

International Conference – Green Urbanism, GU 2016

Street networks between traditional and new Egyptian developments, Problems and learned lessons Abdelkhalek Ibrahim^{*a}, Abdullah Alattar^b

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Abstract

With no doubt, street network design and urban form are assumed to mutually influence each other over time and the link between them is well tested in literature. In Egypt, however, this link is seemingly ambiguous particularly in planning of the new cities. In most of the new-city plans no apparent street pattern relevant to the Egyptian city have been introduced which in turn create unsustainable cities. It is widely agreed that the traditional urban form developed hundreds of years ago may hold some significant guidelines for the future. The current generation of the new city policy invite some urban sustainability guidelines based on the international benchmarks and with some applicable to the traditional form. As a result, an increase demand for defining a sustainable urban form for the new cities is quickly raised. This paper extends the discussions over the sustainability urban form using the analysis of road network. The paper makes a critical comparison between different cases from Greater Cairo Region that range from early developed neighbourhoods to the new planned cases. Route Structure Analysis and Simple Network analysis are the two main themes employed here in building the analytical framework that are then translated into a number of dimensions and quantitative measurements. The research uses a geographic information system (GIS) as an instrument for the analysis.

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Peer-review under responsibility of the organizing committee of GU 2016

Keywords: Connectivity; Street Networks; Simple Network Analysis; Route Structure Analysis; Urban Form; Walkability; Accesability

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1. BACKGROUND

It is academically agreed that the spatial development strategies adopted for the new development in Egypt are not environmentally, socially or economically sustainable (e.g. Ibrahim 2009; Marouf 2001). The layout of the new development established thirty years ago ignores the conventional planning principles for the desert environment, which have been established in the area over many centuries (Gabr 1990; Shalaby 1999). Looking for the typical Egyptian urban form reveals that the compact-city pattern with high density, high diversity of activities and dense accessible network is the common form (Ibrahim 2009). However, by time the traditional urban form was disappeared and a scattered pattern that is described as western (Hegab 1985) or modern (BeCARD 1985) style has been introduced with many concerns regarding its sustainability. The reasons for resulting this pattern back to the history of planning strategies adopted for the new urban extension in Cairo and for the new cities around it. These strategies were new (Shalaby 1999) and the Egyptian planners were not sufficiently aware of planning principles (BeCARD 1985) or process (Hegab 1985). Therefore, the Egyptian government invited Western experiences in planning Heliopolis (Libert 1985), the first new development in the outskirts of Cairo in 1910s, and Western (from Belgium and Switzerland) and American companies for the development of the first generation of new cities in 1980s (Ahmed 2003). As a result many current problems are existed such as long commuting, shortage of public transportation (Acioly 2000), social fragmentation and less richness in the urban environment (Marouf 2001). Yet, recently, the Egyptian government invited some patterns similar to the conventional pattern for the new development but without an implementation case. Accordingly, many researchers have highlighted the need to investigate (Abdelhalim 1985; Abu-Lughod 1987; Rageh 1985), analyse (Abouel-Ela 2003; Hakim 1990; Ibrahim 2009), preserve and even reactivate (Abu-Lughod 1987; Rageh 1985) the underlying processes of traditional city form to learn some lessons for the new urban development.

Urban form is a set of characteristics related to land use patterns, street network, and urban design (Dempsey, et.al. 2010). The majority of previous researches were based on Lynch definition: 'it's the spatial pattern of the large, inert, permanent physical objects in a city'(Lynch, 1981). Urban form consists of four main elements which are: land use, density, street network and characteristics of the built environment (Day, et.al. 2006). This study uses urban forms as it is characterized to some extent by the pattern of road network. An analysis of street pattern and route structure may be useful for this study (Marshall, 2005). Consequently, this paper extends the soundness over this dilemma and try to find the most sustainable urban form using the structure of street pattern as one of the key elements of city urban form.

2. ACHIEVING SUSTAINABLE URBAN FORM

Over the past decades, cities have been seen as the sources of environmental degradation and resource depletion. The past ten years have brought different examples of unsustainable cities suffering from pollution, poor built environment and less connected patterns and therefore it is frequently asked: how to make our cities more sustainable. In a sense, sustainability can be achieved through different tools, methods and process. One among them is to introduce a sustainable urban form characterised by; dense, diverse and highly connected (Jenks & Dempsey 2007). For the purpose of this study, the link between connectivity and sustainability is examined.

Connectivity refers to the directness of links and the density of connections in path or road network. A well-connected road or path network has many short links, numerous intersections, and minimal dead-ends. Street

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