Keio University

Thesis Abstract

No. 1

Registration Number:	□ "KOU" □ "OTSU" No. *Office use only	Name:	CHEDDADI, Mohammed Aqil

Thesis Title:

Generative Urbanism in Morocco: Simulating Adaptive Processes from Traditional Models

Thesis Summary:

This research explores Moroccan historical cities' adaptive and generative urbanism. It highlights their peculiarities within the Arab-Islamic cultural context and investigates how traditional urban development processes could inform contemporary design and planning through bottom-up and emerging computational processes. The traditional city is characterized by a complex adaptive form that has evolved to meet environmental, social, and cultural changes. Similar to the processes forming traditional cities, generative urbanism is an approach to urban design and planning that applies adaptive and interactive rule-based processes to generate flexible and sustainable built environments.

The study critically examines the transition from community-based, bottom-up urbanism to centralized, top-down urban planning systems introduced during Morocco's colonization (1912–1956). Specifically, this study approaches the generative principles of traditional urbanism and their underlying socio-cultural and religious rules for developing adaptive generative codes for contemporary developments.

This research adopts a mixed-method approach combining historical-comparative analysis, case studies, and computational simulations. The historical-comparative analysis investigates the inherent adaptability of traditional Moroccan urban forms compared to the rigidity of (post)colonial planning models. Case studies focus on the persistence of generative principles in urban environments in Morocco, including informal settlements and post-disaster reconstruction contexts. Qualitative data is gathered from interviews, surveys, and observations. Based on this, computational simulations explore the feasibility of generative codes by producing urban configurations and assessing their performance using multi-agent simulations and Genetic algorithms on Rhinoceros 3D and Grasshopper.

Results show that Moroccan traditional cities have adaptive and self-organizing features from day-to-day citizen-driven, iterative growth processes and flexible rules for compact urbanism. This research codifies rules for generating urban forms, translates them into algorithmic models, and tests them with simulations as proof-of-concept (POC). The phased simulations conducted in this research—one addressing slum rehousing and another geared towards post-disaster regeneration scenarios—demonstrated the practical potential of generative urbanism in accommodating contextual complexities and changing needs. Simulations demonstrate how generative urbanism principles result in adaptive and contextual forms. The POCs show their applicability in contemporary design and how to create adaptive urban space that evolves with changing needs.

The study demonstrates the transformative potential of generative urbanism as a paradigm shift for creating resilient urban spaces that evolve with societal needs, leveraging computational simulations to actualize traditional urban principles. Re-encoding these rules in simulations offers a practical framework for sustainable, bottom-up urban development and advancing urban studies and architecture.

Keywords: Islamic city, Slums, Architecture, Design, Simulation