UNIVERSITI PUTRA MALAYSIA

APPLICATION OF GEOGRAPHICAL INFORMATION SYSTEM AND SMART GROWTH MODELLING FOR IDENTIFICATION OF INEFFECTIVE QUARTERS IN BANDAR ABBAS, IRAN

MOHSEN DADRAS

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APPLICATION OF GEOGRAPHICAL INFORMATION SYSTEM AND SMART GROWTH MODELLING FOR IDENTIFICATION OF INEFFECTIVE QUARTERS IN BANDAR ABBAS, IRAN

By

MOHSEN DADRAS

Thesis Submitted to the School of Graduate Studies, Universiti Putra Malaysia, in Fulfilment of the Requirements for the Degree of Master of Science

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To my beloved family

Father and Mother

Abstract of thesis presented to the senate of Universiti Putra Malaysia in fulfilment of the requirement for the degree of Master of Science

APPLICATION OF GEOGRAPHICAL INFORMATION SYSTEM AND SMART GROWTH MODELLING FOR IDENTIFICATION OF INEFFECTIVE QUARTERS IN BANDAR ABBAS, IRAN

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MOHSEN DADRAS

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Chairman: Ahmad Rodzi Mahmud, PhD

Faculty: Institute of Advanced Technology

During recent decades, planning and management of urban land use has had an important role in development of social and economy of countries. On the other hand expansion of land use can be managed by using geospatial data and development patterns. In Bandar Abbas city, the management of urban development are by trial and error urban land policies as compared to other cities due lack to the of accurate and complete geospatial data. It has been caused by the overgrowing population and migration towards the city without planning. In addition, the inefficiency and very old buildings had also contributed and became the main reason for low quality of urban life in District 1. The aim of this research was to recognize and identify the development patterns for inefficient quarters in District 1 with an inclination towards the use of AHP and Smart Growth models. To achieve appropriate patterns for managing and identifying the utilization of land in quarters, a spatial and attribute

database in the GIS environment was used. The relationship between effective factors namely land use, population, density and construction of the development were considered in the analytical process.

The investigation was carried out to locate capable region for urban development in the inefficient areas of District 1 in the Region 3 of Bandar Abbas. The use of AHP and Smart Growth model in GIS environment were implemented to the collected geospatial database. The collected information includes the land use of the present condition, the procedure of urban development and the effective factors over inefficient land use.

The procedure of this research started with the reconnaissance of effective parameters upon land development in the surveyed region. Having identified the effective factors, layer classification was generated according to their degree of importance and criteria through the use of AHP model. It was implemented to identify suitable site for developing urban users in District 1. Then the Smart Growth model was used to generate zones under the surveyed region according to the kind of operation in inefficient patterns and land use. In Smart Growth model on the basis of divisions of land use it has been designed into three zones of Regional Center Development (RCD), Traditional Neighborhood Development (TND), and Special District (SD). Finally by investigating the relationships and their effects towards each other, and by determining smart code for each zone, the development pattern and inefficient control in District 1 were identified.

The results achieved from this research have successfully identified the suitable lands for urban uses development and identify patterns of user control and land development in inefficient quarters of District 1. According to the results obtained from AHP model central and western portion are appropriate for development. Based on the results obtained from zoning in District 1 and also the Smart Growth model, a major part of the inefficiency of available textures in the quarters of District 1 is due to existing incompatible land uses, being old and obsolete residential and non residential textures, poor management, lack of supervision regulations and comprehensive lack of administrative laws.

Abstrak tesis yang dikemukakan kepada Senat Universiti Putra Malaysia sebagai memenuhi keperluan untuk ijazah Master Sains

APPLIKASI SISTEM MAKLUMAT GEOGRAFI DAN PEMODELAN PERTUMBUHAN PINTAR UNTUK PENENTUAN KAWASAN YANG KURANG EFEKTIF DI BANDAR ABBAS, IRAN

Oleh

MOHSEN DADRAS

April 2009

Pengerusi : Ahmad Rodzi Mahmud, PhD

Fakulti : Institute of Advanced Technology

Sejak kebelakangan ini, perancangan dan pengurusan gunatanah untuk pembangunan bandar memainkan peranan penting dalam pembangunan sosial dan ekonomi negara. Dalam kata lain, perluasan gunatanah boleh dikendalikan dengan menggunakan data geospatial dan pola pembangunan. Di Bandar Abbas, pola pengurusan, pembangunan dan polisi dasar gunatanah Bandar, jika dibandingkan dengan bandar-bandar lain adalah kurang tepat dan lengkap ini adalah kerana data geospatial. Hal ini disebabkan oleh populasi penduduk yang terlalu pesat dan penghijrahan ke kota tanpa perancangan. Tambahan pula, pengurusan yang kurang efektif dan kerosakan dalam pembinaan juga penyumbang dan penyebab utama rendahnya kualiti kehidupan bandar di Daerah 1. Tujuan penyelidikan ini untuk mengenali dan mengenalpasti pola pembangunan untuk kawasan yang kurang efektif dalam Daerah 1 dengan menggunakan AHP dan Model Pertumbuhan Pintar. Untuk mencapai pola yang tepat

dalam pengurusan dan mengenalpasti penggunaan gunatanah di kawasan tersebut pengkalan data spatial dan atribut dalam GIS digunakan.

Dalam kajian ini, hubungan antara faktor-faktor keberkesanan iaitu gunatanah, populasi, kepadatan dan proses pembangunan merupakan proses analisis. Dalam kajian ini, penyelidikan dilakukan untuk mencari kawasan yang sesuai untuk pembangunan bandar di dalam pola-pola yang kurang efektif dalam Daerah 1 di Kawasan 3 di Bandar Abbas. Penggunaan AHP dan Model Pertumbuhan Pintar dalam persekitaran GIS dilaksanakan dengan pengumpulan pengkalan data geospatial. Menurut maklumat yang terkumpul, data terdiri daripada gunatanah sedia ada, penyiasatan prosedur pembangunan bandar dan faktor-faktor yang kurang efektif dalam gunatanah.

Prosedur analisis kajian ini bermula dengan mengenalpasti parameter yang efektif pada pembangunan tanah dalam daerah yang dikaji. Setelah mengenalpasti faktor-faktor yang efektif, klasifikasi lapisan dihasilkan mengikut tahap kepentingan dan kriteria melalui model AHP. Ini dilaksanakan untuk mengenalpasti tapak yang sesuai untuk pembangunan bandar di Daerah 1. Kemudian dengan menggunakan Model Pertumbuhan Pintar, ia mampu menghasilkan zon di bawah kawasan kajian yang sesuai dengan jenis operasi dalam pola kurang efektif dan gunatanah. Dalam Model Pertumbuhan Bijak berdasarkan pecahan gunatanah itu telah menjadi tiga zon Daerah Pusat Pembangunan (RCD), Tradisional Pembangunan dan Persekitaran (TND) Negeri Khas (SD). Akhirnya dengan meneliti hubungan dan kesan terhadap satu sama lain, dan menentukan kod pintar bagi setiap zon, pola pembangunan dan kawalan kurang efektif dalam Daerah 1 telah dikenalpasti.

Keputusan yang dicapai daripada kajian ini telah berjaya mengenalpasti kawasan yang sesuai untuk pembangunan dan mengenalpasti pola-pola kawalan dan pembangunan kurang efektif dalam Daerah 1. Menurut keputusan yang diperolehi daripada pusat model AHP dan bahagian barat merupakan kawasan paling sesuai untuk pembangunan. Berdasarkan keputusan yang diperolehi daripada Zon Daerah 1 dan juga Model Pertumbuhan Pintar, sebahagian besar kawasan yang kurang efektif dalam Daerah 1 adalah kerana kawasan gunatanah yang sedia ada tidak sesuai, tanah lama dan tekstur yang usang untuk perumahan dan bukan kawasan perumahan, pengurusan yang teruk, kurangnya peraturan dan kawalan undang-undang yang menyeluruh.

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I certify that an Examination Committee has met on (…….) to conduct the final examination of **Mohsen Dadras** on his Master of Science thesis entitled " Application of GIS and Smart Growth Modelling for Identification of Ineffective Quarters in District of Bandar Abbas, Iran " in accordance with Universiti Pertanian Malaysia (Higher Degree) Act 1980 and Universiti Pertanian Malaysia (Higher Degree) Regulations 1981. The Committee recommends that the student be awarded the Master of Science degree.

Members of the Examination Committee were as follows:

Chairman, PhD
Professor
Faculty of
Universiti Putra Malaysia
(Chairman)

Examiner 1, PhD
Professor
Faculty of
Universiti Putra Malaysia
(Member)

Independent Examiner, PhD
Professor
Faculty
Universiti

BUJANG KIM HUAT, PhD
Professor and Deputy Dean
School of Graduate Studies
Universiti Putra Malaysia

Date:

This thesis was submitted to the Senate of Universiti Putra Malaysia and has been accepted as fulfilment of the requirement for the degree of Master of Science. The members of the Supervisory Committee were as follows:

Ahmad Rodzi Mahmud, PhD
Associate Professor
Institute of Advanced Technology
Universiti Putra Malaysia
(Chairman)

Abdul Rashid Mohamed Shariff, PhD
Associate Professor
Faculty of Engineering
Universiti Putra Malaysia
(Member)

HASANAH MOHD GHAZALI, PhD
Professor and Dean
School of Graduate Studies
Universiti Putra Malaysia

Date: 15 July 2010

DECLARATION

I declare that the thesis is my original work except for quotations and citations which have been duly acknowledged. I also declare that it has not been previously, and is not concurrently, submitted for any other degree at Universiti Putra Malaysia or at any other institutions.

_____

MOHSEN DADRAS

Date:

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LIST OF ABBREVIATIONS

AHP	Analytic Hierarchy Process
APA	American Planning Association
CI	Consistency Index
CR	Consistency Ratio
FAO	Food and Agriculture Organization
GIS	Geographic Information System
GPS	Global Position System
IDW	Inverse Distance Weighting
ORUP	Organization of Residential and Urban Planning
RCD	Regional Center Development
RI	Ration Index
RIW	Relative Importance of Weights
RS	Remote Sensing
SD	Special District
TND	Traditional Neighborhood Development
UK	United Kingdom
UNEP	United Nations Environment Programme
USA	United States of America

CHAPTER I

INTRODUCTION

1.1 Introduction

Land and humans natural capital form the social life, so that it is formed by land and earth development. This clears the necessity of directed and controlled use of land and as a result, land use and its development becomes the main structure of urban planning. During recent decades, the management of urban land use has had an important role in the social and economy development of countries. On the other hand, the expansion of land use can be managed by using spatial and attribute data and development patterns. So the necessity of using the Geographic Information System (GIS) and Smart Growth model to access to the information is found to be relevant. The significance of using spatial data in management and urban development, the implementation of patterns and laws as well as in confronting the political, social and natural crisis is not unknown for all. But through this, the existence of a logical system is the first provisions of this using. Accordingly there should be a system to settle on organizing, specifying approaches, processing, presentation of information, saving and maintenance. Way of processing is most important of all the manner of communication of land use with information and to decide their use. It is for this reason that GIS is the system that is chosen to show and analyze the spatial objects and establishes the possibility of communication between GIS and user management. In this direction the new tendencies has been presented; the process of land management is used in order to establish warranty for proposal

patterns of land use and the process of land development as the last step of the process of land managing is propounded.

1.2 Problem Statement

Common traditional approach (master plans) is determined through the separation of different land use in the form of urban zoning and land development. However, urban land use and up-zoning often remained on the paper and what occurred really follows the tendencies of land market that caused inefficient land development patterns for the cities. In Bandar Abbas city, like the management patterns, development and trial-error urban land policies of other cities, lacks any correct spatial and attribute data within which a skilled system to be analyzed. It has been caused by the overgrowing population and migration toward the city which accordingly land development on the basis of self-growing patterns and without planning. Inefficiency and obsoleteness of construction, which according to the quality of the urban life is in the low level, lead to the vulnerability of buildings, especially after the passing of several decades of their existence. Plans, land policies as well as rules and regulation in these limitations are cross sectional and could not have good results (Sharmand, 2008). An obvious example is the regulations of encouraging policies to renew old features in recent three years with no considerable effect on the renovation and development of these features.

Thus land development is always a topic of great challenge to governments, managers and planners as well as of interest to researchers specializing in this field. In this research the main problem of district 1 is identify the development pattern for