The GDP-to-GVA ratio of 1.42 further reinforces the strength of these secondary effects, pointing to intensified rounds of spending and circulation within the local economy. Taken together, these findings confirm the effectiveness of demand-side stimulation in promoting broad-based economic activity.

The outcomes in the labour market are noteworthy. The generation of 20.2 jobs for every million rand invested reflects a significant demand for the workforce. However, while these figures indicate an increase in employment opportunities, structural rigidities and skills mismatches may prevent this from translating into actual jobs. As a result, this could limit the reduction of structural unemployment and hinder inclusive growth.

Household welfare indicators, however, present a more nuanced picture. While an additional household income of R32.1 per million rand points to direct poverty alleviation through improved disposable resources, the finding of household excess income at only R1.4 per million rand reveals critically limited capacity for wealth accumulation. The implied savings rate of just 4.4% suggests that households consume nearly all additional income received, reflecting high levels of precarity and immediate consumption needs. This highlights a vulnerability whereby short-term welfare improvements are unlikely to translate into longer-term household asset building or resilience.

At the municipal level, the fiscal effects appear marginal. An incremental revenue gain of R0.4 per million-rand injection suggests that the scale of municipal revenue enhancement lags behind the broader economic activity generated. While the local economy benefits through multiplier effects, the limited fiscal capture raises important sustainability concerns regarding the ability of local government to expand service delivery in line with rising demand. This weak fiscal feedback loop underscores the necessity of complementary reforms in municipal finance to ensure that the developmental dividends of investment are not undermined by fiscal constraints.

7.3 Analysis and Discussion

The empirical analysis highlights the multiple channels through which provincial spending transmits into the local economy and the structural patterns that shape these outcomes. The results demonstrate clear evidence of primary, secondary, and tertiary effects. At the primary level, provincial spending directly stimulates productive sectors, activating supply chains and production networks across the City of Johannesburg (CoJ) economy. These productive linkages are reinforced by secondary effects, as shown by the higher GDP multiplier relative to the GVA multiplier, which reflects significant induced consumption. Income recipients re-spend their earnings locally, thereby extending the reach of the initial fiscal injection into wider cycles of economic activity. However, tertiary effects remain weak: household savings are limited, and municipal fiscal gains are negligible, suggesting that while immediate benefits are achieved, the capacity for longer-term wealth accumulation and institutional strengthening remains constrained.

The results also reveal structural features consistent with consumption-led stimulus patterns typical of developing economy contexts. The exceptionally high household propensity to consume—95.6% of additional income—is channelled primarily towards basic needs rather than discretionary expenditure or investment, reinforcing the view that the intervention alleviates poverty but does not substantially shift household asset trajectories. Although the positive output multipliers confirm productive stimulus, the relatively modest GVA impact indicates limited structural transformation, with little evidence of productivity enhancement or sectoral upgrading. The muted fiscal response further underscores these structural constraints: despite the generation of significant economic activity, municipal revenue capture remains marginal. This outcome points to either weak tax administration capacity or the continued predominance of informal economic activity that escapes the fiscal net.

From a policy perspective, the findings provide valuable insights into the dynamics of fiscal federalism in South Africa's metropolitan economies. The composite index score of 29.3% illustrates the difficulty of translating provincial spending into durable local economic development outcomes.

While provincial budgets appear effective in stimulating demand for jobs, they do not address deeper structural challenges. The observed "employment-demand but savings-poor" pattern of results reflects a double-edged outcome: provincial spending has the potential to contribute to immediate poverty alleviation and labour market absorption but fails to generate the household asset accumulation or municipal fiscal capacity necessary for sustained development. This signals the need for complementary policy interventions that go beyond short-term consumption stimulation to address the institutional, structural, and productivity-related barriers that limit the transformative potential of public spending.

7.4 Case Study Conclusion

The SIM application to the 2024 Gauteng Provincial Budget demonstrates the model's capacity to provide a comprehensive multi-dimensional impact assessment. The empirical results reveal

a consumption-driven stimulus pattern with strong short-term effects but limited structural transformation capacity. The moderate composite impact index (29.3%) reflects typical challenges of provincial fiscal policy in addressing complex urban development challenges.

The case study validates the SIM's analytical utility whilst highlighting the complexity of translating public spending into sustainable economic development. The findings contribute empirical evidence to debates regarding the effectiveness of fiscal federalism in South African metropolitan contexts and demonstrate the importance of multi-dimensional impact assessment in evaluating development interventions.

Future applications of the SIM framework should incorporate dynamic elements and quality dimensions to enhance policy relevance and analytical depth. The methodology provides a robust foundation for evidence-based fiscal policy evaluation that can inform more effective intergovernmental fiscal arrangements and development planning processes.

8. Methodological Constraints and Prerequisites for Successful Implementation

8.1 Methodological Constraints

The proposed analytical framework offers significant potential for evidence-based urban planning, yet its application is bounded by methodological, data, and governance constraints. Methodologically, the reliance on a dynamic macro-econometric model enables sophisticated multiplier analysis but creates strong dependencies on high-quality time-series data for calibration and validation. The framework is sensitive to structural breaks caused by shocks, reforms, or policy shifts, which may undermine parameter stability. Spatial downscaling introduces further uncertainties, as local heterogeneity is often insufficiently captured by broader econometric relationships. Moreover, while inter-sectoral integration enhances comprehensiveness, it complicates causal identification and risks oversimplification through equal weighting of evolving sustainability trade-offs.

Data-related challenges further constrain effectiveness. Variability in the quality, timeliness, and coverage of municipal datasets, combined with reliance on proxy indicators for complex socio-environmental phenomena, weakens assessment validity. In addition, limited historical data—particularly for social and environmental indicators—hampers the framework's ability to separate intervention effects from broader structural trends, raising the likelihood of attribution errors.

Institutional and governance factors present equally significant limitations. The framework demands advanced technical expertise in econometrics, spatial modelling, and systems thinking, capacities that many municipalities lack. This creates reliance on external consultants and risks undermining long-term institutional sustainability. Furthermore, evidence-based planning often collides with political cycles that favour short-term priorities over long-term development objectives. Finally, effective implementation assumes robust intergovernmental coordination and integrated planning capacity—conditions often undermined by fragmented governance, competing mandates, and resource constraints.

8.2 Prerequisites for Successful Implementation

The successful implementation of the proposed analytical framework depends on a set of technical, institutional, and stakeholder engagement prerequisites that extend well beyond conventional municipal planning requirements. At the technical level, municipalities must establish robust data management systems capable of integrating diverse datasets from multiple sources in real or near-real time. This necessitates investments in compatible information systems, standardised

protocols, and quality assurance mechanisms, as well as formalised data-sharing agreements with provincial and national agencies, private partners, and research institutions. Equally important is the development of advanced analytical capacity. The framework's reliance on dynamic macro-econometric modelling requires expertise in econometric estimation, time-series analysis, and system-wide multiplier interpretation—skills that are typically scarce in municipal administrations. Addressing this gap demands either significant investment in in-house technical capacity or long-term partnerships with universities and specialised research organisations. Furthermore, adequate computing infrastructure, including modern hardware, software licenses, and reliable connectivity, is essential to support the data processing and modelling demands of the system.

Institutional prerequisites are no less critical. Implementation requires sustained political leadership and commitment that transcends electoral cycles, supported by formal policy adoption, budget allocation, and alignment with existing planning processes. Political champions play a key role in articulating the framework's value and maintaining momentum during periods of institutional resistance. Organisational restructuring may also be necessary, as effective use of the framework relies on integrated, cross-sectoral coordination. This entails redefining departmental roles, communication channels, and decision-making processes to reflect a systems-oriented approach. Additionally, the framework's recommendations must be compatible with existing legal and regulatory provisions. Where conflicts arise, municipalities may need to pursue legislative amendments or adopt flexible interpretations that preserve compliance while enabling innovation.

Finally, successful implementation depends on active stakeholder engagement. Community participation mechanisms are crucial for ensuring legitimacy and relevance, allowing citizens to influence priority-setting, indicator selection, and interpretation of results. Inter-sectoral partnerships with the private sector, civil society, and academic institutions enhance analytical depth and resource mobilisation, but require formal agreements to clarify responsibilities and ensure sustained collaboration. Given the technical complexity of the framework, capacity building for non-technical stakeholders—including councillors, community representatives, and other participants—is essential. Training programmes, simplified communication materials, and participatory interpretation tools can help bridge the gap between sophisticated modelling outputs and accessible, actionable insights, thereby ensuring that the framework strengthens both technical analysis and democratic governance.

8.3 Critical Success Factors

The successful operationalisation of the proposed framework depends on a set of critical success factors that emphasise adaptive implementation, sustainability, and institutional integration. An adaptive approach is essential, beginning with phased implementation strategies that prioritise pilot applications in selected functional areas or sub-regions. Such a stepwise process enables iterative refinement, reduces the risks associated with large-scale roll-out, and gradually builds institutional confidence and technical capacity. Equally important is the establishment of continuous improvement mechanisms. Regular review cycles, structured stakeholder feedback, and periodic methodological updates ensure that the framework remains responsive to evolving policy priorities, changes in data availability, and lessons drawn from practical application. Flexibility and customisation further underpin success, as municipalities operate within highly diverse contexts. The framework must therefore strike a balance between standardisation—needed for comparability—and tailored adjustments that enhance local relevance and institutional usability.

Sustainability considerations are equally critical. Long-term application requires reliable financing mechanisms that extend beyond initial implementation costs to cover recurrent expenditures such as system maintenance, analytical updates, and ongoing capacity development. Innovative funding

arrangements, including blended municipal and external support, may be necessary to secure stability. Institutional memory and knowledge management are also vital, given the framework's technical complexity and vulnerability to staff turnover. Establishing formal systems to preserve methodological expertise ensures continuity and safeguards analytical capacity over time. Finally, integration with existing planning systems is essential. By complementing rather than displacing current municipal tools and processes, the framework reduces institutional resistance, enhances adoption, and maximises the value of existing investments in planning infrastructure. Together, these success factors underscore the importance of gradual, well-resourced, and context-sensitive implementation to ensure that the framework realises its full potential in guiding evidence-based urban development.

9. Conclusions

Despite decades of scholarly efforts, the complex relationship between sustainability and integration in urban planning has remained difficult to model effectively, largely due to the variability of local contexts and institutional capacities. These challenges have hindered the development of universal frameworks and limited the practical utility of integration metrics. This paper responds to these limitations by proposing a robust, systems-based framework for integrated development planning that advances both strategic foresight and operational capacity.

By embedding a Sustainable Development Impact Module (SIM) at its core, the framework enables municipalities to conduct dynamic, data-driven assessments of their financial, capital, and strategic decisions. Unlike traditional planning tools, the SIM fosters participatory, forward-looking planning by digitising and analysing complex interdependencies across economic, social, and environmental dimensions.

This approach not only addresses the critical capacity gaps in many urban governance contexts but also equips planners with actionable insights to guide sustainable development more effectively. As cities face mounting pressures from rapid urbanisation and climate change, this framework offers a scalable, adaptable tool for embedding long-term sustainability into the heart of urban decision-making. Future research and application can further refine this model, ensuring it evolves with the changing demands of urban development.

Recommendations

To ensure the successful adoption, implementation, and institutionalisation of the proposed analytical systems-based urban planning framework, supported by the Sustainable Development Impact Module (SIM), several key recommendations are put forward.

Firstly, **institutional integration and policy alignment** should be prioritised. This involves embedding the SIM into existing municipal planning systems, such as Integrated Development Plans (IDPs) and Spatial Development Frameworks (SDFs). Framework indicators must be aligned with the National Development Plan (NDP), the Sustainable Development Goals (SDGs), and the District Development Model. Additionally, national policy and legislative backing should be secured to mandate the framework's use.

Secondly, **data systems must be strengthened and standardised**. This includes improving access to high-quality, spatially disaggregated data and standardising sustainable development indicators across municipalities. Real-time data feeds from national and municipal systems should be enabled to ensure responsiveness and relevance.

Thirdly, **technical and institutional capacity should be built**. Dedicated municipal planning units with expertise in modelling and data analysis should be established. Training programmes and user-friendly guidance should be provided to planners and stakeholders. Furthermore, interdisciplinary teams should be promoted to foster integrated and collaborative decision-making.

Fourth, **planning must become more participatory and evidence-based**. SIM outputs should support inclusive, transparent, and interactive planning processes. Interfaces should be tailored for different users, including municipal officials, councillors, and communities. There must also be clear linkages between SIM results and performance monitoring, as well as accountability systems.

Fifth, **scenario planning and risk analysis need to be incorporated**. The framework should include forward-looking scenarios that address shocks and uncertainties and integrate resilience and vulnerability indicators to support risk-sensitive urban planning.

Sixth, **a phased approach should be used to pilot and scale the framework**. Initial implementation should begin in selected pilot municipalities, where the framework can be tested and refined. A central innovation hub should be established to coordinate implementation and provide technical support. Based on these pilots, a scalable national roll-out plan should be developed.

Seventh, **sustainable financing and incentives must be secured**. Dedicated funding should be mobilised from national budgets and development partners. Grant allocations should be linked to evidence-based planning supported by SIM, and private sector involvement in data provision and investment planning should be encouraged.

Together, these recommendations provide a pathway for operationalising and institutionalising a transformative, impact-analysed urban planning approach in South Africa. By rooting the methodology in empirical, context-specific modelling, ensuring participatory and evidence-based planning, and aligning it with national policy priorities, the framework offers a robust platform for inclusive, sustainable, and adaptive urban development.

These recommendations support the operationalisation and institutionalisation of a transformative, impact-analysed urban planning approach in South Africa. By grounding the methodology in empirical, context-specific modelling, ensuring participatory, evidence-based planning, and aligning closely with national policy objectives, this framework offers a powerful platform for inclusive, sustainable, and adaptive urban development.

References

Becker, W., Paruolo, P., Saisana, M., & Saltelli, A. (2017). Weights and importance in composite indicators: Closing the gap. *Ecological Indicators, 80*, 12–27. https://doi.org/10.1016/j.ecolind.2017.03.045

Bibri, S. E. (2023). Data-driven smart eco-cities of the future: An empirically informed integrated model for strategic sustainable urban development. *World Futures*, 79(7–8), pp. 703–746. https://doi.org/10.1080/02604027.2021.1969877

COGTA (Department of Cooperative Governance and Traditional Affairs). (2023). *Dysfunctional as of 2023*. [Online] Available at: https://www.cogta.gov.za/index.php/66-dysfunctional-as-at-march-2023/ [Accessed: 13 November 2023].

Delchambre, L. (2015). Weighted principal component analysis: A weighted covariance eigendecomposition approach. *Monthly Notices of the Royal Astronomical Society, 446*(4), 3545–3555. https://doi.org/10.1093/mnras/stu2219

ESPON. (2018). *Indicators for integrated territorial and urban development*. Working Paper. ESPON: Luxembourg.

European Commission (EC). (2020). *Handbook of sustainable urban development strategies*. Joint Research Centre. European Commission: Brussels, Belgium.

Ferry, M., Kah, S., & Bachtler, J. (2018). Integrated territorial development: New instruments—New results? *IQ-Net Thematic Paper*, 42, pp. 1–57.

Gauteng Provincial Government, ed. (2024). *Gauteng Provincial Budget 24/25*. [online] Gauteng.gov.za. Available at: https://www.gauteng.gov.za/Publications/PublicationDetails/%7B142a7fa4-aeff-4f62-9e84-a121d84788e0%7D.

Greco, S., Ishizaka, A., Tasiou, M., & Torrisi, G. (2019). On the methodological framework of composite indices: A review of the issues of weighting, aggregation, and robustness. *Social Indicators Research, 141*, 61–94. https://doi.org/10.1007/s11205-017-1832-9

Green, P. E., & Srinivasan, V. (1978). Conjoint analysis in consumer research: Issues and outlook. *Journal of Consumer Research, 5*(2), 103–123. https://doi.org/10.1086/208721

Harrison, P. (2001). The genealogy of South Africa's Integrated Development Plan. *Third World Planning Review*, 23(2), pp. 175-193. https://doi.org/10.3828/twpr.23.2.q4172h26466148n3

Harrison, P. (2002). *Towards integrated inter-governmental planning in South Africa: The IDP as a building block*. A report prepared for DDP Task Team, Department of Provincial and Local Government.

Koroneos, C.J. & Rokos, D. (2012). Sustainable and integrated development—A critical analysis. *Sustainability*, 4, pp. 141-153. https://doi.org/10.3390/su4010141

Koshkalda, I., Hoptsii, D., Morozova, H., Scoromna, O., & Gurskiene, V. (2023). Methodology for assessing the sustainable development of administrative-territorial units. *IOP Conference Series: Earth and Environmental Science*, 1150. https://doi.org/10.1088/1755-1315/1150/1/012020

Leipzig Charter (LC). (2007). *Leipzig Charter on sustainable European cities*. European Commission Member States: Leipzig, Germany.

Lekabe, T. (2023). Poor governance reason 66 municipalities are dysfunctional, require swift support, says Mashatile. *City Press*, [Online] 22 September. Available at: https://www.news24.com/citypress/news/poor-governance-reason-66-municipalities-are-dysfunctional-require-swift-support-says-mashatile-20230922 [Accessed: 13 November 2023].

McCann, P. (2015). *The regional and urban policy of the European Union*. Edward Elgar Publishing Limited: Cheltenham, UK. https://doi.org/10.4337/9781783479511

Medeiros, E. & van der Zwet, A. (2020). Sustainable and integrated urban planning and governance in metropolitan and medium-sized cities. *Sustainability*, 12(15), 5976. https://doi.org/10.3390/su12155976

Munzhedzi, P.H., Phago, K. & Mubangizi, B. (2022). Contending for the designs and features of integrated development planning in South Africa? An empirical analysis of the Limpopo Province. *Journal of Local Government Research and Innovation*, 3(0), a77. https://doi.org/10.4102/jolgri.v3i0.77

Oranje, M., & Van Huyssteen, E. (2011). A meta-review of the 'state of the IDP' literature in South Africa (2001–2010). *Town and Regional Planning*, 59, pp. 1-12.

Pourhabib Yekta, A., Kordrostami, S., Amirteimoori, A., & Kazemi Matin, R. (2018). Data envelopment analysis with common weights: The weight restriction approach. Mathematical Sciences, 12, 197–203. https://doi.org/10.1007/s40096-018-0259-z

Saaty, T. L., & Vargas, L. G. (2012). *Models, methods, concepts & applications of the analytic hierarchy process* (2nd ed.). Springer. https://doi.org/10.1007/978-1-4614-3597-6

Spangenberg, J.H. (2002). Institutional sustainability indicators: An analysis of the institutions in Agenda 21 and a draft set of indicators for monitoring their effectivity. *Sustainable Development*, 10(2), pp. 103-115. https://doi.org/10.1002/sd.184

Stats SA (Statistics South Africa). (2023). *Sustainable Development Goals Country Report 2023 South Africa*. Statistics South Africa: Pretoria. (ISBN: 978-0-621-51505-3).

United Nations. (2005). *2005 World Summit Outcome*. Resolution A/60/1. [Online] Available at: http://data.unaids.org/Topics/UniversalAccess/worldsummitoutcome_resolution_24oct2005_en.pdf

Van der Walt, C., Venter, A., Phutiagae, K., Nealer, E., Khalo, T. & Vyas-Doorgapersad, S. (2018). Municipal management serving the people. In G. Van der Waldt (Ed.), *Municipal Management: Serving the People*. 3rd ed. Juta: Claremont.

Villeneuve, C., Tremblay, D., Riffon, O., Lanmafankpotin, G.Y., & Bouchard, S. (2017). A systemic tool and process for sustainability assessment. *Sustainability*, 9(10), 1909. https://doi.org/10.3390/su9101909

Watson, V. (2009). 'Seeing from the South': Refocusing urban planning on the globe's central urban issues. *Urban Studies*, 46(11), pp. 2229–2251. https://doi.org/10.1177/0042098009342598

World Bank. (2023). *Urban Development*. [Online] Available at: https://www.worldbank.org/en/topic/urbandevelopment/overview

World Commission on Environment and Development (WCED). (1987). *Our Common Future*. Oxford University Press: Oxford.

Zeeman, K. (2023). Almost 90% of municipalities are 'distressed' or 'dysfunctional'. *The Citizen*, [Online] 12 July. Available at: https://www.citizen.co.za/news/south-africa/government/almost-90-of-municipalities-are-distressed-or-dysfunctional/ .