UNIVERSITI PUTRA MALAYSIA

ASSESSING THE COVERAGE, ADEQUACY AND ACCESSIBILITY OF SELECTED COMMUNITY FACILITIES FOR MALAYSIAN ELDERLY BASED ON GIS APPROACH

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The numbers of elderly in the population nowadays have grown tremendously and benefited from the modern development of better community services especially in countries where there are great advancement and progression in health technology. This emphasis on improvement of community facilities has undoubtedly provided a better quality of life to many of the older generation and undeniably help in increasing their life span, hence the increase in population. Contrary to this, many from the older generations are still faced with difficulties in getting access to the provided services because of problems in efficiency of facilities provision. In conjunction to this, many initiatives have been taken by the associated government agencies dedicated to meet the needs of the elderly. The dedications are in terms of easier access to the available facilities and without having to pay an astronomical fee. But the planning for the elderly is a complex issue because their needs are as varied as the population composition itself. On the other hand, conventional method of data collection (hardcopy based) has been found to be inefficient and ineffective in terms of producing qualitative results within a short time span. The two primary objectives guide this

research which is analysis of the coverage, adequacy and the accessibility of selected community facilities for the elderly through the GIS technology, and second is to create an automated data collection technique by using the PDA. Methods in use involve PDA program customization, selection and surveying of targeted sites in terms of accessibility to the selected community facilities. All collected PDA data are pooled and incorporated into the GIS database. This is followed by creation of elderly database for spatial analysis and accessibility analysis. From the experimental results, the used of automated data collection PDA system is much more cost-effective and time saving. Besides, with the aid of GIS technology, the distributions of demographic of elderly in different characteristic are clearly determined based on several definitions. The study successfully demonstrated the application of GIS with the several methods in the facilities accessibility assessment of the targeted group, and it has been found that the community facilities are barely adequate in study area. As an addition, an automated data collection technique and complimentary spatial analysis procedures can help to encourage better decision modeling in the development of a better health care for the elderly. With this automated GIS system, it is hope that better planning and decision modeling can be done. This is to ensure that problems of specific needs of the target group, in relation of accessibility to social and health facilities, will be reduced and finally overcome albeit slowly.

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

PENENTUAN LIPUTAN, KECUKUPAN DAN KEBOLEHCAPAIAN PERKHIDMATAN KEMUDAHAN AWAM YANG TERPILIH UNTUK WARGA TUA MALAYSIA MELALUI PENDEKATAN BERTERASKAN GIS

Oleh

LIM CHE KIONG

Oktober 2005

Pengerusi: **Profesor Madya Abdul Rashid Mohamed Shariff, PhD**

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Kini, bilangan warga tua telah meningkat secara mendadak akibat perkembangan kemudahan kesihatan moden, terutamanya di kalangan negara yang mencapai kemajuan dari segi teknologi kesihatan. Penekanan terhadap pembangunan infrastruktur dan perkhidmatan penjagaan kesihatan telah meningkatkan kualiti hidup generasi tua dan jangka hayat mereka. Namun begitu, masih ramai warga tua yang menghadapi kesukaran dalam mengakses kemudahan dan perkhidmatan kesihatan yang disediakan kerana sistem perbekalan yang kurang efisyen. Sehubungan itu, banyak inisiatif telah diambil oleh agensi-agensi kerajaan yang berkaitan untuk memenuhi keperluan golongan warga tua tersebut. Antara langkah-langkah yang diambil termasuk meningkatkan pencapaian dan akses kemudahan kesihatan yang sedia ada tanpa kos bayaran yang tinggi. Tetapi, perancangan untuk warga tua merupakan satu isu yang kompleks memandangkan keperluan mereka adalah berbeza-beza dan berlainan seperti populasi penduduk yang lain. Kaedah pengumpulan data secara konvensional (berasaskan salinan bercetak) didapati kurang efisien dan tidak berkesan untuk menjana hasil kuantitatif dalam jangka masa yang singkat. Dua objektif utama menjadi panduan

kepada kajian ini, iaitu 1) analisis liputan, kecukupan dan aksesibiliti perkhidmatan kemudahan awam yang terpilih untuk warga tua, dan; 2) pembentukan teknik pengumpulan data secara automatik dengan PDA. Kaedah yang digunakan melibatkan pengubahsuaian program PDA, peninjauan dan pemilihan lokasi pilihan dari segi kebolehcapaian kemudahan kesihatan awam. Semua data PDA yang terkumpul akan dihimpunkan dalam pangkalan data GIS. Ini adalah diikuti dengan pembentukan pangkalan data warga tua untuk analisis spatial dan aksesibiliti. Dalam pada itu, pendekatan baru untuk anggaran jarak sesuatu perkhidmatan turut disarankan. Daripada keputusan eksperimen ini, didapati sistem pengumpulan data berasaskan PDA adalah jauh lebih kos efektif dan menjimatkan masa. Selain itu, taburan demografi warga tua dari segi ciri-ciri yang berlainan turut diperjelas dengan bantuan teknologi GIS, berasaskan definisi yang ditetapkan. Dari segi liputan dan kecukupan kemudahan terpilih, didapati infrastruktur dan perkhidmatan yang sedia ada di lokasi kajian adalah tidak memuaskan. Hasil kajian akses kemudahan kesihatan menunjukkan bahawa warga tua terpaksa bergantung kepada kemudahan kesihatan swasta daripada kemudahan kesihatan awam kerana kekurangan hospital dan klinik kerajaan. Kesimpulannya, teknik pengumpulan data secara automatik dan prosidur analisis spatial dapat membantu dalam proses membuat keputusan ke arah pembangunan penjagaan kesihatan warga tua yang lebih sempurna. Dengan sistem GIS tersebut, adalah diharapkan perancangan dan pembentukan keputusan yang lebih baik dapat dilakukan. Ini adalah untuk memastikan permasalahan yang dihadapi oleh kumpulan sasar, dari segi pencapaian kemudahan kesihatan dan sosial, dapat dikurangkan dan diatasi walaupun secara beransur-ansur.

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LIST OF ABBREVIATIONS

API	Application Programming Interface
MPSJ	Majlis Perbandaran Subang Jaya
CP	Center Point
EB	Enumeration Block
GIS	Geographical Information System
GPS	Globe Positioning System
IDE	Integrated Development Environment
IWOD	IntelliWhere OnDemand
MP	Majlis Perbandaran
PDA	Personal Digital Assistants
POUNC	Post Office Users National Council
RSO	Rectifies Skew Orthomorphic
SDE	Services Distance Estimating
SIP	Soft Input Panels
PC	Personal Computer
MacGDI	Malaysian Centre for Geospatial Data Infrastructure
MNUSD	Ministry of National Unity and Social Development
MOH	Ministry of Health
NHCE	National Health Council for the Elderly
NPE	National Policy for the Elderly
RAM	Random Access Memory
TFR	Total Fertility Rate
UMMC	University Malaya Medical Center
UN	United Nations
UNESCAP	United Nations Economic and Social Commission for Asia and the Pacific

CHAPTER 1

INTRODUCTION

1.1 Background

In Malaysia, '60 years and over' has been used as the cut-off point in deliberating aging trends since the 1982 United Nations World Assembly on Ageing in Vienna (Pala, 1988). At present, the Malaysian mid-year population stands at 25.49 million persons (UNESCAP, 2004). In the 2000 Census, there were 1,451,665 older persons in the country, which means that 1 out of every 16 persons in Malaysia today is 60 years old or older. The number of older person in the population have grown tremendously, have benefiting from the modern development of the better health care especially in countries where there are great advancement and progressing in health technology. This emphasis on improvement of health care services undoubtedly provided a better quality of life to many of the older generation and undeniably help increase their life span, hence the increased in the proportion of the older persons in the population. Contrary to this, many from the older generations are still faced with difficulties in getting access to the provided facilities/health services. Many still did not get access to the facilities especially those living in rural area and those facing financial difficulties (Garman, 1997).

In cognisance with the growth of the number of older persons in the community, many initiatives have been taken by the associated government agencies dedicated to meet the needs of the elderly. The dedications are in terms of easier access to the available facilities and without having to pay an astronomical fee. Even with this commitment, the number of facilities still does not meet the elderly needs in the country. This means the effort of building the various kinds of the facilities is still an on-going process. The needs for new

facilities mean that more sites have to be chosen and decided upon to determine their suitability, yet these services are beneficial if the target population is able to utilize the facilities.

In conjunction with this development in the country, there is a clear opportunity for the synergistic application of GIS (Geographical Information System) technology on this issue. With an ageing society, there is an increasing emphasis on access to basic health care facilities and services. Longer life expectancy, higher levels of education and increased health awareness contribute to the rising demands for better health care and medical services. The paradox of affluence, where rising standards of living can lead to poorer quality of life of some, serves as a reminder to the grim reality faced by the at-risk groups such as the poor and the elderly. While many could not receive medical attention because of physical accessibility barriers, many older persons simply could not afford private health care facilities. Therefore, the planning of public health care facilities becomes even more important to ensure broader access.

1.2 Problem Statement

The growth of the older population, due to an increase in life expectancy for men and women, has resulted in changes on society needs relating to public facilities and services. The elderly has special needs and concerns that must be met. Hence, plans to build or upgrade existing facilities and services must be able to anticipate the changes in demand and demographics of the population.

There have been no studies investigating whether the current facilities and services are able to meet the needs of the elderly in the community. Research is needed to provide an empirical and systematic assessment on the accessibility of key facilities for older Malaysians.

1.3 Objectives

Two broad objectives guide this research. They are:

a. To analyse the coverage, adequacy and the accessibility of selected community facilities for the elderly through the GIS technology.

b. To create an automated data collection technique using the PDA.

The purpose of this study is to develop an automated method of data collection on elderly-related facilities and services using a GIS-based approach. Current technology is but implementation and integration of the approach is still not fully crystallized. The system has been proposed to explore ways to bring together technological innovation in mobile devices and Geographical Information System to benefit the public and policy makers. It is hopes that the mobile GIS technology can be fully utilized in fieldwork data collection to make it more efficient and ensuring a smooth workflow between the study area and work office.

1.4 Assumptions and Limitations of the Research

The complexity of the elderly care GIS-based system, its related range of planning activities and the constraints of time, human resource and financial availability make it essential to limit the scope of study. This is to ensure that all the data are manageable. Nevertheless, the system and analysis proposed in this research can be applied to any area in this country. The assumptions and limitations are discussed below:

i. The research will be limited to one Municipal Council only. The proposed study area is Subang Jaya Municipal Council (Majlis Perbandaran Subang Jaya, MPSJ), Selangor.

ii. Only the community and health related facilities provided by the government or the local authorities will be taken in to account in this research. The list is as follows:

   a. Medical – Hospital and clinic

   b. Religious ceremonies or worship facility – Mosques, Church, Indian Temple and Chinese Temple

   c. Post Office

iii. This is assumed that the used of the facilities should be equally accessible for the different group of the elderly.

iv. The PDA in used will be Compaq IPAQ H3900 series with extended backup battery which operated in the Windows CE platform and the capacity of the device is more and less uniform for the various brands of PDA. Besides, the availability is also a contributing factor in the choice of hardware.

v. The census data in used is based on the year 2000 census data set, and the resolution of the dataset is limited on combined Enumeration Block (EB).

1.5 Organisation of Thesis

The thesis is divided into five chapters. Chapter One introduced the general ideas of the study, problem statement, aim, objectives as well as the scope of research. This is followed by Chapter Two which discusses and reviews the literature related to the study. In this chapter, a series of related project, research and review are addressed.

The methodology of the research is described in Chapter Three. This includes the study area background, type of data used and data processing, software customization and the method/technique used to gauge the levels of the accessibility of the facilities. Chapter Four is focused on the custom application output and the results of various types of analyses. In this chapter, discussion on the problems and issues of the research are also highlighted. The final chapter concludes the overall findings of the study and recommends the future work that can be integrated with the current work to produce more advanced findings.

CHAPTER 2

LITERATURE REVIEW

2.1 Introduction

This literature chapter will start with the current status of older person in Malaysia and issues faced by the older persons. This is followed by the introduction of Geographical Information System (GIS) technology and its function in the social science studies. Automated data collecting environment and the review of the tool kits which performs this task would be discussed in detail. Next, the role and function of the facilities planning are reviewed. The discussion then moves on to the relationship between the facilities accessibility and spatial analysis. The final section will focus in the issues that influence the implementation of spatial analysis in the GIS environment.

2.2 Overview of Elderly and Health in Malaysia

> "Developing the society of Older People to be secure, dignified, highly esteemed by optimizing their potential and ensuring they enjoy equal opportunities in all areas and receiving care and shelter as a member of a family, a society and the nation".
>
> -The National Policy on Older People

The declaration in 1992, of 1st October as the Elderly Day marked a new chapter in the history of Malaysia as the government began to recognize the needs of the older person in this country. Like many others countries in the world, Malaysia is experiencing population

ageing characterized by lower fertility and mortality rates (United Nations, 2004; Pala, 1998). The percentage of distribution of older persons in Malaysia is estimated to reach 21.6% during year 2050 (Figure 2.1).

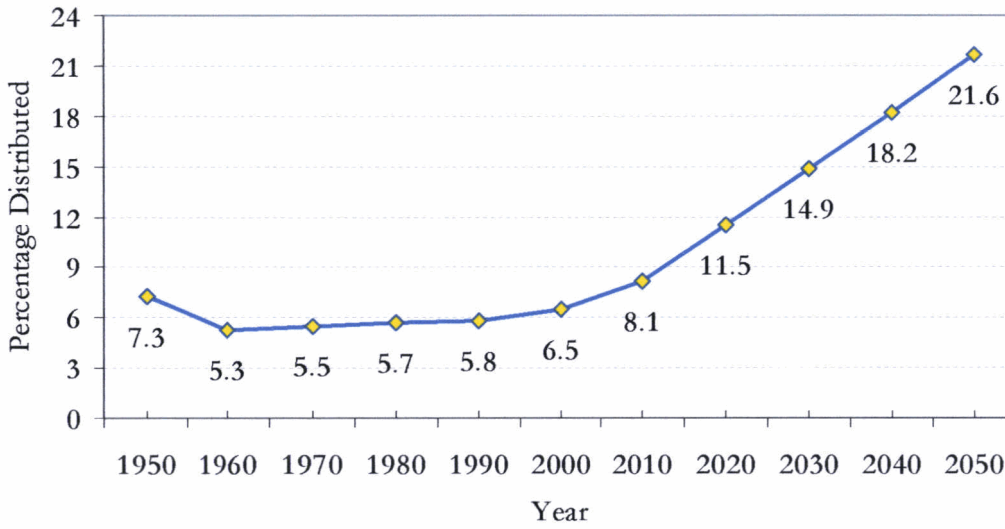

Figure 2.1: Percentage of Distribution of Older Persons in Malaysia by Years (1950 – 2050)

Source: United Nation (2004)

Malaysia's Total Fertility Rate (TFR) fell from 6.72 in 1960 to 2.95 in 2000 (United Nations, 2004). Life expectancy in the country has also increased. In 1957, life expectancy at birth for the male and female population was 55.8 and 58.2 years respectively (Table 2.1). In less than half a century, life expectancy at birth in the year 2000 increased to 70.5 years for males and 75 years for females (Department of Statistics, 2001). That is on average a ten-year increase a person born today can expect to live when compared to the life expectancy recorded 30 years ago in 1970.

Table 2.1: Life Expectancy at Birth of Malaysians by Gender (1957 - 2000)

Year	Malay		Chinese		Indian		National Average	
	Male	Female	Male	Female	Male	Female	Male	Female
1957	50.2	53.4	59.5	66.7	57.5	54.6	55.8	58.2
1966	61.3	62.5	66.2	71.2	62.5	61.9	63.1	66.0
1970	63.8	65.5	65.1	73.4	60.2	63.9	61.6	65.6
1980	66.5	68.9	68.0	74.0	62.1	67.0	66.4	70.5
1990	69.0	72.4	70.6	76.3	64.4	70.4	68.9	73.5
1996	68.8	72.7	71.9	77.6	65.0	72.8	69.3	74.0

Source: MNUSD (1999)

The distribution of older persons in Malaysia is further broken down by state in figure 2.2. From 2000 census data, Johor, Perak and Selangor recorded the highest absolute number of older persons, combining to form 38% of the total elderly population in the country. The seven states of Kedah, Kelantan, Melaka, Negeri Sembilan, Perak, Perlis and Pulau Pinang are in the same population ageing situation in which the proportion of elderly exceeding the 7% of the total population.

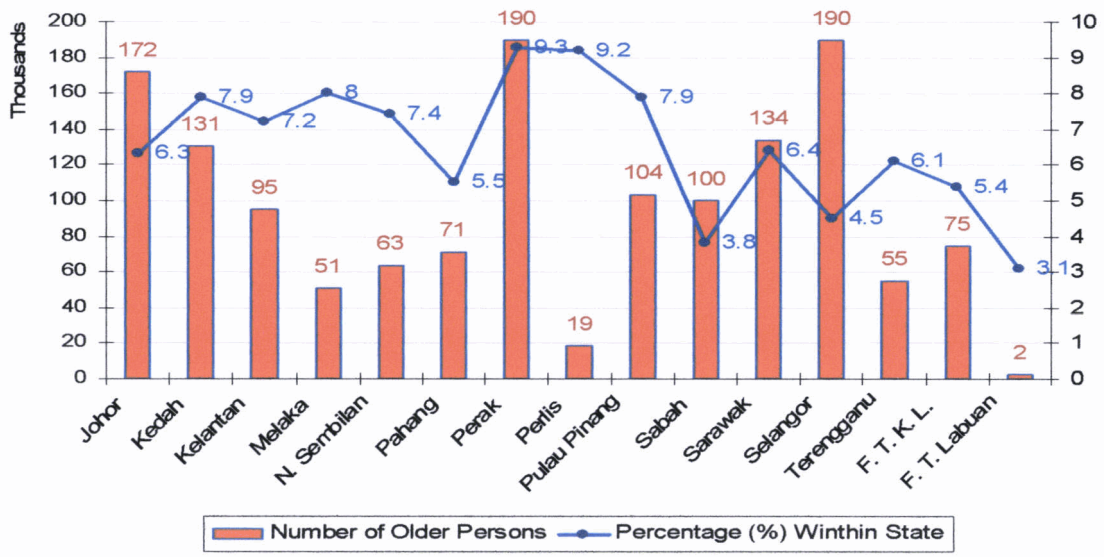

Figure 2.2: Distribution of the Elderly Population by State

Source: Department of Statistics (2001)