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# Projection for new city future scenarios – A case study for Kuwait

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## Abstract

The creation of new cities is a planning approach adopted in several regions around the world, in order to accommodate urban growth. New cities are typically constructed according to well-thought out, centralised plans in areas without any prior development. However, whether the development of these new cities is able to address existing urban issues more effectively than traditional methods such as intensification, is currently an unanswered research question. Several Arabian Gulf countries, such as Kuwait are considering the construction of new cities to address urban issues, specifically the traffic congestion and housing shortages. In Kuwait, the master plan for these construction projects was developed solely by state authorities without any public participation or urban modelling that may have provided a more well-rounded view of the potential impacts and effectiveness.

This paper aims to address these research opportunities of investigating the effectiveness of new cities in addressing traffic congestion and housing shortage, as well as the potential to integrate public opinions in urban development in the form of a model. Towards that end, the study proposes an Agent Based Model (ABM) that will allow simulating the population distribution and urban growth impacts of new cities in Kuwait by 2050. The methodology involves collecting primary data via interviewing the key government stakeholders of urban development and surveying the residents in order to collect the model inputs. In Kuwait's society, citizens and non-citizens form two distinct resident groups with

often very diverse needs and lifestyles; hence the survey responses will differentiate between them. The data from the interviews and surveys from both resident groups will be incorporated as agent behaviours in the ABM. The simulations examine a multitude of scenarios for the new cities, involving construction delays and infrastructure project delays. The results indicate that the impacts of constructing new cities will be favourable across all different scenarios in terms of alleviating the traffic congestion and housing shortage compared to a business as usual approach of existing urban centre expansion. Furthermore, the survey responses confirm that the resident perspectives closely align with the government's priorities in the master plan for the new cities, further improving the chances for the successful project implementation. The methodology and findings may be applied in cities in the Gulf area or elsewhere with similar urban issues.

Keyword: Geography

## 1. Introduction

Urban growth is a result of the global population rising and the ever-increasing appeal of cities to house the majority of people (United Nations, 2015). Cities offer a significant range of opportunities and life quality improvements to their residents; however, living in a city is not without any challenges. Among the most common issues city-dwellers have to face globally are traffic congestion (Glaeser and Kahn, 2004; Duranton and Turner, 2012), low housing affordability (Chen et al., 2011; Isma'il et al., 2015), social imbalance (Farber and Li, 2013; Zhao, 2013; Pereira et al., 2014) and environmental degradation (Irwin and Bockstael, 2004; Seto et al., 2010, 2012; Sypharda et al., 2011; Arouri et al., 2012). The physical shape of a city, or urban form, and the ways it expands directly affect the severity of these issues (Broitman and Koomen, 2015). As such, there is a growing research interest in the field of urban systems on how modern cities grow and expand; for instance, the mobility patterns of city dwellers and the commute times are strongly correlated to the spatial patterns of existing and new residential developments (Camagni et al., 2002).

While the ways cities grow differ according to their geographic location, history, political and economic conditions (Kaiser et al., 1995), they tend to follow similar patterns. Urban growth may manifest as outward radial expansion of the urban form (Biddle et al., 2006; Newton, 2010) or upwards as urban intensification of existing districts (Melia et al., 2011). Intensification is associated with increasing the population density in existing city districts, for instance through the construction of high rise buildings (Broitman and Koomen, 2015). This results in a more compact urban form, which is often considered more desirable than outward expansion (Bronstein, 2009; Caragliu et al., 2011; Echenique et al., 2012). Some of the stated benefits of

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