Improving Sustainability Concept in Developing Countries

# Pre-assessment of Metropolitan Areas' Smart Growth through Agent Based Modelling

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**Abstract**

Smart Growth (SG) is an approach for sustainable urban development, it emerged to restrain the drawbacks of Metropolitan Areas' urban sprawl. This approach enhances social equity and environmental justice through policies covering micro and macro levels, in addition, it discusses sustainability aspects. However, there are few attempts that simulate the effect of applying principles of SG on emergent behaviour within different context. This study aims at initiating a platform for building a SG Agent Based Model SGABM which focuses on the social behaviour, in order to assist in management of growth dynamics and build an information database for Urban Facility Management. The paper reviews literature and undergoes an application on Walkability principle.

*Keywords:* Smart Growth, Agent Based Modelling, Urban Facility Management, Decision Making, Walkable Communities

## 1. Introduction

Urbanization has become an uprising phenomenon, where about 70% of World's population will be living in cities by 2050,[1].This rapid urbanization caused a number of consequences; starting with the emergence of Urban Sprawl over the fringes of Metropolitan Areas, forming excessive pressure on environmental resources and infrastructure, in addition to negatively affecting the surrounding environment. This phenomenon is also generally associated with common problems like the growth of informal settlements, the increase social segregation, and the lack of social equity

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and the unfair distribution of resources. Most of the attempts to control Urban Sprawl were unsuccessful, in fact, the growing patterns of cities are still uncontainable, which is highly evident in most developing countries.

Smart Growth is a proactive development approach that has been introduced by the American Planning Association in 2002, [2] to restrain urban sprawl of the Metropolitan Areas and to achieve urban sustainability goals as well. It aims at enhancing the communities' quality of life, whereas achieving environmental justice and social welfare in general. The approach of SG has been negatively criticized owing to its need to be supported with a simulation model which is able to validate the application of SG in different urban areas before applying it on real areas. This Validation procedures are performed in order to avoid any unexpected outcomes.

This research focuses on the urban development strategies that are involved in the planning phase for existing Metropolitan Areas. The emphases is on the principle of Creating Walkable Communities and its correlation with the scope of work of Urban Facility Management. The researchers utilized the tool of Agent Based Modelling ABM, as a simulation tool that drives input data developed by planners for the application on the principle of Smart Growth.

This paper has a double –fold objective, first it aims to construct a platform of measurable indicators and input variables, which can be utilized by ABM, to value the effect of applying principles of SG on social interactions and behaviors of different communities. Second, to build a SG model that supports information acquisition and resources management for efficient practicing of Urban Facility Management.

## 2. Methodology

In order to achieve the objective of this paper, the author undergone literature review for concepts of Smart Growth (SG), Urban Facility Management (UFM) and Agent Based Modelling (ABM), which form the key terms of this study. Afterwards, the study attempted to transform the principles of SG into simulation attributes and variables that were applicable through ABM. An application was finally done on the principle of Walkability .The output of the analysis and application, shown in figure 1, was considered as an input to the Urban Facility Management process. This was proved evident in terms of supporting UFM information database and resources management application techniques, along with assigning roles and responsibilities of different stakeholders.
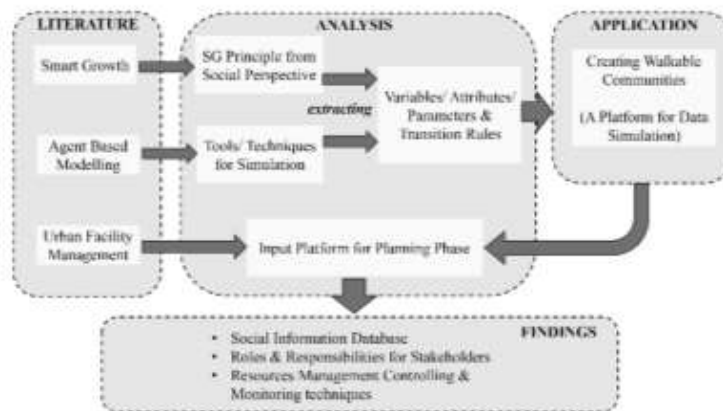


Fig. 1 Research Methodology - by Authors

## 3. Emerging of Metropolitan Areas

Due to the rapid urbanization of developing and developed countries, cities are expanding and growing in the most complex manners. Their growing dynamics are based on layers of historic events, upgrading policies and urban transformations. These cities are classified according to their population densities, as well as their participation in the World's economy and their ability to attract tourists and investments. According to United Nations (UN) report,