Ain Shams University
Faculty of Engineering
Department of Urban Planning

Resource Efficient Cities For Sustainable Urban Development

By

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M.Sc. Urban planning,

Ain Shams University 2009

A Thesis submitted in Fulfillment of the Requirements of the degree

of Doctor of Philosophy in Urban Planning and Design

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Disclaimer

This thesis is submitted to Ain Shams University in the partial fulfilment of the requirements of the degree of Doctor of Philosophy in Urban planning and design. The work included in the thesis was carried out by the author during the years from 2012 to 2018 at the Faculty of Engineering, Department of Urban planning and Design. The candidate confirms that the work submitted is his own and that appropriate credits are given in terms of reference citation to the work of others. No part of this thesis has been submitted for a degree or a qualification at any other university or institution.

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Ph.D. Thesis

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Post Graduate Studies

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In the memory of my mother ….

“Mother is such a simple word,

But to me there’s meaning seldom heard,

For everything I am today,

My mother’s love showed me the way.

I’ll love my mother all my days,

For enriching my life in so many ways,

She set me straight and then set me free,

And that’s what the word “mother” means to me. “

Karl Fuchs

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Abstract

The study objective is understanding resource efficient cities and their multiple benefits, which contribute significantly to alleviate the pressures on cities and meet the challenges of the future, especially with regard to scarcity of resources. The research hypothesis states that in order to achieve cities that are resource efficient in Egypt, a data management platform for resource efficiency must be developed with the integration of actors, standards, flows, and synchronization of processes and approaches. Therefore, the research aims to understand the efficiency of the use of resources and their various principles and applications. To achieve these goals, the study was divided into four sections.

The first section consists of a single chapter that provides a comprehensive understanding of the problems facing cities and their implications in the future with reference to the Egyptian situation. This section addresses the scarcity of resources with their various components of energy, natural resources, waste, water and food. The challenges of the future will be reviewed globally and international initiatives will be highlighted, ending with the situation in Egypt and point out the city of Cairo through international classifications. The chapter also addresses the necessary elements for the development of cities such as the unexploited loss of resources, linear development dimensions, resource informatics, and actors within the city development system.

The second section consists of two chapters that provide the theoretical framework for the concept of sustainability and its chronological development

during the previous era, ending with the concept of cities with efficient use of resources. Two basic concepts of resource efficiency within cities are discussed: natural capital and urban metabolism. Through the literature review, a detailed explanation was introduced of the definitions of both concepts, including the intellectual dimension, their areas of work within the cities, the importance of applying them, and their application and activation frameworks.

The third section consists of one chapter to study the conceptual issues related to the study of efficiency concerning the use of resources and its various principles. This chapter highlights six methods and five approaches to study and analyze the efficiency of the use of resources within cities with analytical comparisons among them based on detailed description, planned goal, activation mechanisms, desired value and expected advantages.

The fourth section consists of two chapters that explain the empirical study, which attempts to generate an inquiry platform tailored for individuals within residential houses as an influential actor considering the use of resources and indicating the importance of gathering information to create a comprehensive spatial-temporal framework for all resources flows. The section describes how to create a query matrix that will be translated into an application on mobile phones, showing how they are designed, and activated.

The study concluded that it is possible to form an information platform through a mobile phone application to survey the information on the use of resources within residential houses with the possibility of merging them to form aggregated reports that can easily be linked to temporal and spatial data.

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