



Hungarian University of Agriculture and Life Sciences
Doctoral School of Economic and Regional Sciences (Gödöllő)

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**Urban transformation through the triple bottom line and gentrification
mitigation: Johannesburg's social housing paradigm**

By

Mzuchumile Makalima

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Name of Doctoral School: Doctoral School of Economic and Regional Sciences

Discipline: **Regional Sciences**

Head of Doctoral School: **Dr. Viktória Szente**
Hungarian University of Agriculture and Life Sciences,

Supervisor: **Dr. Csaba Szűcs**
Hungarian University of Agriculture and Life Sciences,

.....
Approval of Head of Doctoral School

.....
Approval of Supervisor

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1 INTRODUCTION

1.1 Background and significance of the research

Johannesburg is a South African city of unique and crucial urban significance. The city owes its growth to the discovery of gold in the Witwatersrand Basin that set off a gold rush (Scheba and Turok, 2020). The event not only led to rapid urbanization but also helped to establish Johannesburg as a hub of mining and trade activities.

The city is crucial due to its pivotal and primary role in the rise of the mining sector in South Africa. Following 1886, several adventurers and financiers from all over the world flocked to the area, thereby driving a rapid evolution in the urban structure and demographics (Lipton, 2011). The built environment that resulted from this era is the major precursor of the present, day city as is its concentrated central business districts, soaring buildings, and a diverse population in terms of social class.

Major urban transformations in Johannesburg have corresponded with changes in its socio, economic structure (Mabin, 2021). The apartheid era is the most telling and decisive phase of this development as urban planning and development patterns were mainly influenced by racial segregation and discriminatory legislations (Leibbrandt et al., 2010). The state used zoning policies and forced removals to separate communities and, in doing so, non-white communities were pushed to townships on the outskirts. Such spatial arrangements have deeply cemented disparities that are still visible on the city facade. Following the fall of apartheid in 1994, Johannesburg embarked on a journey of physical and socio, economic reconstruction aimed at the resolution of long, standing positional inequalities and the creation of conditions for

inclusive urban development and growth (Chigumira et al., 2020). To a certain extent, the initiatives rolled out in the post, apartheid period have focused on redeveloping the inner city and the township areas largely through the lens of socio, economic integration and urban regeneration.

The shift to democracy in 1994 was a major structural upheaval. The post, apartheid reforms mostly aimed at lessening the inequality and raising the level of inclusion (Makalima, 2024). Changes in governance, provision of infrastructure, and revision of spatial planning frameworks were all geared towards reshaping an urban environment that was very fragmented due to apartheid.

Against this backdrop, the Triple Bottom Line (TBL) concept was widely accepted as a mode of sustainable development that reconciles social, environmental and economic imperatives. It provided decision makers and planners a roadmap to synchronise their developmental targets with the agenda of sustainability in mind.

Meanwhile, the phenomenon of gentrification took place in certain parts of Johannesburg. The refurbishing of a few neighbourhoods has in most cases led to rising property values resulting in the displacement of the less affluent residents (Cirolia et al., 2016). These issues have rekindled the discussion on matters such as the affordability of housing, spatial justice, and the protection of communities that have been in existence for a long time even as redevelopment continues.

By looking at the social housing system of Johannesburg, we are able to build a platform for the evaluation of these interrelated issues. It is an opportunity

to reflect on the ways in which the legacies of inequality, the sustainability agenda, and issues of fairness are transformed into practical solutions.

1.2 Research objectives

O1. Historical Analysis: To examine expert assessments of the historical evolution of Johannesburg's social housing system and evaluate the extent to which it reflects path-dependent institutional dynamics.

O2. Gentrification Dynamics: To evaluate expert perceptions of the relationship between social housing provision and gentrification-related displacement pressures within the urban context.

O3. Triple Bottom Line (TBL) Evaluation: To assess the degree to which current social housing delivery aligns with economic, social, and environmental sustainability principles as conceptualised within the Triple Bottom Line framework.

1.3 Research hypotheses

H1: Johannesburg's social housing system exhibits features consistent with institutional path dependency, particularly in spatial configuration and delivery mechanisms.

H2: The displacement-mitigating capacity of social housing is conditional upon governance structures, locational decisions, and affordability mechanisms.

H3: The implementation of Triple Bottom Line in social housing delivery reflects a connection across economic, social, and environmental dimensions.

2 MATERIALS AND METHODS

2.1 Introduction to Methodology

The Delphi method, initially developed as a forecasting tool, is a method that enables an iterative consultation process, controlled feedback, and the synthesis of expert opinions (Dalkey and Helmer, 1963). It has been used in situations where the complexity of the issue is caused by uncertainty, disciplinary fragmentation, or policy sensitivity. Its formal structure makes it an excellent fit for social housing issues, an area that combines construction, spatial planning, public policy, and financial governance.

2.2 Justification for the Method

2.2.1 The Need for Collective Expert Insights

The first major justification of using the Delphi method is its ability to synthesize and integrate diverse expert opinions. Social housing in Johannesburg is a multi-disciplinary practice with many connected sectors.

2.2.2 The Dynamic and Complexity of the Housing Problem

The other important reason for using the Delphi method is the complexity and dynamics of the problem. Social housing in Johannesburg is influenced by a multitude of constantly changing factors such as economic adjustments, policy changes, urbanization trends, and technological innovations. They are linked together and often result in unexpected consequences, thus, it is almost impossible to apply none-dynamic research methods.

2.2.3 Dealing with Uncertainty and Forecasting Future Directions

A third reason why the Delphi method is used is that it can effectively handle uncertainties and also predict future trends. In general, research on housing, especially in cities, is fraught with uncertainties that arise from demographic

changes, policy interventions, and market trends. For example, the demand for housing in Johannesburg might be influenced by population growth, variations in income levels, or migration patterns (Park et al., 2024). Similarly, gentrification, which is a common phenomenon in most cities, brings about significant uncertainties, e. g the inevitable displacement of low, income households and the subsequent impact on the supply of affordable housing (Smith, 2019).

2.2.4 Minimizing Bias through Anonymity

Another built-in strength of the Delphi method is that it can minimize group dynamic biases, social stratification, or dominating personalities (Makalima, 2023). With in-person group interviews or discussions, participants might be influenced by status disparities, wherein persons of higher status (e.g., government officials, renowned experts) would dominate, tilting the outcomes. Moreover, groupthink, a psychological phenomenon whereby participants tend to agree with the majority simply to avoid conflict, can potentially undermine accuracy and validity of results.

2.3 Research Flowchart

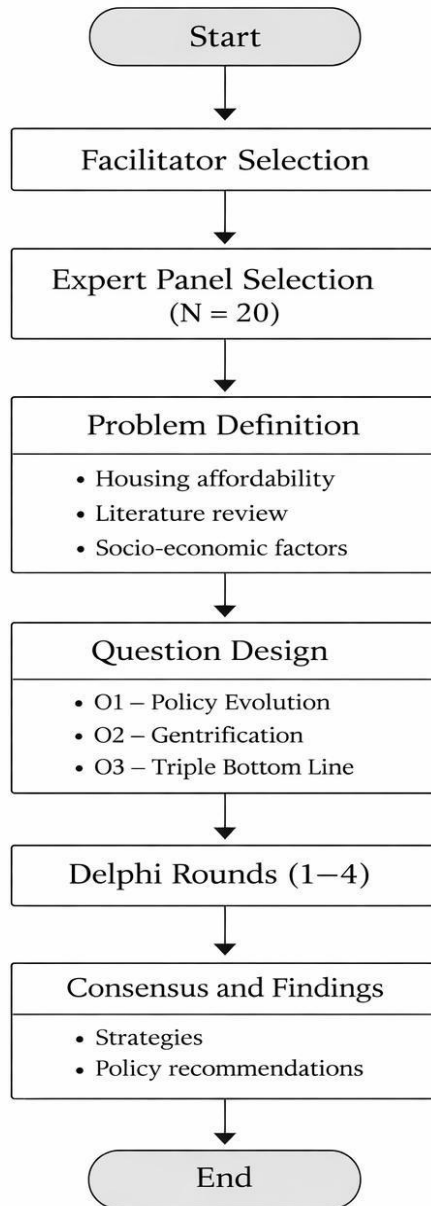


Figure 1: Research flowchart

Source: Author's compilation of research flowchart, 2025.

Figure 1 illustrates the Delphi research process used in this study. The process begins with the selection of the facilitator and a panel of 20 experts, representing stakeholders involved in the housing sector. After defining the research problem focusing on housing affordability, literature insights, and socio-economic factors questions were developed based on three themes: policy evolution, gentrification, and the Triple Bottom Line (TBL).

The study then proceeded through four Delphi rounds, where experts provided feedback and reconsidered their responses based on the group results. This iterative process helped achieve consensus among the experts, leading to the identification of key findings, strategies, and policy recommendations related to social housing and sustainable urban development in Johannesburg.

2.4 Reliability and hypotheses testing

Reliability testing was done to determine whether there was internal consistency and stability of expert ratings throughout the Delphi process and to pave the way for hypothesis assessment. Although Delphi research mainly emphasizes the iterative refinement of expert's judgements as opposed to the total statistical uniformity, it still becomes necessary to check if the consistency was maintained in participant application of the 1-5 Likert scale across different items linked to each research question. Here, hypotheses were evaluated through structured consensus that was supported by reliability and stability analysis rather than through traditional parametric significance testing.

Fleiss Kappa (κ) was used to measure reliability of the results. This statistic fits the situation where there are numerous raters and the choices of responses are categorical, including those on Likert scale. It calculates the level of agreement between the experts which is over and above what would be judged to have occurred simply by chance. Here, coefficients were determined for

each research question separately which allowed reliability measures for the sets of statements to be obtained.

Kendall's Coefficient of Concordance (W) was applied to examine the level of agreement within each Delphi round. Whereas Fleiss' Kappa assesses categorical agreement, Kendall's W evaluates the consistency with which experts ranked or prioritised issues relative to one another. This distinction is significant because participants may align in overall direction while differing in how they weight specific factors. Kendall's W therefore offered insight into the internal coherence of expert judgement within individual rounds.

Stability of responses across rounds was analysed using the Friedman test, a non-parametric alternative to repeated-measures ANOVA suitable for ordinal Likert-scale data collected from the same respondents over multiple iterations. The test was used to determine whether ratings for identical statements changed significantly between rounds, thereby indicating whether expert views were consolidating or continuing to shift.

Hypotheses were evaluated through the combined use of consensus thresholds, descriptive measures (including percentage agreement, medians, and interquartile ranges), and reliability and stability statistics. Collectively, these procedures provided a structured and methodologically appropriate basis for assessing the research's hypotheses within a Delphi research framework.

3 RESULTS AND DISCUSSION

3.1 Introduction

In this research, expert consensus was gauged by employing the Interquartile Range (IQR) alongside the percentage of agreement. The IQR essentially denotes the dispersion of the responses and was derived using the expression $IQR = Q3 - Q1$, where Q3 is the third quartile (75th percentile) and Q1 is the first quartile (25th percentile). A lesser IQR displays that the experts' responses are tightly clustered, implying a higher degree of concordance. Moreover, consensus was characterized by 75% or more of the participants choosing Agree or Strongly Agree (75%) on a particular statement. Those statements that fulfilled this criterion were deemed to have reached a consensus in the Delphi study.

Formulas:

$$\text{Interquartile Range (IQR)} = 3\text{rd Quartile (Q3)} - 1\text{st Quartile}$$

$$(Q1) \text{ IQR} = Q3:Q1 \text{ and}$$

$$\text{Consensus} = (\text{Agree} + \text{Strongly Agree}) \geq 75\%$$

3.2 Research Question 1: Historical Analysis

3.2.1 Statement 1: The Role of the RDP

Statement (Q1): *“The post-apartheid Reconstruction and Development Programme (RDP) has significantly shaped social housing in Johannesburg.”*

Round 2 Results

The second round of Delphi produced the following distribution:

Table 1: Round 2 statement 1

Response	Frequency	Percent	Valid Percent	Cumulative Percent
Disagree	1	5.0	5.0	5.0
Neutral	5	25.0	25.0	30.0
Agree	5	25.0	25.0	55.0
Strongly Agree	9	45.0	45.0	100.0
Total	20	100.0	100.0	

Source: Author’s analysis based on Delphi expert survey data, 2025.

- **Consensus (Agree + strongly agree): 70% → below the 75% threshold.**
- **Median = 4.00, IQR = 1** (Moderate spread of opinion).

The data show that while a majority of experts acknowledged the RDP as significant, a quarter remained neutral and one expert disagreed outright. At this stage, consensus had not yet been reached, requiring a third round.

Round 3 Results

Table 2: Round 3 statement 1

Response	Frequency	Percent	Valid Percent	Cumulative Percent
Disagree	1	5.0	5.0	5.0
Neutral	2	10.0	10.0	15.0
Agree	8	40.0	40.0	55.0
Strongly Agree	9	45.0	45.0	100.0
Total	20	100.0	100.0	

Source: Author's analysis based on Delphi expert survey data, 2025.

- **Consensus (Agree + strongly agree): 85% → Consensus achieved.**
- **Median = 4.00, IQR = 1** (tight agreement).

By Round 3, three neutrals shifted to agreement, pushing the group past the threshold. The strong showing of “Strongly Agree” (45%) highlights conviction among the panel.

Interpretation:

The Delphi process demonstrates that experts overwhelmingly recognize the RDP as a foundational milestone in Johannesburg's housing policy trajectory. This finding supports the position that post-apartheid housing policy fundamentally reoriented the city's housing strategy toward redistribution and equity.

3.2.2 Statement 2: Post-1994 Policy Reforms

Statement (Q2): “Policy changes since 1994 have improved inclusivity and rectified historical inequalities in social housing.”

Table 3: Round 2 statement 2

Response	Frequency	Percent	Valid Percent	Cumulative Percent
Strongly Disagree	1	5.0	5.0	5.0
Disagree	1	5.0	5.0	10.0
Neutral	1	5.0	5.0	15.0
Agree	10	50.0	50.0	65.0
Strongly Agree	7	35.0	35.0	100.0
Total	20	100.0	100.0	

Source: Author’s analysis based on Delphi expert survey data, 2025.

- **Consensus (Agree + strongly agree): 85% → Consensus achieved immediately.**
- **Median = 4.00, IQR = 1.**

Interpretation:

This rapid consensus indicates widespread recognition of the role of policy reforms in correcting apartheid-era spatial inequities. The results highlight that inclusivity has been a consistent achievement of post-1994 policy frameworks.

3.2.3 Statement 3: The Role of Migration and Politics

Statement (Q3): *“Economic factors, such as urban migration and political shifts, are key drivers in shaping the trajectory of social housing.”*

Table 4: Round 2 statement 3

Response	Frequency	Percent	Valid Percent	Cumulative Percent
Neutral	2	10.0	10.0	10.0
Agree	5	25.0	25.0	35.0
Strongly Agree	13	65.0	65.0	100.0
Total	20	100.0	100.0	

Source: Author’s analysis based on Delphi expert survey data, 2025.

- **Consensus (Agree + strongly agree): 90% → Consensus achieved.**
- **Median = 5.00, IQR = 1.**

Interpretation:

This was the strongest consensus across RQ1. Experts almost universally affirmed the centrality of urban migration and political context in shaping housing policy. The very high median (5 = Strongly Agree) underscores the intensity of agreement.

3.2.4 Statement 4: Breaking New Ground Policy

Statement (Q4): *“The introduction of the Breaking New Ground (BNG) policy marked a pivotal shift in Johannesburg’s social housing strategy.*

Table 5: Round 2 statement 4

Response	Frequency	Percent	Valid Percent	Cumulative Percent
Disagree	1	5.0	5.0	5.0
Neutral	3	15.0	15.0	20.0
Agree	6	30.0	30.0	50.0
Strongly Agree	10	50.0	50.0	100.0
Total	20	100.0	100.0	

Source: Author’s analysis based on Delphi expert survey data, 2025.

- **Consensus (Agree + strongly agree): 80% → Consensus achieved.**
- **Median = 4.5, IQR = 1.**

Interpretation:

The high levels of agreement confirm the BNG policy as a pivotal turning point, shifting housing policy from quantitative supply toward integration, sustainability, and inclusivity.

3.2.5 Section Synthesis

Collectively, the results for RQ1 provide strong evidence that Johannesburg’s housing trajectory since apartheid has been defined by milestones and structural drivers:

- **Milestones:** RDP and BNG policies are identified as turning points.

- Structural drivers: Urban migration and political shifts are persistent, shaping demand and policy direction.
- Policy legacy: Post-1994 reforms are widely accepted as having advanced inclusivity and equity.

This sets the foundation for understanding Johannesburg’s housing evolution not as static policy delivery, but as a dynamic trajectory shaped by political, economic, and demographic forces.

3.3 Research Question 2: Gentrification Dynamics

Research Question 2:

3.3.1 Statement 5: Gentrification and Affordability

Statement (Q5): *“Gentrification has significantly impacted housing affordability and availability in Johannesburg.”*

Table 6: Round 2 statement 5

Response	Frequency	Percent	Valid Percent	Cumulative Percent
Disagree	2	10.0	10.0	10.0
Neutral	3	15.0	15.0	25.0
Agree	10	50.0	50.0	75.0
Strongly Agree	5	25.0	25.0	100.0
Total	20	100.0	100.0	

Source: Author’s analysis based on Delphi expert survey data, 2025.

- **Consensus (Agree + strongly agree): 75% → Consensus achieved.**
- **Median = 4.00, IQR = 1.5.**

Interpretation:

This result confirms that experts widely acknowledge gentrification as a core pressure undermining affordability and access to housing. The IQR of 1.5 suggests some divergence, with a small minority rejecting or expressing neutrality. Nonetheless, the majority agreement (75%) signals recognition that rising costs directly limit housing availability for lower-income groups.

3.3.2 Statement 6: Social Housing in Gentrifying Areas

Statement (Q6): *“Social housing initiatives in areas like Hillbrow and Maboneng have effectively mitigated gentrification pressures.”*

Table 7: Round 3 statement 6

Response	Frequency	Percent	Valid Percent	Cumulative Percent
Strongly Disagree	1	5.0	5.0	5.0
Disagree	2	10.0	10.0	15.0
Neutral	2	10.0	10.0	25.0
Agree	9	45.0	45.0	70.0
Strongly Agree	6	30.0	30.0	100.0
Total	20	100.0	100.0	

Source: Author’s analysis based on Delphi expert survey data, 2025.

- **Consensus = 75% → Consensus reached.**
- **Median = 4.00, IQR = 1.75.**

Interpretation:

The progression shows that experts eventually converged on the idea that social housing in gentrifying nodes (Hillbrow, Maboneng) has some mitigating impact. However, the relatively high IQR (1.75) indicates persisting divergence, some stakeholders remain unconvinced about the extent of mitigation.

3.3.3 Statement 7: Zoning and Land Policy

Statement (Q7): *“Government zoning/land policies protect low-income residents.”*

Table 8: Round 3 statement 7

Response	Frequency	Percent	Valid Percent	Cumulative Percent
Disagree	4	20.0	20.0	20.0
Agree	10	50.0	50.0	70.0
Strongly Agree	6	30.0	30.0	100.0
Total	20	100.0	100.0	

Source: Author’s analysis based on Delphi expert survey data, 2025.

- **Consensus = 80% → Consensus reached.**
- **Median = 4.00, IQR = 1.00.**

Interpretation:

By Round 3, experts agreed that zoning policies offer meaningful protections to low-income residents. The tighter IQR demonstrates improved alignment across the panel compared to earlier rounds.

3.3.4 Statement 8: Integration vs. Shelter Priorities

Statement (Q8): *“Policy has prioritized long-term integration over short-term shelter.”*

This statement was **the most divisive**.

- **Round 2:** 50% consensus → not reached.
- **Round 3:** 60% consensus → still not reached.
- **Round 4:** 60% consensus → still not reached.

Table 9: Final Round 4 statement 7

Response	Frequency	Percent	Valid Percent	Cumulative Percent
Strongly Disagree	1	5.0	5.0	5.0
Disagree	4	20.0	20.0	25.0
Neutral	3	15.0	15.0	40.0
Agree	8	40.0	40.0	80.0
Strongly Agree	4	20.0	20.0	100.0
Total	20	100.0	100.0	

Source: Author’s analysis based on Delphi expert survey data, 2025.

- **Consensus never reached.**
- **Median = 4.00, IQR = 1.75.**

Interpretation:

Even after four rounds, disagreement persisted. Experts were **deeply divided** on whether current housing policy favours integration or immediate shelter. This reflects a structural tension in South African housing policy between **quantities vs. quality** imperatives.

3.3.5 Statement 9: Government Role in Balancing Gentrification

Statement (Q9): *“Government policies play a crucial role in balancing gentrification effects and preserving affordable housing.”*

Table 10: Round 2 statement 9

Response	Frequency	Percent	Valid Percent	Cumulative Percent
Disagree	1	5.0	5.0	5.0
Neutral	1	5.0	5.0	10.0
Agree	10	50.0	50.0	60.0
Strongly Agree	8	40.0	40.0	100.0
Total	20	100.0	100.0	

Source: Author’s analysis based on Delphi expert survey data, 2025.

- **Consensus = 90% → Consensus reached.**
- **Median = 4.00, IQR = 1.00.**

Interpretation:

This result reflects **clear faith in government’s central role** in managing gentrification pressures and protecting affordable housing.

3.3.6 Statement 10: Rising Property Values and Displacement

Statement (Q10): *“Rising property values in traditionally low-income areas have disproportionately displaced vulnerable populations.”*

Table 11: Round 2 statement 10

Response	Frequency	Percent	Valid Percent	Cumulative Percent
Disagree	3	15.0	15.0	15.0
Agree	3	15.0	15.0	30.0
Strongly Agree	14	70.0	70.0	100.0
Total	20	100.0	100.0	

Source: Author’s analysis based on Delphi expert survey data, 2025.

- **Consensus = 85% → Consensus reached.**
- **Median = 5.00 (Strongly Agree), IQR = 1.00.**

Interpretation:

This statement produced one of the **strongest agreements** across all of RQ2. The overwhelming majority acknowledged displacement as a direct effect of rising property values in gentrifying areas.

3.3.7 Section Synthesis

The Delphi results on gentrification reveal several important findings:

- Affordability and displacement pressures are real and widely acknowledged. Both Q5 and Q10 confirm that gentrification undermines housing access.
- Social housing and zoning can mitigate pressures, but consensus emerged only after multiple rounds. This suggests some ambivalence among experts about policy effectiveness.
- Government's role is undisputed. The strongest consensus (90%) confirmed that state intervention is central to balancing gentrification and affordability.
- Division persists on integration vs. shelter priorities. Despite four rounds, no consensus was reached on Q8, exposing a policy fault line between short-term provision and long-term integration.

These results establish gentrification as a critical challenge to Johannesburg's housing system, with displacement and affordability at the centre, and highlight the importance of state-led strategies in mediating these effects.

3.4 Research Question 3: Triple Bottom Line (TBL) Evaluation

Research Question 3:

How do social housing projects in Johannesburg align with the Triple Bottom Line (TBL) framework, considering economic viability, social inclusivity, and environmental responsibility?

The Triple Bottom Line framework provides a holistic lens for evaluating housing projects across **three interconnected domains**:

1. **Economic viability**: financial sustainability and affordability

2. **Social inclusivity:** equitable access, community integration, and diversity
3. **Environmental responsibility:** sustainability practices and climate adaptation

This section analyses eight Delphi statements (Q12–Q18), presenting the results by dimension, integrating frequency tables, statistical measures, and visuals. Interpretations emphasize patterns of consensus, points of divergence, and evolving opinions across Delphi rounds.

3.4.1 Economic Viability

Q12: Economic Sustainability of Social Housing

Statement: *“Current social housing models in Johannesburg are economically sustainable without ongoing subsidies.”*

Table 12: Round 3 statement 12

Response	Frequency	Percent	Valid Percent	Cumulative Percent
Strongly Disagree	5	25.0	25.0	25.0
Disagree	7	35.0	35.0	60.0
Neutral	2	10.0	10.0	70.0
Agree	5	25.0	25.0	95.0
Strongly Agree	1	5.0	5.0	100.0
Total	20	100.0	100.0	

Source: Author’s analysis based on Delphi expert survey data, 2025.

- **Consensus: 80% (Disagree + Strongly Disagree) → Consensus reached**
- **Median = 2.00, IQR = 1.00**

Interpretation:

Consensus emerged that **current models are *not* economically sustainable without subsidies**. This confirms financial fragility in Johannesburg’s housing system, reflecting dependence on public financing. It suggests systemic risks if subsidies are reduced, a critical finding for future policy planning.

3.4.2 Social Inclusivity

Q11: Social Housing Inclusivity

Statement: *“Social housing in Johannesburg effectively fosters inclusivity and integration of diverse communities.”*

Table 13: Round 2 statement 11

Response	Frequency	Percent	Valid Percent	Cumulative Percent
Strongly Disagree	1	5.0	5.0	5.0
Disagree	2	10.0	10.0	15.0
Neutral	1	5.0	5.0	20.0
Agree	10	50.0	50.0	70.0
Strongly Agree	6	30.0	30.0	100.0
Total	20	100.0	100.0	

Source: Author’s analysis based on Delphi expert survey data, 2025.

- **Consensus: 80% → Consensus reached**
- **Median = 4.00, IQR = 1.00**

Interpretation:

This strong consensus underscores the **social strength of Johannesburg’s housing interventions**, particularly in integrating diverse demographic groups, aligning well with the social pillar of TBL.

Q15: Decentralization for Inclusivity

Statement: *“Decentralizing social housing projects can further enhance inclusivity and access.”*

Table 14: Round 2 statement 15

Response	Frequency	Percent	Valid Percent	Cumulative Percent
Disagree	2	10.0	10.0	10.0
Neutral	3	15.0	15.0	25.0
Agree	10	50.0	50.0	75.0
Strongly Agree	5	25.0	25.0	100.0
Total	20	100.0	100.0	

Source: Author’s analysis based on Delphi expert survey data, 2025.

- **Consensus: 75% → Consensus achieved**
- **Median = 4.00, IQR = 1.50**

Interpretation:

Experts highlight decentralization as a **viable strategy to enhance inclusivity**, supporting diversified spatial planning and reduced urban congestion.

3.4.3 Environmental Responsibility

Q13: Environmental Sustainability

Statement: *“Environmental sustainability practices are consistently integrated into social housing development.”*

Table 15: Round 2 statement 13

Response	Frequency	Percent	Valid Percent	Cumulative Percent
Strongly Disagree	3	15.0	15.0	15.0
Disagree	5	25.0	25.0	40.0
Neutral	2	10.0	10.0	50.0
Agree	8	40.0	40.0	90.0
Strongly Agree	2	10.0	10.0	100.0
Total	20	100.0	100.0	

Source: Author’s analysis based on Delphi expert survey data, 2025.

- **Consensus: 75% → Consensus reached**
- **Median = 4.00, IQR = 1.50**

Interpretation:

While consensus recognizes the **importance** of environmental considerations, the broad IQR reflects uneven **implementation of green practices** across developments.

Q18: Climate Resilience

Statement: *“Housing projects should prioritize climate resilience and environmental adaptation.”*

Table 16: Round 2 statement 18

Response	Frequency	Percent	Valid Percent	Cumulative Percent
Disagree	2	10.0	10.0	10.0
Neutral	2	10.0	10.0	20.0
Agree	10	50.0	50.0	70.0
Strongly Agree	6	30.0	30.0	100.0
Total	20	100.0	100.0	

Source: Author’s analysis based on Delphi expert survey data, 2025.

- **Consensus: 80% → Consensus reached**
- **Median = 4.00, IQR = 1.00**

Interpretation:

This finding reveals strong agreement that **future housing strategies must be environmentally resilient**, signalling expert alignment with global climate adaptation priorities.

3.5 Hypotheses testing

This part of the paper explains the results of the hypothesis testing. It not only shows if each hypothesis was supported or not but also explains how the decision was made and what the research implications are. Percentage

agreement (Agree + Strongly Agree 75%), the median scores, interquartile ranges (IQR), and inter-rater reliability were used to evaluate the hypotheses.

3.5.1 Hypothesis 1 (H1): Historical analysis

H1: Johannesburg's social housing system exhibits features consistent with institutional path dependency, particularly in spatial configuration and delivery mechanisms.

H1 is accepted. Expert's answers to Research Question 1 not only met but in fact significantly surpassed the 75% consensus level. Their levels of agreement range from 80% to 90%. Median scores were in agree to strongly agree range, which denotes a very clear directional alignment. Experts placed differing emphasis but ultimately agreed that it is mainly the historical policy frameworks that continue to determine present housing outcomes. The very low value of Fleiss Kappa (= 0.006) should be interpreted as demonstrating the presence of variations within a multidisciplinary panel rather than the absence of a shared understanding. Since this is a structural and historically layered issue, we should expect some dispersion in the ratings. Qualitative comments also support the statistical results, linking the present-day pressures of affordability, spatial inequality, and institutional fragmentation with the decisions of the past policy.

Implications for the Research:

The support for H1 is essentially confirmation that the historical path dependency plays a crucial role in the analytical framework. It states that the current housing changes are still deeply linked to the long-term institutional and spatial development. This finding helps to interpret the gentrification processes as well as the sustainability issues discussed in later hypotheses.

3.5.2 Hypothesis 2 (H2): Social Housing and Gentrification

H2: The capacity of social housing to limit displacement depends on governance structures, locational strategy, and affordability mechanisms.

H2 is accepted because the research looked at the final responses of the deliberative group to see if their collective opinion (75% consensus threshold) on the big ticket items - coordination by the state, use of regulatory instruments, and picking strategic sites was consistent. The research also looked at median scores which show a level of consensus that social housing, in the right institutional setting, can help alleviate the housing displacement problem. At the same time, the research does acknowledge that the Fleiss' Kappa value ($= 0.027$) points to significant variations in ratings. Differences in roles such as public officials, financial stakeholders, and implementation practitioners resulted in different views on feasibility, scale, and long-term sustainability. But despite this, there was a strong consensus at the conceptual level, agreeing with the idea that social housing's positive effects are dependent on certain conditions.

Implications for the Research:

Backing H2 positions social housing as a key, albeit highly dependent on local conditions, measure. The main ingredient to the success of this measure is properly coordinated governance, regulatory alignment and other urban policy measures. This, in turn, strengthens the overarching claim that delivery of housing must be part of the overall integrated approaches to development in order to effectively deal with the problem of displacement.

3.5.3 Hypothesis 3 (H3): Triple Bottom Line Alignment

H3: The application of Triple Bottom Line principles in social housing delivery reflects integration across economic, social, and environmental dimensions.

H3 is only partly accepted. Experts had a very high level of agreement (8590%) regarding social dimension as they suggested that social housing contributes a lot to inclusion and spatial redress. Economic sustainability had lower consensus responses, people were worried about the subsidy dependency and fiscal exposure. Environmental integration was the theme that got the most mixed reactions, the agreement levels were diverging across different professional groups. The low Fleiss Kappa value for RQ3 (= 0. 007) is in line with the nature of sustainability assessment which looks forward and the evaluation element in it. Although there were quite different numerical ratings, the qualitative responses showed that the priorities of the groups were the same in terms of resilience, affordability, and institutional coherence.

Implications for the Research:

Partial support for H3 shows that the social housing sector in Johannesburg is, to a greater extent, aligned with social objectives as compared with environmental or long-term financial integration. This result points to priorities for policymaking, especially environmental performance and fiscal resilience. It also offers an empirical base for the suggestions made in the last chapter.

Table 17 Chi-square goodness of fit

Response category	Observed	Expected	(O-E) ² /E
Strongly disagree	0	4	4.00
Disagree	1	4	2.25
Neutral	2	4	1.00
Agree	9	4	6.25
Strongly agree	8	4	4.00
Total χ^2			17.50

df = 4

p < 0.05

Source: Author’s statistical analysis based on Delphi survey responses 2025.

Table 17 displays the Chi-square goodness-of-fit results for the comparison between the observed and expected response distributions. Under a neutral distribution, it would be expected that each of the five Likert categories gets four responses. Nonetheless, the observed responses mainly fall within the Agree (9) and Strongly Agree (8) categories; the Strongly Disagree category, on the contrary, had no responses. The computed Chi-square statistic of 17.50 signifies that the observed pattern of responses varies markedly from the expected pattern of a neutral distribution. It can therefore be inferred that expert responses tend to a marked agreement rather than a random variation.

Table 18: Spearman Rank Correlation between Key Research Dimensions

Variables	Spearman ρ	Interpretation
Gentrification pressures (RQ2) vs TBL social housing response (RQ3)	0.48	Moderate positive correlation

Source: Author’s statistical analysis based on Delphi survey responses 2025.

Table 18 gives the results of Spearman rank correlation analysis between gentrification pressures (RQ2) and the Triple Bottom Line social housing

response (RQ3). The correlation coefficient is = 0.48 which indicates a moderate positive relationship between the two variables. Therefore, one interpretation is that experts who perceive gentrification pressures as stronger will also stress more the role of social housing as a policy response within the sustainability framework.

Table 19: Summary of Hypothesis Testing Outcomes and Implications

Hypothesis	Decision	Primary Evidence	Implications for the Research
H1	Accepted	High consensus; Median 4–5; Historical convergence	Confirms historical path dependency as a core analytical foundation
H2	Accepted	Final-round ≥75% consensus; Conditional agreement	Positions social housing as a conditional mitigation tool requiring policy integration
H3	Partially Accepted	Strong social consensus; Mixed economic and environmental results	Reveals uneven sustainability performance and guides targeted recommendations

Source: Author’s synthesis based on Delphi survey analysis and statistical results 2025.

Table 19 presents a summary of the hypotheses testing results that this research achieved through consensus levels, Fleiss Kappa’s K value, statistical testing through the Chi-square goodness of fit as well as Spearman rank of correlation.

4 CONCLUSION AND RECOMMENDATIONS

Experts converged on the view that migration and political dynamics are central drivers of housing demand and policy trajectories. This high-consensus result explains why the city's policy apparatus is frequently reactive: population pressures and shifting political priorities influence location choices and delivery tempo. The BNG policy was recognized as a turn towards more integrated and densified forms of housing, but consensus on its effective realization was more modest: while the policy introduced useful objectives, implementation has been constrained by institutional fragmentation, fiscal pressures and inertia within delivery systems.

A second set of findings concerns the character and drivers of gentrification in Johannesburg. The research finds that gentrification in the city is often state initiated or state-enabled: public investments and municipal renewal strategies frequently precede and catalyse private capital inflows that then trigger rent inflation and displacement pressures. This sequence (public investment followed by speculative private investment) differentiates Johannesburg from many Global North models where private reinvestment commonly precedes public action. Experts identified eviction, rental inflation and informal sector displacement as the primary mechanisms through which gentrification transforms neighbourhoods.

The Delphi analysis produced a nuanced TBL profile for Johannesburg's social housing sector. On the economic pillar, the research identified persistent funding fragilities: housing delivery remains heavily dependent on subsidies, and the institutional appetite and capacity for blended or innovative financing (e.g., green bonds, public-private blended instruments) is not yet robust. Banks and NHBRC respondents especially highlighted the sector's vulnerability to macroeconomic shocks and material cost inflation.

Socially, social housing shows some possibilities for fostering inclusiveness in cases where it is well, located and combined with other uses, but such cases are scarce. Decentralisation and mixed, income strategies were perceived as the right track for solving the problems and providing people with better access to opportunities; however, the implementation on the ground is patchy (Crankshaw, 2022). Most importantly, the experts emphasised that the majority of the housing units turned out to be inefficient tools of wealth creation or not providing access to the labour market to the beneficiaries when these housing units were located on the urban periphery.

Environmentally, the report identified the lowest score. The incorporation of green technology and designs resilient to climate change is not only irregular but also mostly lacking because of a number of factors such as: high initial costs, shortage of technical skills, and a weak enforcement of environmental regulations. However, experts were unanimous that climate resilience should be the main focus of future projects and that by retrofitting existing stock and making housing more consistent with transport corridors (Transit, Oriented Development) the sectors environmental impact can be greatly diminished.

5 NEW SCIENTIFIC FINDINGS

This chapter presents the scientific contributions derived from the structured expert consensus generated through the Delphi process. Rather than advancing isolated or radical claims of novelty, the research offers an integrative theoretical contribution by synthesising institutional theory, urban political economy, displacement scholarship, and sustainability frameworks within the context of Johannesburg's social housing system. The five findings below articulate how the research refines, extends, and contextually integrates existing theoretical debates.

Finding One: Social Housing as a Path-Dependent Institutional System

The research demonstrates that Johannesburg's social housing system operates within a path-dependent institutional framework shaped by apartheid spatial planning, inherited governance structures, and enduring land-market inequalities. Empirical consensus indicates that post-apartheid housing reforms expanded delivery but did not fundamentally reconfigure inherited spatial-economic patterns. Instead, contemporary housing outcomes reflect continuity within institutional constraints.

Finding Two: Social Housing has a Conditional Role in Displacing Mitigation

The research shows that social housing is able to act as one of the mechanisms for mitigating displacement only if the issue of spatial integration as well as the coherence of the governance and the sustainability of affordability are addressed. The preponderance of experts emphasizes that the protective impact of such policies depends on locational and institutional conditions and not simply the existence of social housing provision.

Finding Three: Governance Conflict between Quantitative Unit Delivery and Spatial Integration

The research discloses that the housing governance system of Johannesburg is structurally conflicted between the quantitatively focused short, term delivery imperatives and the spatially oriented long, term integration objectives. Institutional incentives to a great extent determine the prioritization of output targets that can be measured whereas integration outcomes are relatively de-institutionalized.

Finding Four: The Structural Interdependence of Fiscal Architecture and Social Inclusion

The research points to an intricate structural interdependence of social inclusion with a fiscal architecture that is capable of providing continuous support as well as with institutional stability.

The panel of experts agrees that affordability, security of tenure, and social cohesion are not merely the results of a good architectural design but are deeply rooted in the continuity of subsidy and financing schemes in the long run.

Finding Five: The implementation Gap in Environmental Sustainability.

This discovery spots the long, standing difference between the environmental sustainability pledges made in housing policies and the actual realisation of these pledges in practice. It is true that the sustainability goals get a very high level of support, yet their fulfilment is held back by the lack of financial resources, the legal framework, and technical expertise.

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