

REVIEWER'S REPORT

Manuscript No.: IJAR- 59352

Title: Agent-Based Modeling and Simulation for Resilient and Sustainable Smart City Planning in Saudi Arabia

Recommendation:

Accept

Rating	Excel.	Good	Fair	Poor
Originality	Yes			
Techn. Quality	Yes			
Clarity	Yes			
Significance		Yes		

Reviewer's ID: JPR- 015

Detailed Reviewer's Report

Reviewer's Comment for Publication.

Acceptance Comment are mentioned below suitable for the paper titled "Agent-Based Modeling and Simulation for Resilient and Sustainable Smart City Planning in Saudi Arabia"

Reviewer Comments: Accept

Reviewer Comments –

1. Introduction

The introduction clearly establishes the complexity of contemporary urban planning in Saudi Arabia and appropriately explains why conventional forecasting approaches may be insufficient. The emphasis on interactions among households, travellers, firms, utilities, public agencies, infrastructure, and environmental conditions provides a strong rationale for ABMS. The study's focus on resilience, sustainability, digitalization, and quality of life is highly relevant to smart-city development. The research motivation and intended contribution are clearly presented. The introduction successfully establishes the importance of examining ABMS within the Saudi urban context.

2. Literature Review

The literature review provides a relevant and well-integrated examination of peer-reviewed research published between 2020 and 2025. It effectively brings together ABMS, urban digital twins, transportation, energy systems, infrastructure resilience, and smart-city research. The thematic and cross-domain synthesis strengthens the theoretical foundation of the study. The discussion appropriately recognizes behavioural validity, calibration, uncertainty, data governance, interoperability, and documentation as critical requirements. The review also identifies opportunities for integrating ABMS

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with GIS, IoT, digital twins, and participatory planning. Overall, the literature review is comprehensive and well aligned with the objectives of the manuscript.

3. Solution Approach

The proposed six-layer planning framework is a strong contribution of the manuscript. The framework appropriately integrates urban agents, spatial infrastructure, behavioural rules, disruption scenarios, resilience and sustainability indicators, and adaptive policy feedback. It provides a logical mechanism for connecting individual-level behaviour with city-level outcomes. The integration of ABMS with GIS, urban digital twins, IoT data, and participatory planning enhances the practical applicability of the proposed approach. The framework is particularly suitable for evaluating alternative policies and disruptive urban scenarios under uncertainty. Overall, the solution approach is conceptually coherent and sufficiently robust.

4. Results and Discussion

The findings clearly demonstrate the potential of ABMS to represent heterogeneous behaviour, evaluate disruptive scenarios, examine policy feedback, and connect individual decisions with system-level outcomes. The discussion appropriately avoids presenting ABMS as a deterministic predictive tool and instead positions it as a policy laboratory for exploring plausible futures. The emphasis on calibration, uncertainty analysis, data governance, and interoperability adds methodological depth to the findings. The Saudi-specific implications are clearly articulated and provide valuable insights for smart-city planners and policymakers. The discussion successfully connects the reviewed evidence with the proposed planning framework. Overall, the results and discussion are relevant, balanced, and practically meaningful.

5. Conclusion

The conclusion effectively summarizes the role of ABMS in supporting resilient and sustainable smart-city planning in Saudi Arabia. It appropriately emphasizes that the effectiveness of agent-based approaches depends on behavioural validity, reliable data, uncertainty assessment, interoperability, and transparent documentation. The integration of ABMS with digital twins, GIS, IoT, and participatory planning provides a promising direction for future urban development. The conclusion is consistent with the literature synthesis and the proposed six-layer framework. The manuscript provides useful implications for researchers, urban planners, government agencies, and infrastructure stakeholders. Overall, the conclusion clearly communicates the study's academic and practical significance.