



Sustainable Environment and the built Space: Integrating Ecology, Planning and Human Well-being

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A DIGITAL FRAMEWORK FOR LANDSCAPE PLANNING IN COMPLEX URBAN FACILITIES THROUGH THE INTEGRATION OF GIS, BIM, AND SIMULATION IN MOSHOOD ABIOLA NATIONAL STADIUM, ABUJA

Saleh-Bala, Maimuna¹, & Akinola Timilehin²,

^{1,2}Department of Architecture, Faculty of Environmental Design, Ahmadu Bello University, Zaria

E-mail: timilehinakinola@gmail.com

Abstract

The emergence of the growing complexity of large-scale urban facilities has heightened the necessity to develop planning strategies that could incorporate both the spatial analysis and the environmental performance analysis, as well as coordination of its multi-disciplinary nature. The digital technologies that have been introduced, including Geographic Information Systems (GIS), Building Information modeling (BIM) and three-dimensional simulation, have become essential to support data-driven and performance-based design processes in the built environment. However, in most developing countries as Nigeria, implementation of these technologies in landscape planning is limited to visualization and not formalized and systematic decision-making. This paper explores the adoption of digital tools in the landscape design of the Moshood Abiola National Stadium Hotel complex in Abuja, Nigeria. It is a hybrid methodology of design-led case study that integrates GIS-based analyses of sites, the exploration of scenarios in three-dimensional models, and BIM-enabled coordination to create a fully digital workflow of landscape planning. Landscape Systems Theory forms the theoretical foundation of the study supplemented by Technology Acceptance Model (TAM) and the Diffusion of Innovation (DOI) framework. These taken together can be used as conceptual framework for understanding the functional role of digital technologies and the institutional processes that determine its adoption. The proposed workflow comprises of five phases: spatial analysis with GIS, scenario modelling via digital design solutions, coordination with BIM, experiential simulation and visualization, and design evaluation. The study shows through this process how digital tools can increase spatial accuracy, environmental responsiveness and transparency in decision making.

Keywords: Digital landscape planning, GIS, BIM, landscape systems, sustainable built environment