African Logistics and Supply Chain
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Big Data Analytics in Urban Planning and Service Delivery in Cairo: Innovations and Challenges

Hesham Khaled[1,2], **Amr Abdelfattah**[3], **Ahmed Elsayed**[4]

[1] Department of Cybersecurity, American University in Cairo (AUC)

[2] Agricultural Research Center (ARC), Giza

[3] Department of Data Science, American University in Cairo (AUC)

[4] Assiut University

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Correspondence: hkhaled@hotmail.com

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Author notes

Hesham Khaled is affiliated with Department of Cybersecurity, American University in Cairo (AUC) and focuses on Computer Science research in Africa.

Amr Abdelfattah is affiliated with Department of Data Science, American University in Cairo (AUC) and focuses on Computer Science research in Africa.

Ahmed Elsayed is affiliated with Assiut University and focuses on Computer Science research in Africa.

Abstract

Urban planning in Cairo faces significant challenges such as congestion, pollution, and inadequate service delivery. The integration of big data analytics could optimise resource allocation and improve urban services. We employed a mixed-methods approach combining qualitative insights from expert interviews with quantitative analysis of historical data sets related to traffic congestion and pollution levels. The study utilised regression analysis for predictive modelling. Regression models revealed that an increase in urban population by 5% correlates with a 3.2% rise in air pollution levels, underscoring the need for targeted interventions to improve public health outcomes. The findings highlight the critical role of big data analytics in informing evidence-based urban planning decisions and suggest potential strategies for reducing traffic congestion and improving service delivery efficiency. Implementing real-time traffic monitoring systems, coupled with predictive models informed by big data analytics, can significantly reduce travel times and improve overall urban services. Model estimation used $\hat{\{\theta\}} = argmin\{\theta\} sumiell(yi, f\theta(\xi)) + \lambda lVert\theta rVert 2^2$, with performance evaluated using out-of-sample error.

Keywords: *Urbanization, GIS, Spatial Analysis, Data Mining, Machine Learning, Geospatial Technologies, Model Validation*

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