Research Report 2014
Project No: A-14/ 001

ATRANS
ASIAN TRANSPORTATION RESEARCH SOCIETY

Bus Mobility and Quality of Life of Aging People in Bangkok: An Exploration and Recommendations for Policy Makers

JUNE 2014

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June, 2014

Printed in Thailand

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Abstract

The main objectives of this study were (1) to examine Bangkok transportation policy (public bus service) for aging people, and its problems and obstacles (2) to better understand aging people's needs and preferences on public bus services (3) to better understand difficulties of aging people in using public bus services (4) to examine the impacts of mobility on aging people's satisfaction on public bus services, convenience and accessibilities to certain facilities, and their quality of life and (5) to develop a set of specific suggestions and recommendations for policy makers on public bus services for aging people. The samples of this study were 400 aging people in Bangkok. The data were gathered using questionnaire as a tool. The collected data then were analyzed using structural equation modeling (SEM) technique. The study found that bus mobility was the most influential factor on quality of life of aging people followed by feeling independence, medical convenience, and socialization convenience. Suggestions and recommendations for policy makers then were discussed.

Acknowledgements

We would like to gratefully and sincerely thank Professor Dr. WirojRujopakarn, Associate Professor Dr.ChumnongSorapipatana for their valuable advices. We would also like Dr. Tuenjai Fukuda for her substantial support. This project would not be complete without her kind cooperation. We would like to thank Assistant Professor Dr. SitthaJaensirisak, Dr. ParametLuathep, and Dr. PredaPichayapan for reviewing the questionnaire. They also gave us fruitful and valuable recommendations. Thank you ATRANS's staff for facilitating our project. Finally, thank you ATRANS for granting this project.

Police Lieutenant Colonel Dr. WaiphotKulachai
(Project leader)

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List of Abbreviations

BMA	Bangkok Metropolitan Administration
BMTA	Bangkok Mass Transit Authority
CFA	Confirmatory Factor Analysis
NESDB	Office of the National Economic and Social Development Board
OECD	The Organization for Economic Co-operation and Development
QOL	Quality of Life
SEM	Structural Equation Modeling
WHO	World Health Organization

CHAPTER I INTRODUCTION

1.Introduction

In Thailand, there is a trend to become aging society. The Population Reference Bureau – PRB (2013) reported that population with the age of 65+ in Thailand is accounting for about 10 percent. However, it is estimated to be 20 percent in 2030 (NESDB, 2013). Thailand will have stable number of population whereas the number of aging people has increased gradually but the birth rate has been decreased. According to the report conducted by the Foundation of Thai Gerontology Research and Development Institute (2013), the fertility rate has decreased from 2.0 in 1995 to be 1.5 in 2021.This trend of population structure has become a challenging issue for this country since it might affect policy making on economic development, labor, education, finance, environment, social welfare as well as transportation.

Transportation is a very important part of people's lives and activities. It enhances people to gain access to goods, services, social interaction, and good quality of life. However, when people are getting older and older, they will face difficulties in using various modes of transportation due to their health and disabilities. The Beverly foundation (2010) stated that the transportation options available do not meet the seniors and their caregivers. Each country might have different articulation and implementation of the policy but their general objectives are not so different as Mercado, Scott, Newbold, and Kanaroglou (2007) stated that "the nature and degree to which countries recognize the impact of demographic aging are reflect in their choice of transport policy actions."

Public bus service is one of major modes of transportation for people in developing country, such as Thailand. Aging people in the country have faced many obstacles in using public buses according to their mobility issues. Mobility would enhance them to access medical service easier. They can be more comfortable to go shopping, travel, socialize, and other activities. In addition, they may feel independence if they can travel on their own. Most important, mobility could enhance their well-being as a whole. Hence, public transport policy for aging people, especially a policy on bus service for aging people, should be considered. However, making decision on any particular policy requires information, evidences, researches, and empirical studies.

According to the review or literatures on public transportation for aging people in Thailand, there are few researches and empirical studies. One of recent study is

entitled "public transport for Thai elderly case study in north east region" by Karnkrong Su-Anka in 2013. Another study entitled "comparative study of public transportation policy for gerontology" was conducted by students of Burapa University in 2012. The locus of these two studies is Chon Buri province and a northeastern part of Thailand respectively. However, there is no research on public bus and mobility for aging people recently. We, therefore, interested in conducting a research entitled "bus, mobility, and quality of life of aging people in Bangkok: An exploration and recommendation for policy makers" since Bangkok's aging population has been increased recently accounting for approximately 10.35 percent in 2013 and it is estimated to reach 25.50 percent in 2035 (NESDB, 2013). Hence, understanding how aging people travel in their communities and to outside their societies as well as their satisfaction on bus service is very crucial for policy makers to establish a policy that meets the aging people's needs, life style, and well-being.

2. Objectives of the research

To address findings and recommendation for policy makers on bus transportation for aging people in Bangkok, it is the purpose of the research project to examine following issues;

1. **To examine Bangkok transportation policy (public bus service) for aging population, and its problems and obstacles.**
2. **To better understand aging population's needs and preferences on public bus services.**
3. **To better understand difficulties of aging population in using public bus services.**
4. **To examine the impacts of mobility on aging people's satisfaction on public bus services, convenience and accessibilities to certain facilities, and their quality of life.**
5. **To develop a set of specific suggestions and recommendations for policy makers on public bus services for aging people.**

3. Research questions

Since the purposes of this research project are to examine Bangkok transportation policy (public bus service) for aging population, and its problems and obstacles, to better understand aging population's needs and preferences on public bus services, to better understand difficulties of aging population in using public bus services, to examine the impacts of mobility on aging people's satisfaction on public bus services, convenience and accessibilities to certain facilities, and their quality of life,

and to develop a set of specific suggestions and recommendations for policy makers on public bus services for aging people. This research project, therefore, will focus mainly on public bus service policy for aging people, mobility, direct and indirect impacts of mobility on satisfaction of public bus services, quality of life of aging people as well as aging people's medical accessibility, shopping convenience, travel convenience, socialization convenience, recreation convenience, and feeling independence required to answer the following questions;

1. **Are there any existing policies on public bus transportation for aging people in Bangkok?**
2. **What are the problems and obstacles in implementing the policy?**
3. **Does mobility affect medical accessibility, shopping convenience, travel convenience, socialization convenience, recreation convenience, feeling independence, satisfaction on bus services, and quality of life of aging people in Bangkok?**
4. **What are suggestions and recommendations for policy makers?**

4. Scope of the Study

This study focuses on aging people who are 65 years of age or older and living in Bangkok Metropolitan area.

5. Advantages

1. **The results yielded from this study will enhance policy makers and related stakeholders to make a decision on public transportation policy exclusively for aging people.**
2. **The findings would be beneficial for public and private sectors providing bus services for aging people. Hence, they can provide bus technology and facility that meet the needs and preferences of aging people.**
3. **Bus operators can apply the findings to improve their quality of bus services that meet their customers' desires at all age groups especially for aging people and disabilities.**
4. **The findings of this study will also beneficial for transportation studies. In addition, public transportation issues would have more public attraction so that related agencies would pay more attention on this issue.**

6. Limitation

Since the study requires the samples who are aging people in Bangkok, there might be some difficulties in collecting the data. Many of them may not read and understand well on filling the questionnaire themselves. The well-trained research teams, therefore, are assigned to assist them in filling the questionnaires.

CHAPTER 2 REVIEW OF LITERATURE

1. Policy on public bus services

For better understanding of public bus services policy in Bangkok, four main bodies' policies, namely Office of the National Economic and Social Development Board (NESDB), Ministry of Transport, the National Commission on the Elderly (NCE) which reports directly to Ministry of Social Development and Human Security, the Bangkok Metropolitan Administration (BMA), and the Bangkok Mass Transit Authority (BMTA), must be illustrated. This section will examine public policy with regard to aging people, especially, policy on public bus services. The linkage and relationship between policies of each organization will be explored.

1.1 The 11th Social and Economic Development Plan (2012-2016)

The Office of the National Economic and Social Development Board (NESDB) is responsible for giving suggestions and recommendations for the government on social and economic matters. It is the agency who creates the 11th Social and Economic Development Plan of the country. According to the 11th Social and Economic Development Plan (2012-2016), "a happy society with equity, fairness and resilience" was stated as its missions. Four missions then were set up as follows:

1. To promote a fair and quality society so as to provide social protection and security, to enjoy access to a fair judicial process and resources, and to participate in the development process under good governance.

2. To develop people with integrity, knowledge and skills appropriate to their ages, and to strengthen social institutions and local communities for positive adaptation to changes.

3. To enhance productivity and services based on local wisdom, knowledge, innovation and creativity by developing food and energy security, reforming the structure of the economy and consumption to be environmentally friendly, and strengthening relations with neighboring countries in the region for mutual economic and social benefits.

4. To build a secure natural resource and environmental base by supporting community participation and improving resilience to relieve the impacts caused by climate change and disasters.

To achieve the vision and mission as given, 6 major strategies were established in accordance with the vision and missions.

1. Creating justice society. This strategy can be achieved by (1) enhancing socio-economic security for all Thai citizens to be capable of managing risks as well as creating opportunities in life, such as restructuring the tax system and fair distribution of income, and fair allocation of resources and property ownership (2) providing social services based on the fundamental of human rights, emphasizing self-resilience of individuals, and encouraging participation in policy making (3) empowering all sectors to have alternatives in living and participating in social, economic, and political decision making so the citizens will have freedom to think and act creatively. This will enhance the citizens to access better public services and welfare. In addition, minority groups would have better opportunities and (4) enhancing social interaction among citizens so that they can have shared values and benefits, and reinforcing effective, transparent, and accountable public administration.

2. Developing lifelong learning society by adjusting the national population structure, developing human resources capabilities, promoting reduction of health risks, promoting of lifelong learning, and reinforcing roles of social institutions.

3. Strengthening agricultural sector as well as food and energy security by (1) reinforcing natural resources, such as, efficient land utilization, restoration of good agricultural norms and practices, sustainable farming, and conservation of productive arable land (2) increasing agricultural productivity by encouraging agriculture that preserve biodiversity, controlling imported fertilizers and pesticides as well as supporting usage of green and environmental friendly technologies in the production processes (3) promoting value-added agricultural commodities which requires collaboration of academic institutions in each regions as well as better logistic management (4) creating job and revenue security for farmers, such as developing income and crop insurance system, and promoting young generation and skilled labors to engage in agriculture (5) enhancing food security and bio-energy development in household and community (6) promoting bio-energy production and usage in agricultural sector to support the national development and (7) improving public management to enhance food and energy security.

4. Restructuring the economy toward equity growth and sustainability. This measure focuses mainly on utilization of science, technology, innovation, and creativity. Hence, research on science have been encouraged and promoted. Free and fair competitive environment as well as sound macroeconomic management shall be carried out to achieve economic stability.

5. Creating regional connectivity in term of social and economic stability. This measure could be achieved by developing transport and logistics systems among ASEAN countries, promoting the country as an investment base, preparing not only the pubic but also the private sector to be ready in joining the AEC, promoting regional and international cooperation, creating regional economic partnership, and supporting international community against terrorism, international crime, drugs

trafficking, natural disasters, and epidemics. In addition, cooperation with NGOs on ethical and environmental issues should be developed. The free trade agreement should be implemented effectively. The plan also stated that supporting foreign investors will enhance Thailand to become the business hub and cooperation base in the region. Furthermore, there shall be an empowerment for community and local government to strengthen regional partners with neighboring countries.

6. Managing natural resources and environment toward sustainability by conserving, restoring, and creating environmental security, promoting low-carbon and environmental friendly economy and society, preparing for climate change and any disaster, fostering resilience through trade measures, enhancing role of Thailand in international arena, controlling and reducing pollution, managing natural resources more efficiently, transparently, and equitably.

Based upon the 11th Social and Economic Development Plan, no specific policy describes about transportation for aging people. However, this plan is the main policy of the country so that it is quite broad. Hence, related public organizations shall deploy this policy to be more concrete with regard to the first strategy "creating justice society" since this strategy aim to enhance the citizens to access better public services and welfare which might include public bus services and other modes of public transportation.

1.2 The Government's policy

The Ministry of Transport represents the government of Thailand to be responsible for transportation in the whole country. Its policy has been found in the Ministry of Transport Strategy Plan (2011-2015). Its vision is "toward sustainable transportation" (Policy and Strategy Department, Ministry of Transport, 2013). The missions of the Ministry of Transport are to develop transportation system, mechanism and personnel, to set up development policy, and to monitor and integrate transportation efficiently, thoroughly, economically, and fairly. Six major objectives are detailed as followings:

1. To be the hub of linkage and transportation of the region. The strategy of this objective is to link domestic transportation with neighboring country. The transportation infrastructure, such as, road, railway, air, and marine transportation will be developed to support customer needs and economic growth.

2. To have efficient logistics systems which enhance competitive advantages of the country. The strategy of this aim is to develop logistics systems so that goods and services are delivered to customers punctually and cost saving.

3. To have safe, energy saving, and environmental friendly traffic and transportation. Four strategies are proposed to achieve this objectives namely (1) improving transportation infrastructure and facilities as well as road environment for safety reason (2) influencing people to have awareness on traffic and transportation safety including law enforcement (3) promoting transportation which are environmental friendly and energy saving as well as developing green transportation technology and (4) develop transportation infrastructure to facilitate the traffic including road network improvement.

4. To improve public transportation services for better quality of life by improving, developing, and linking public transportation throughout urban and rural area as well as promoting utilization of mass public transportation.

5. To achieve efficient traffic and transportation management. There are five major strategies to accomplish this aim which are (1) Restructuring/reorganizing transportation-related organizations and their roles (2) Developing personnel capability (3) Integrating policy implementation (4) Utilizing information technology to support the tasks and (5) Amending laws and regulations to meet the change.

6. To be a high performance organization with good governance and pay important against corruption in public sector. This aim consists of four strategies which are (1) Developing quality, efficient, economically, transparent, non-corrupted, and accountable management system (2) Developing transportation database which is up to date, correct, and linkable among transportation agencies (3) Developing transportation personnel (4) Creating new organizational culture and improving the quality of work life of the personnel.

The transportation policy of the government can be linked with the 11th National Economic and Social Development Plan "creating justice society." Such policy has been deployed by improving public transport services for better quality of life. However, there is no specific policy, plan, and project on transportation for aging people identified in the Ministry of Transport Strategy Plan (2011-2015).

1.3 The National Commission on the Elderly's policy

The National Commission on the Elderly, the Ministry of Social Development and Human Security (2002) established the 2nd National Plan on the Elderly (2002-2021) in 2002. However, this plan was firstly revised in 2009. The plan was set up based on the perspectives "the elderly are valuable assets to the society" as well as the following philosophy.

1. The aging people are not neither vulnerable groups nor social burdens, but able to take part as the social development resources.

2. The elderly shall be entitled to recognition and support by their family, community and the state to have a valuable life with dignity and sustain their healthiness and living standards as long as possible.

3. The aging people who encounter difficulties shall access the full and justified care from the family, community, society and the state.

4. The establishing of security for aging people is deemed as a process in social strengthening to be accomplished by the participation of all concerned parts and sectors. To achieve the aging people security, four main issues namely self-help disciplinary population, caring by the family, support by the community, and social and state's support must be considered.

The main objectives of setting this national plan are to (1) encourage the aging people well-being where they can lead their life as an asset to the society with their dignity, individual independence, and autonomy under the reliable security (2) raise social concern on the respect for and recognition of the aging people's valuable contribution to the society whereby their valuable experiences shall be promoted as long as possible (3) raise all people's awareness regarding the necessity for readiness preparation for their quality aging (4) encourage the people, family, community, local, public and private sectors to realize and take part in the actions involving the aging people and (5) formulate the frameworks and guidelines for good practice on aging people for all concerned parties to achieve an integral and comprehensive implementation of the policy on aging people.

According to this plan, 5 strategies has been set up and implemented. The details of each strategy are:

1. Strategy on readiness preparation of the people for their quality aging. This strategy consists of three major measures, namely:

- **(1) Income security for old age. To achieve this measure, money saving discipline should be encouraged and established among the aging people. In addition, the security of aging people should be extended to cover all target groups.**
- **(2) Education and lifelong learning. This measure can be achieve by encouraging the access to and developing the education service and lifelong learning in either the formal, adult learning by preference in order to provide correct knowledge and better understanding of life and aging, and campaigning for social awareness regarding necessity of the preparation for aging.**
- **(3) Raising social conscience on the respect for and recognition of the elderly valuable contribution and dignity. This can be accomplished by**

(1) encouraging the learning and participation of people in all age groups towards caring of aging people not only the family but also the community level (2) promoting the activities which enhance good relationships between the aging people and persons of all ages. The activities can be held as a part of education, religion, culture and sports and (3) campaigning for social concern on the respect for and recognition of the aging people dignity and valuable contribution to the society.

2. Strategy on the aging people promotion and development. This strategy consists of six measures;

(1) Health promotion, prevention against disease and primary self-care. Health promotion activities should be organized to meet the aging people and their family preferences and needs.

(2) Encouraging of groups joining and strengthening the aging people groups, communities and organizations. Hence, the establishment of aging people clubs and networked should be encouraged. In addition, the aging people activities and networks should be supported by the state and related agencies.

(3) Promotion of employment and income of the aging people. This can be achieved by (1) promoting their employment either fulltime or part-time job in term of both formal employment and self-employment (2) promoting their occupational training and job placement which suit to their ages and abilities and (3) encouraging groups joining in communities to gain additional income in which the aging persons can take part.

(4) Promotion of the skillful elderly. To achieve the goal of this measure, award should be presented to aging person who serves as a good person in order to praise her/him so the others can learn from his/her experience. In addition, the state should encourage the establishment of "aging people brain bank" to collate the wisdom of the society as well as providing them the opportunities to transmit their wisdom to others. Furthermore, participation in social activities of aging people must also be encourage and enhanced.

(5) Promotion and support all kinds of mass media to include the aging people-related issues in their programs and support the accessibility of aging people on knowledge, data, information, and news. Hence, the suitable program for aging people should be promoted by the state. Accessibility to all kinds of media for aging people should be supported ensured.

(6) Promotion and provision of aging people housing with suitable and safe environment. Hence, the state should support and encourage educating of the elderly and their families on adjustment and modification of their housing to suit the needs of the aging people. The loan sources with lower interest for construction/modification of housing and public facilities which are accessible to and usable by the elderly should be promoted. Last but not least, the legislation to give privilege to the private entities that provide service housing for the aging people should be established and enacted.

3. Strategy on the social safeguards for the aging people. This strategy consists of four measures as followings;

(1) Income security. To ensure that the aging people have income security, accessibility to the welfare rendered by the state should be promoted among aging people. In addition, the community based-fund should be established so that the aging people can access to the loan.

(2) Health security. The quality and efficient health security for all aging people should be developed and promoted. The state shall ensure their access to health care service and annual health examination. In addition, the required vaccinations in conformance with the standard practice should be provided for them to ensure their health security. Furthermore, the government shall support them auxiliary technologies necessary for their living such as glasses, cane, wheelchair, and denture.

(3) Families, caregivers and protection. To achieve this measure, awareness regarding the value of sharing the living with elderly persons based on a basis of mutual caring should be encouraged among family members. In addition, family members and caregivers should be provided with knowledge and information so that they can take care of the aging people properly.

(4) Service system and supportive networks. This measure consists of seven sub-measures which are as followings:

(a) Adjust and modify all public service systems to be accessible to and usable by the elderly in order to ease convenience and feasibility for them in living and contacting with other people either an individual, group or society. This can be achieved by (1) providing and informing them the fares of public transport and other mass transit systems that entitle them some reductions (2) promoting the adjustments and modifications of all kinds of public transport to be

accessible to and usable by the aging people as well as awarding the outstanding either public service organizations or their staff according to their good services. (3) encouraging the public and the private sectors in charge of public places to observe the required standard practice involving public places accessible to and usable by the elderly (4) providing facilities accessible to and usable by the elderly in the public places such as a road, a footpath in communities, to be usable by the aging people and disabled persons and (5) arranging parks and sufficient, safe and proper areas for them to take exercise.

(b) Establish and develop health and social service including the long-term community-based care fully accessible to and usable by the aging people emphasizing on the home care model which cover (1) support of long-term care services (2) nursing systems (3) significant chronic diseases treatments (4) community-based volunteers and (5) support the caregivers to access knowledge and skills important for taking care of aging people.

(c) Encourage local administration organizations, religious entities, private entities and the entities with public interests to take part in provision of welfare for the aging people emphasizing on a community-based approach.

(d) Support the private entities and local administration organizations to render health care and social services. However, such provided-services shall be certified and standardized with fair and reasonable cost.

(e) The state shall establish the plans and systems for mitigation impacts of disaster on aging people.

(f) Promote the public and the private hospitals to provide alternative medical services for aging people.

(g) Establish elderly clinics in public hospitals.

4. Strategy on national comprehensive system management for aging people. This strategy consists of two majors measures as followings:

(1) Managing of national system. The National Commission on the Elderly should be empowered to implement the policy on aging people and the provincial and local sub-committee should be established.

(2) Promoting and supporting personnel on the aging people care services such as provision of training.

5. Strategy on processing, upgrading and disseminating knowledge on the aging people as well as monitoring of the policy implementation. This strategy can be achieved by consecutive and effective monitoring of policy implementation. In addition, the aging people database should be developed and the research on gerontology shall be encouraged and supported.

In conclusion, the National Commission on the Elderly's policy does concern about public transportation for aging people since the third strategy "social safeguard for aging people" emphasizes on promoting all kinds of public transport to be accessible and usable by the aging people, providing them public transportation fares and information as well as improving road and footpath in their communities so that they can access to public transport. However, this commission has some difficulties in implementing the policy.

1.4Policy of Bangkok Metropolitan Administration (BMA)

According to the vision of Bangkok 2020, there are five key strategies to be achieved as the metropolitan of sustainability (Strategy and Evaluation Department, Bangkok Metropolitan Administration, 2009).

1. Strengthening infrastructure for regional mega-city. This strategy aims to create Bangkok as the hub of transportation and communication in South East Asia. There are two main issues to be considered in this strategy; land use and traffic system. According to land use, urban planning should be improved. Some areas need efficient land use management to gain development capability. For traffic system, it should be improved so the citizens can travel easily and safely. Various kinds of public transportation will be promoted especially rail transportation is aimed to be the major transportation mode. In addition, the road and transportation network will be improved to link Bangkok and its periphery, and to decrease the transportation cost caused by traffic congestion.

2. Developing strong economy and knowledge-based society. This strategy consist of five sub-strategies which are (1) promoting entrepreneurship which will enhance small and medium-size enterprises (2) creating good quality products "Bangkok brand" (3) Developing economic, financial, budgeting, and investment data center to provide information for investors and businesses (4) providing investment opportunities for its citizens and (5) promoting tourism in Bangkok to be the center of tourism in this region. In addition, education is one of the most important factors enhancing Bangkok to become knowledge-based society. The BMA, therefore, has established Metropolitan Bangkok University to support this objective.

3. Thriving for green Bangkok. This strategy consists of seven sub-strategies which are (1) Increasing efficiency in flooding prevention and drainage system (2) decreasing the amount of waste and using recycle technology (3) increasing efficiency in air and noise pollution control (4) increasing green areas and public parks (5) conserving and restoring the only-one-left mangrove in Bangkok (6) decreasing GHG by promoting public transportation and alternatives energy as well as enhancing environmental friendly communities.

4. Providing good quality of life in cultural mega-city. The strategies are (1) promoting good health of the citizens (2) social development and social welfare which include the development of community leaders, family, welfare systems for children, women, aging people, disabled persons, and minorities (3) developing sports and recreation activities (4) improving urban safety and orderliness (5) creating economic opportunities for the citizens based on self-efficiency economy (6) creating attractiveness and cultural identity of Bangkok

5. Mastering best service and mega-city management which can be achieved through five major strategies, namely, aiming to be the best service organization, developing electronic services, monitoring and evaluating people satisfaction on the services provided, fostering empowerment from the central government especially revenues, tax, budget, and other missions as stated in the constitution, and reengineering the administration structure.

The policy of the BMA toward transport mainly focuses on providing public transport for the citizens in general. No specific policy on public transportation for aging people at all. Moreover, the BMA also pay more attention on facilitating traffic flow which will benefit economic growth of the city rather than accessibility and mobility of people with difficulties, such as aging people, and disabled persons.

1.5The Bangkok Mass Transit Authority (BMTA)'s policy

The vision of the BMTA is "long-live mass transit, international standard service, touchable servicing for people, connected all mass transit network, and environmental friendly." The mission then has been set up as followings (Bangkok Mass Transit Authority, 2013).

1. To improve sustainable public bus services in Bangkok Metropolitan and periphery area so the people can access to the service easily, economically, safely, and fast.

2. To develop the bus system to connect with other mass transit systems.

3. To apply the modern management and technology for reducing the cost and environmental friendly purposes.

4. To improve the organizational structure and administration system to enhance and achieve the mission efficiently.

According to the vision and mission as stated, the three main strategies have been established to support them as followings.

1. The strategy of increasing the competitive advantage. The main objectives of this strategy are to increase the competitive advantage, to improve and provide better public bus services, to improve infrastructure and facilities for passengers, and to enforce the laws against illegal bus services.

2. The strategy of organizational development. The main objectives of this strategy are to develop human resource management system in accordance with the good governance, to reengineering organizational structure and size to be appropriated, and to develop the administration system and increase employees' competence at all level.

3. The strategy of debt management. The main objectives of this strategy are to manage the enterprise's debt in the short and medium terms, to find out how to decrease loss from implementing public policy, and to improve public bus services according to the public service obligation (PSO).

From the vision and mission of the public enterprise, the policies, plans, and pivotal projects on public bus services have been established and implemented in 2013.

1. Provision of 3,183 NGV buses project. This project aims to replace the old buses, to improve the service standard as well as reliability of the public bus services, to promote public transportation, to save cost and energy in accordance with the government policy, and to mitigate pollution and global warming issues.

2. Changing the engine of 323 buses to be Euro II project. This project aims for cost and energy saving as well as decreasing pollution.

3. Bus route development and improvement project. This project aims to manage current bus routes more efficiently and to link public bus services to other modes of public transportation, and to enhance utilization of public transportation.

4. Development of BMTA's land project. This project has the objectives to encourage investors to invest in the area of BMTA so it would enhance higher revenues and economically land usage.

5. Synery project. This project refers to sharing resources among public enterprises which will be very beneficial in worthy investment, saving cost, increasing capability, facilitating people using public transportation, and sharing knowledge between personnel of each enterprise.

6. Early retirement project. The main objective of this project is to decrease the number of staff to meet organizational technology and environment.

7. Improvement of free bus's quality of service. This project aims to improve the standard of public bus services and expand the services to cover the whole Bangkok.

Like the policy of other transportation agencies as stated above, the BMTA does not pay more attention on the transportation for aging people. There is no specific policy on improving and providing facilities of buses for aging people.

2. Defining aging people

There is no specific threshold age for "older person." In Thailand, the "older person" as stated in the law is as of 60 completed years of age and older. In addition, the United Nations (UN) and World Health Organization (WHO) considered a person or population group of age 60 years or older as "older persons." According to Japan, people with 65 years of age and older are considered as "older persons." However, some scholars have different perspectives on this issue.

Rosenbloom (1999, p. 4), who specializes in transportation for aging people, considered aging population as people with age of over 65. She described that the proportion of aging people in American society will be increased more than double between 1996 and 2050 from 34 million to 78 million. The growth of such number has been caused by two main reasons. First, people live longer due to better income, education, and medical services. Second, the number of fertility rate has decreased dramatically. When people continue to age, their physical and medical situation may worsen. Some people may face difficulties in mobility and become dependent on the others. Okayama and Sawai (2010, p. 1301) stated that when people getting older, they will have difficulties in driving and the number of people who cannot drive will increase. People who used to live independently may need assistance whereas some people may need to move into special facilities. Even people living with their younger's family also face the problems since most of their relatives have to work and raise their family.

Gray, Pattaravanich, Chamchan and Suwannoppakoa (2013, p. XI) stated that the definition of "older person" as of 60 years and older has been applied in Thailand for a long period of time. Also, sixty years of age is the threshold of retirement for government officials and the law also designates "older person" as of 60 completed years of age and older. They claimed that Thai society continue to involve in terms of social, economic, cultural, and health dimensions. Hence, they conducted a research

to reconsider the definition of "older person" which meets the contexts of these changes. Based upon their findings from focus group discussion and in-depth interview, they proposed the new definition of "older person" as a person with 60 completed years of age and older.

In this study, the definition of "older persons" or "aging people" as the persons with 65 years of age and older will be applied.

3. Transportation trends of aging people

Transportation trends of aging people in each country are varied. However, transportation planners are unaware of the growth of aging population. They, therefore, provide unsuitable public transportation for this new market segment. According to traditional transportation planning, the policy making is likely to be supply oriented rather than to meet the mobility needs of travelers. Hence, the transportation system does not meet the mobility needs of aging people (Suen&Sen, 1999, p. 98). Rosenbloom (2009, p. 34) supported this argument as appeared in her statement "traditional public transit services as currently funded and delivered are not responsive to the needs of most older travelers, particularly those no longer in the labor force." Hence, Suen and Sen (1999, p. 98) suggested that policy maker and transportation providers should consider about aging people as growing travel market segment according to the reason as stated below:

> "The senior tomorrow will be more affluent, more vocal, and increasingly used to claim their rights. Because they likely will be more active than previous generations in their retirement, shopping, banking, and recreation trips will continue, and health-related trips are expected to increase"

For American aging people, they lack of suitable transportation alternatives to driving. They perceive only traditional public transportation such as buses and train. In addition, they lack of confidence to use such public transportation modes (Suen&Sen, 1999, p. 98). Private car, therefore, is the most important mode for most of them. They are most likely to be passengers rather than to be the drivers themselves. Freund (1999, p. 115) claimed that elderly take 9 out of 10 trips in private cars as either passengers or drivers. Their trips tend to be shorter, and closer to their home. Women are most likely to go shopping and social while men make trips for recreation and medical reasons (Whelan, Langford, Oxley, Koppel, & Charlton, 2006, p. 5). In addition, they are less likely to use public transport compared to younger people. However,

they are likely to use public transport, especially taxi, for their medical and recreational trips. Furthermore, older people are more likely to walk than using public transit (Rosenbloom, 1999, p. 8). Suen and Sen (1999, p. 101) stated that "walking" is the second most used travel mode for seniors. The main reasons for them not using public transport is that they often fear of falling and the crush of people in public transportation (Freund, 1999, p. 115).

In some developing countries such as Thailand and Laos, motorcycle is the most crucial mode of travel. Onnavong and Nitta (2005, p. 1080) found that Motorcycle is the vital modes for Laos even this mode of travel is very dangerous.

4. Defining mobility

Mobility is very important for people to access to facilities. Without mobility, people cannot participate in social activities. They might lose connection with friends and relatives and less likely to live happily and longer. However, mobility is defined slightly different according to the context of the study of each scholar and there is no single universally accepted definition (Onnavong& Nitta, 2005, p. 1065).

Before the 19th century, mobility is defined as "moving people and goods at the speed a person could walk, a horse could gallop, an ox could draw a cart, or a boat propelled by sails or oars could move through the water." After the invention of petroleum-fueled vehicle, airplane provided greater opportunity and flexibility to travel. Road network had been expanded to the places where the railroad could not go. Hence, the twentieth century become the "golden age" of mobility (Onnavong& Nitta, 2005, p. 1066).

Suen and Sen (1999, p. 97) described mobility as "being able to travel where and when a person wants, being informed about travel options, knowing how to use them, being able to use them." They also added that private car in the closest of full definition of mobility. However, patterns of land use, growth of services, and direct delivery of goods may affect the acceptability and viability of transit alternatives.

Rosenbloom (1999, p. 3) defined mobility as "the trip rate by all modes, includes walking and biking as well as driving and using the various other modes of transportation." She also suggested that mobility would affect the lifestyle of elderly people because of their inability to drive and to find satisfactory transportation modes to access services and facilities they need.

In conclusion, the narrow definition of mobility considers mobility as ability to travel. However, for broader definition, mobility is being able to travel where and when a person wants, being informed about travel options, knowing how to use them, and being able to use them as described by Suen and Sen (1999, p. 97). Then, the broader definition of mobility will be applied in this study.

5. Measuring mobility

There are some slightly different in measuring mobility. Segawa et al. (2003 as cited in Onnavong& Nitta, 2005, p. 1066) considered mobility in term of trip frequency, trip length, and trip speed. However, Onnavong and Nitta (2005, p. 1066) themselves defined mobility as "the combination of personal and transportation attributes. Hence, they measured the mobility by the maximum distance a person can go by all affordable transportation modes within a certain time of his/her daily life. Rosenbloom (1999, p. 5) stated about mobility measured by trips taken and mile travelled while Okayama and Sawai (2010, p. 1305) considered mobility of bus services as the number of services, locations of bus stops, roads and road network, and sidewalks. For this research, mobility measurement will be based on both the study of Okayama and Sawai (2010) and the definition of mobility as proposed by Suen and Sen (1999).

6. Satisfaction of bus services

Islam, Chowdhury, Sarker and Ahmed (2014) defined satisfaction as "an experience of fulfillment of an expected outcome." They also studied factors affecting customer's satisfaction on bus transportation which are services, access, availability, time, and environment. Disney (1998) suggested that friendliness of bus driver did influence on customer satisfaction. In addition, the layout of the platform or the station, reliability, convenience and responsiveness are also important in customer satisfaction (Cavana& Corbett, 2007). According to the survey of Sydney Metropolitan bus users 2010, there are ten aspects of satisfaction on bus services; clean seats, helpful and friendly driver, journey time, buses keep to timetable, easy to get information on tickets and fares, comfortable seats, timetable displayed at bus stop, buses connect with other public transport, always get a seat, and buses not too crowded in peak (Independent Transport Safety and Reliability Regulator, 2010).

7. Quality of life

7.1 Perspectives on quality of life

Murphy, O'Shea, Cooney and Casey (2007) stated that defining "quality of life" is a difficult task since it has been studied in various disciplines. This study will focus on major five different disciplines concerned which are environmental approach, healthcare approach, sociological approach, economic approach, and psychological approach.

1. Environmental approach. This approach views the quality of life as physical and social quality of individual's environment and the interaction between the individuals with their environment. Individuals who are flexible and adaptable to the environment will have a good quality of life.

2. Healthcare approach. This approach was developed based on the impact of a treatment on a patient's life assessment and comparison of outcomes with alternative health intervention. Hence, the quality of life in this aspect relates to generic or specific diseases, mobility, self-care, anxiety, depression, and well-being (which measure emotional function). Traditionally, the health-related quality of life focused mainly on impediment and disabilities. However, studies on this issue nowadays focus on both negative and positive terms. Some studies measure quality of life by comparing expectation and experience of individual's quality of life. Some studies may study by comparing individuals' health and well-being with others who are worse off than themselves.

3. Sociological approach. Schuessler and Fishe (1985) said that this approach examines the quality of life from an individual and societal perspective. It focuses on relationship between individuals with their families, friends, and communities. These social relations are very important to identify the quality of life of an individual.

4. Economic approach. This approach claimed that the quality of life involves income, wealth, and rational resource allocation. Hence, the quality of life of an individual depends on budget and resource constraints.

5. Psychological approach. This approach is concerned with fulfilling needs beyond material nature. Individuals will have satisfaction in life and well-being if their needs have been met.

7.2 Quality of life of aging people

Quality of life of aging people currently has been realized as an important issue in various countries. The World Health Organization also places important on this

matter. It has developed and revised measurement for examining the quality of life several times. The World Health Organization Quality of Life Assessment (WHOQOL) is an instrument developed to measure quality of life (QOL). It has been developed in different cultures and languages in order to make it applicable to many cultures. This instrument comprises of six dimensions; physical health, psychological, level of independence, social relationships, environment, and spirituality/religion/personal beliefs (WHO, 1997). According to the WHOQOL group (1998), WHOQOL-100 is a reliable and valid measure of QOL for use in a diverse range of cultures which consists of 24 facets grouped into six domains as described, whereas WHOQOL-BREF is a reduced 26-item version comprising four domains: physical, psychological, social and environment.

According to the study by Pucci, Reis, Rech and Hallal (2012), WHOQOL-BEIEF with four dimensions of quality of work life; physical, psychological, environmental, and social dimensions were examined. The study found a positive relationship between physical activity and quality of life of older people.

Burckhardt and Anderson (2003) validated the Quality of Life Scale (QOLS) developed by Flanagan. This instrument consists of five domains which are (1) material/physical well-being (2) relationship with other people (3) social, community, and civic activities (4) personal development and fulfillment and (5) recreation. According to the findings, the QOLS is valid instrument to measure the quality of life of patients.

Murphy, O'Shea, Cooney and Casey (2007) explained that there are seven aspects have been studied recently.

1. Health. There are some studies on health-related quality of life. According to the study by Borglin, Jakobsson, Edberg, and Hallberg (2006), aging people with good quality of life also had good or excellent self-rated health. The findings in the study of Bowling, Gabriel, Dykes, Marriott-Dowding, Evans, Fleissig, Banister and Sutton (2003) also found the importance of health on quality of life especially ill-health will have negative effect on quality of life.
2. Psychological well-being. This aspect is one of the most important matters that affect individual quality of life. The study of Borglin et al. (2006) found that individuals with high quality of life also have high mental stability.
3. Social relationship. In the social gerontology, family and kinship are very importance for quality of life of individuals. The social relationship refers to connectedness to family and friends which yield positive result on the quality of life (Bond & Corner, 2004). The study by Borglin et al. (2006) also found that people with the highest self-rated quality of life had "excellent" or "good" social support. Farquhar

(1995) found the similar results since there are some evidences of relationship between social interaction and quality of life.

4. Activities. Involvement in social and community activities will enhance quality of life of the aging people. Bowling et al. (2003) indicated that involvement in social activities, and local community and voluntary organizations contributed to a good quality of life. The survey by Farquhar (2005) also found the similar result.

5. Home and neighborhood. Neighborhood is one of the environments according to environmental approach. Hence, people who have good neighborhood should have good quality of life. Home and neighborhood in this sense refers to living in a safe, secure, and friendly area, having friendly and helpful neighbors as well as having good community's facilities (Murphy, O'Shea, Cooney, & Casey, 2007). The study by Borglin et al. showed the relationship between quality of life and satisfaction of residential environment. Furthermore, the study by Bowling et al. reported that about 37 percent of respondents suggested that neighborhood is critical to the quality of life.

6. Financial circumstances. Financial issue is critical for aging people to live their life. The study conducted by Browne, O'Boyle, McGee, McDonald, O'Malley, and Hiltbrunner, (1994) indicated that finance is the important domain of quality of life accounting for 25 percent of the respondents in their study. The study by Bowling et al. (2003) also indicated that orries in financial issues will affect the quality of life.

7. Spiritual and religion. Spiritual in this sense refers to the private subjective experience. The religion refers to the powerful religious organizations. The survey conducted by Farquhar (1995) mentioned about spirituality and religion. In addition, the study by Grewel, Lewis, Flynn, Brown, Bond, and Coast (2006) also suggested spirituality and religion as the important factor influencing the quality of life of the aging people. However, they are not so influenced as the environmental, psychological, and social domains. Also, they play an important role on relieving stress from illness as well as enhance well-being of the aging people.

8. Mobility and quality of life

Mobility is one of major factors affecting the quality of life and well-being of aging people. The study conducted by Moriyama, Fujiwara, and Sugie (2002 as cited in Okayama and Sawai, 2010, p. 1301) tried to find the relationship between the levels of travel services and quality of life of elderly people. However, they found no statistically significant relationship between the two variables. However, Rosenbloom (1999, p. 19) described that older people will face significant decline in their quality of lives since they can no longer drive to the places they desire. Women are the most vulnerable group since they live longer and most likely to live alone.

Okayaman and Sawai (2010, p. 1312) conducted a research entitled "An attitude analysis of elderly people toward mobility and community bus in rural area: Case study of the Osaki-Kajiyama island in Japan" and found that improvement of mobility and easiness to use the medical facilities and the community spirits could enhance the level of satisfaction in lives of elderly. In addition, the number of bus services was the most important factor affecting their decision to use community bus services. Furthermore, elderly people without assistance required more frequent services than people who can ask someone to take them by car.

Whelan, Langford, Oxley, Koppel and Charlton (2006, p. XIII) found that older persons who cease driving will lead to the reduction of their quality of lives. In addition, poor mobility is the major impact on individual, family, and society in which they live. The groups of older persons who will have substantial impact are women and financially disadvantaged groups. Their findings are supported by the study of Harrison and Ragland (2003, p. 102) who found that reduction and cessation of driving may cause adverse consequences such as reduced out-of-home activities, increased dependence on caregivers, increased dependence on other transportation, loss of independence, loss of personal identity, increased depression, and reduced life satisfaction.

9. Suitable transportation alternatives for aging people

Suitable transportation alternatives depend mainly upon the area of providing the services. Sune and Sen (1999, p. 111) suggested "a broader range of services, including accessible fixed route, flex route, service route, dial-a-ride, and taxis, can provide seniors with alternatives to driving that may be acceptable in urban and denser suburban areas." For small and medium size communities, innovative third party services are more likely popular, affordable, and suitable. However, personal vehicles (electric bicycles, powered wheelchairs, scooters, golf carts, and NEVs), provide independent mobility for aging people in rural areas. In addition, walking and cycling are very suitable for seniors living in rural areas but the road structure should be designed to reflect the needs of elderly and their safety.

Freund (1999, p. 116) proposed suitable transportation resources for aging people in her paper presented in the conference on "Transportation in Aging Society: A Decade of Experience" held during 7-9 November 1999 in Bethesda, Maryland. She described that the most significant transportation resource for aging people is another form of automobile. Volunteer ride is the second most important alternatives. The latter one has some advantages such as comfort, familiarity, low cost, personal assistance, and

opportunity to ask for favors or goods. However, it also has some drawbacks such as dependence, socially inequitable position, and unsafe operators.

To provide transportation alternatives for aging people, policy makers are very important persons to push the related policies to be effective. They, therefore, should realize in this important issue and should know the true needs of aging people. In addition, there is a need for public policy to "guide education and public information about the importance of mobility" to aging people's quality of life (Freund, 1999, p. 120). Cobb and Coughlin (1999, pp. 286-287) then suggested that policy makers should be educated about aging. Alternative transportation should be promoted as a mode, nor as a social policy tool.

The Organization for Economic Co-operation and Development -- OECD (2001, pp. 4-5) suggested that eight major policy priorities should be identified; support and funding to enable lifelong mobility, support for older people to continue driving safely, provision of suitable transportation options to the private cars, safer vehicles for older people, development of safer roads and infrastructure, appropriate land-use practice, involvement of older people in policy development, and educational campaigns to promote maximum mobility and safety for older people. Rosenbloom (2009, p. 40) provided some similar recommendations, for instances, adopt policies that provide substantially more funding for transit operators to develop meaningful transit services and increase ADA-type paratransit services for aging people, provide better support and financial resources for the wide variety of community transportation providers, develop programs and policies of safety driving for aging people, enhance and maintain pedestrian network as well as ensure restricted traffic regulation enforcement.

This study will figure out suitable transportation alternatives from group discussion. Then comments and recommendations for policy makers will be discussed.

10. Conceptual framework

According to the review of literature, the conceptual framework of this study is proposed as illustrated in Figure 1.

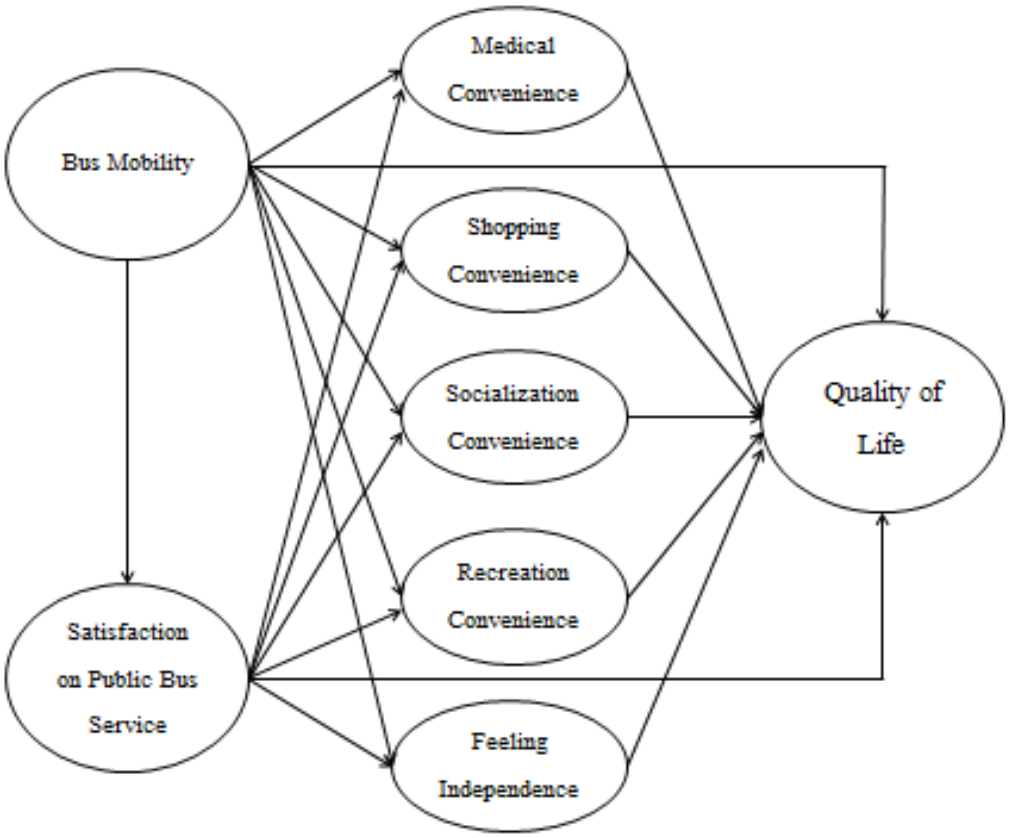


Figure 1 Conceptual framework

11. Research hypotheses

According to the research questions and the review of literature, the research hypotheses are proposed as followings:

1. There are some related policies on bus transportation for aging people in Bangkok.

2. Bus mobility has positively direct effect on medical convenience, shopping convenience, socialization convenience, recreation convenience, feeling independence, satisfaction on public bus services, and quality of life of aging people.

3. Bus mobility has positively indirect effect on quality of life of aging people via satisfaction on public bus services, medical convenience, shopping convenience, socialization convenience, recreation convenience, and feeling independence.

4. Satisfaction on public bus services has positively indirect effect on quality of life of aging people via, medical convenience, shopping convenience, socialization convenience, recreation convenience, and feeling independence.

5. Quality of life of aging people is directly influenced by bus mobility, medical accessibility, shopping convenience, socialization convenience, recreation convenience, feeling independence, and satisfaction on public bus services.

CHAPTER 3 METHODOLOGY

1. Population

The population of this study is aging people (age of 65+) living in 50 districts of Bangkok (as of December 2012) accounting for 497,083 residents.

2. Sample

SEM requires a large sample size because larger sizes generally produce more accurate picture of the whole population. In addition, the problems of non-convergence and improper solutions still exist if the sample size is less than 200 (Boomsma&Hoogland, 2001). According to Kline, the 250 sample size is large enough for SEM (as cited in Lei & Wu, 2007) but Fan (2001) proposed that the appropriate sample size should not less than 400. Hence, this study will employ the sample size of at least 400. Hence, samples of the study are then proportionately distributed to five randomly selected districts as shown in Table 1.

Table 1

Sample of the study

No.	District	Population	Sample
1	Saphan Soong	6,534	41
2	Din Dang	13,440	85
3	Bangplud	12,510	79
4	Jomthong	14,699	93
5	Bangsue	16,021	102
	Total	63,384	400

3. Sampling

According to this study, nonprobability sampling method will be employed. In this sampling method, we have no objective way of evaluating how far away from the population parameter our estimate may be. The drawback of this method is that, when we do not select our sample randomly out of the entire population of interest, our sampling results may be biased. In addition, the sample may not be a true representative of the population of interest. However, it is well suited for exploratory research intended to generate new ideas that will be systematically tested later (Salant&Dillman, 1994, p.64). Furthermore, it can save time and budget to collect data from the sample.

4. Questionnaire

Questionnaire will be employed to collect primary data from the sample. The questionnaire is divided into 10 parts;

1) **Demographic data**
2) **Mobility**
3) **Medical accessibility**
4) **Shopping convenience**
5) **Travel convenience**
6) **Socialization convenience**
7) **Recreation convenience**
8) **Feeling independence**
9) **Satisfaction on public bus services**
10) **Quality of life**

5. Validity

Each item will be assessed by transportation experts giving the item rating of 1 for clearly measuring, -1 for clearly not measuring, and 0 for unclear measuring.Finally, the index of item – objective congruence (IOC) will be calculated using the formula developed by Rovinelli and Hambleton (as cited in Kotchapong, 2008) for each item of the questionnaire.According to Rovinelli and Hambleton (as cited in Kotchapong, 2008), IOC value I_{ik} for *i*-th item on *k*-th objective is an average of rating for each combination of each item and objective, and IOC is defined as follows:

$$I_{ik} = \frac{1}{N}\sum_{j=1}^{N} S_{ijk}, i = 1,\ldots,M, k = 1,\ldots,K,$$

where S_{ijk} **= the rating of (-1, 0, 1) of *i*-th item as measure of *k*-th objective by *j*-th specialist**

M **= total number of items**

N **= the number of specialists**

K **= the number of objectives**

Prasitrattasin (2007) suggested that the IOC index higher than .50 is determined as valid. Hence, any item with IOC index lower than .50 will be deleted or the statements will be revised in accordance with the recommendations of the experts.

6. Reliability

After all items of the questionnaire are validated, the questionnaires will be revised and then sent approximately 30 samples as a pilot survey. Then, the reliability of each measurement, measure of internal consistency, will be examined employing Cronbach's alpha coefficient (Cronbach, 1951). For this research, the Cronbach's Alpha coefficient for *k*-th object is defined as follows:

$$\alpha_k = \frac{M_k}{1 - M_k}\left(1 - \frac{\sum_{i=1}^{M_k}\sigma^2(Y_i)}{\sigma_k^2}\right),$$

where M_k **= the number of items in *k*-th objective**

$\sigma^2(Y_i)$ **= variance of rating of *i*-th item on *k*-th object**

σ^2_k **= ni (sgnitar) etisopmoc latot fo ecnairav*k*-th .tcejbo**

George and Marry (as cited in Gliem&Gliem, 2003) suggested that the Cronbach's alpha coefficient >.90 – Exccellent, >.80 – Good, >.70 – Acceptable, >.60 – Questionable, >.50 - Poor, and <.50 – Unacceptable.

7. Questionnaire data collection and analysis

The primary data will be collected using questionnaires as a research tool. Well-trained research assistants are assigned to collect data during July-August 2014. Then, descriptive statistics such as frequency, percentage, mean, median, and standard deviation (SD) will be applied in data analysis. In addition, confirmatory factor analysis (CFA) will be employed in order to test the construct validity of each measurement model. Finally, structural equation modeling (SEM) technique using statistical software will be employed to examine relationship between each variable.

8. Focus group and analysis

Focus group techniques will be employed for this research project. Five focus groups will be administered in accordance with suggestions and recommendations from advisors and experts. The data gathered from focus group discussion will be analyzed by team members. However, the reliability (consistency of findings) and validity (accuracy of information) are very important issues. Two of the most useful tools in analyzing data gathered from focus group will be employed.

1) Coding teams. This means that each researcher codes the same data and discusses their findings. Differences and similarities then will be assessed.
2) Participant validation. This refers to researchers take findings and analysis back to participants and ask them to review the work and provide feedback.

9. Research streams

A short summary of each research streams is illustrated in Table 2.

Table 2
Research streams

Stream	Description	Responsible person	Main support
1	Review of literature 1. Bangkok public transportation policy for aging people 2. Defining aging people and mobility 3. Transportation trends of aging people 4. Measuring mobility/Mobility and well-being 5. Sustainable transportation alternatives for aging people 6. Research methodology	Pol.Lt.Col. Sitthipong Dr. Patama Dr. Saroch	Pol.Lt.Col. Dr. Waiphot Pol.Col.Chinda
2	Construction of questionnaire	All members	Dr. Suwat Assoc.Prof.Dr. Chumnong
3	Questionnaire validation	All members	Dr. Suwat Assoc.Prof.Dr. Chumnong
4	Data collection	All members	Dr. Suwat Assoc.Prof.Dr. Chumnong

Table 2 (Con't)

Stream	Description	Responsible person	Main support
5	Data analysis	Pol.Lt.Col. Dr. Waiphot	Dr. Suwat Assoc.Prof.Dr. Chumnong
6	Focus group 1 & 2	Pol.Lt.Col. Dr. Waiphot Pol.Lt.Col. Sitthipong	Dr. Suwat Assoc.Prof.Dr. Chumnong
7	Focus group 3 & 4 & 5	Dr. Patama Dr. Saroch	Dr. Suwat Assoc.Prof.Dr. Chumnong
8	Analysis of data (Focus group)	All members	Dr. SuwatAssoc.Prof.Dr. Chumnong
9	Focus group feedback	All members	Dr. SuwatAssoc.Prof.Dr. Chumnong
10	Roundtable discussion and workshop	All members	Dr. SuwatAssoc.Pr of.Dr. Chumnong
11	Preparation of reports	All members	Dr. SuwatAssoc.Pr of.Dr. Chumnong

10. Timeframe

The timeframe of this research is scheduled as illustrated in Table 3.

Table 3

Timeframe

Activities	Month											
	1	2	3	4	5	6	7	8	9	10	11	12
Review of literature	X											
Inception report submission	X											
Questionnaire Validation		X										
Progress report			X									
Data collection				X	X							
Data analysis					X							
Interim report presentation & submission						X						
Focus group 1 & 2 analysis							X					
Focus group 3 & 4 analysis							X					
Focus group 5 analysis								X				
Focus group feedback								X				
Roundtable discussion & workshop								X				
Final report presentation & comments									X			
Final report preparation & submission										X	X	X

11. Project oversight

The project oversight component of this research has been designed to track and provide guidance, comments, and recommendations at key stages of the project from different perspectives.

1. Project advisors – two advisors are assigned to provide independent assessment and review of major outputs. Then, they responsible for giving comments and recommendations on technical excellence and relevance.

2. Consultative forum – to ensure the relevance and completeness of the findings, this forum or roundtable discussion will be held in order to gain comments and recommendations from various perspectives.

CHAPTER 4 DATA ANALYSIS

1. Participants

The participants in this study were 400 aging people in Bangkok. The majority of the respondents were female (61.25%). Participants mean age was 69.30 (SD = 5.10, range 65 to 92). About 58% of the respondents were married. The highest level of education consisted of 3.50% master's degree, 24.00% bachelor's degree, 19.30% high school or equivalent, and 53.20% primary school. The mean income of the participants was about 11,530 Baht per month (Range 600 to 80,000). Approximately 47% of them were living with partner. About 40%, and 38% had their own car and driving license respectively. About 89% out of 152 car ownerhad permanent driving license as shown in Table 4.

Table 4

Demographic information **(N = 400)**

Demographic details	Frequency	Percentage
1. Sex		
Male	155	38.75
Female	245	61.25
2. Marital status		
Single	60	15.00
Married	233	58.25
Divorced	28	7.00
Widowed	79	19.75
3. Education level		
Primary school or lower	213	52.25
High school or equivalent	77	19.25
Bachelor's degree	96	24.00
Master's degree or higher	14	3.50
4. Living		
Alone	42	10.50
With partner	186	46.50
With children	123	30.75
With relatives	46	11.50
Home care	1	0.25
Others	2	0.50

Table 4 (Con't)

Demographic information (N = 400)

Demographic details	Frequency	Percentage
5. Car ownership		
Yes	159	39.75
No	241	60.25
6. Holding of driving license		
Yes	152	38.00
No	248	62.00
7. Type of driving license (N=152)		
Temporary	16	10.53
Permanent	136	89.47

2. Travelling trends of aging people

According to the data analysis, shopping and medical reasons were the most important factors for aging people to make trips in their daily lives accounting for 61.50% and 42.25% respectively as shown in Table 5.

Table 5

Reasons for travelling

Reasons for travelling	Frequency	Percentage
1. Shopping	246	61.50
2. Medical reason	159	42.25
3. Socialization	113	28.25
4. Recreations	100	25.00
5. Visiting relatives	68	17.00
6. Traveling	62	15.50
7. Others	38	9.50

2.1 Shopping

Shopping is the most important reason for travelling of aging people in Bangkok. The majority of them reported that they went shopping approximately three times a week. The majority of them went shopping alone (58.54%) while the others went shopping with others which were their children, relatives, and caregivers (41.46%). They took about 67 minutes for the round trip. Each round trip cost around 231 Baht. Personal car was the most vital mode of transportationfor aging people to go shopping accounting for 47.15% as illustrated in Table 6.

Table 6

Mode of transportation for shopping (N = 246)

Mode of transportation	Frequency	Percentage
1. Personal car	116	47.15
2. Walking	63	25.61
3. Taxi	24	9.76
4. Bus	20	8.13
5. Motorcycle taxi	17	6.91
6. Sky train/Underground	6	2.44

2.2 Medical reason

Some participants had faced health problem. They, therefore, had to travel for medical reason.The majority of them reported that they went to see doctors approximately once a week. The majority of them went to see doctors with others which were their children, relatives, and caregivers (60.36%) while the others went to see doctors alone (39.64%). They took about 135 minutes for the round trip. Each round trip cost around 240 Baht. Personal car was the most vital mode of transportation for aging people to see doctors accounting for 40.83% as illustrated in Table 7.

Table 7

Mode of transportation for medical reason (N = 169)

Mode of transportation	Frequency	Percentage
1. Personal car	69	40.83
2. Taxi	59	34.91
3. Bus	32	18.93
4. Motorcycle taxi	4	2.37
5. Walking	3	1.78
6. Sky train/Underground	2	1.18

2.3 Socialization

Socialization was an important activity for aging people to meet friends and neighbors. The majority of them reported that they went for socialization approximately three times a week. The majority of them went for socialization with others which were their children, relatives, and caregivers (53.10%) while the others went for socialization alone (46.96%). They took about 78 minutes for the round trip. Each round trip cost around 256 Baht. Personal car was the most vital mode of transportation for aging people for socialization accounting for 68.14% as illustrated in Table 8.

Table 8

Mode of transportation for socialization (N = 113)

Mode of transportation	Frequency	Percentage
1. Personal car	77	68.14
2. Bus	14	12.39
3. Walking	10	8.85
4. Motorcycle taxi	6	5.31
5. Taxi	5	4.42
6. Sky train/Underground	1	0.88

2.4 Recreations

Recreations were important activities for aging people to entertain their lives. The majority of them reported that they went for recreations approximately four times a week. The majority of them went for recreations alone (55.00%) while the others went for recreations with others which were their children, relatives, and caregivers (45.00%). They took about 85 minutes for the round trip. Each round trip cost around 92 Baht. Personal car was the most vital mode of transportation for aging people for recreations accounting for 55.00% as illustrated in Table 9.

Table 9

Mode of transportation for recreations (N = 100)

Mode of transportation	Frequency	Percentage
1. Personal car	55	55.00
2. Walking	28	28.00
3. Bus	9	9.00
4. Taxi	6	6.00
5. Motorcycle taxi	1	1.00
Sky train/Underground	1	1.00

2.5 Visiting relatives

Visiting relatives was an important activity for aging people to keep good relationship among their kinfolk. The majority of them reported that they went for visiting relatives approximately once a week. The majority of them went for visiting relatives with others which were their children, relatives, and caregivers (61.76%) while the others went for visiting relativesalone (38.24%). They took about 289 minutes for the round trip. Each round trip cost around 421 Baht. Personal car was the most vital mode of transportationfor aging people for visiting relatives accounting for 68.14% as illustrated in Table 10.

Table 10

Mode of transportation for visiting relatives (N = 68)

Mode of transportation	Frequency	Percentage
1. Personal car	36	52.94
2. Bus	12	17.65
3. Taxi	9	13.24
4. Motorcycle taxi	5	7.35
5. Sky train/Underground	3	4.41
6. Walking	2	2.94
7. Train	1	1.47

2.6 Travelling

Travelling was an important activity for aging people to entertain their lives. The majority of them reported that they went for travelling approximately once a week. The majority of them went for travelling with others which were their children, relatives, and caregivers (80.65%)while the others went for travelling alone (19.35%) They took about 349 minutes for the round trip. Each round trip cost around 934 Baht. Personal car was the most vital mode of transportation for aging people for travelling accounting for 79.03% as illustrated in Table 11.

Table 11

Mode of transportation for travelling (N = 62)

Mode of transportation	Frequency	Percentage
1. Personal car	49	79.03
2. Bus	7	11.29
3. Sky train/Underground	4	6.45
4. Taxi	2	3.23

3. Usingof public bus

3.1 Frequency of using public bus

The participants were asked if they had ever used public bus service after retirement. The majority of them (71.75%) reported that they had used this mode of public transportation. Most of the people using public bus service reported that they travel by bus 3 times or less/month accounting for 59.58% as illustrated in Table 12.

Table 12

Frequency of using of public bus (N = 287)

Frequency	Amount	Percentage
1. Three times per month or less	171	59.58
2. Four to six times per month	48	16.72
3. Seven to nine times per month	12	4.18
4. Ten times or more per month	56	19.51

3.2 Reasons for using public bus

The participants were asked why they use public bus service. The majority of them reported that travelling by bus was not expensive (80.14%) and convenient (42.16%) as illustrated in Table 13.

Table 13

Reasons for using of public bus (N = 287)

Frequency	Amount	Percentage
1. Not expensive	230	80.14
2. Convenience	121	42.16
3. No alternative	96	33.45
4. Safety	52	18.12
5. Faster than other modes	29	10.10
6. Cleanliness	15	5.23
7. Others	13	4.53

3.3 Problems of using public bus

The participants were asked why they use public bus service in which they could choose more than one option. The majority of them reported that the most important problems of travelling by bus werethat the bus was overcrowded (68.00%) and unreliable (48.08%) respectively as illustrated in Table 14.

Table 14

Problems of using of public bus (N = 287)

Frequency	Amount	Percentage
1. Overcrowded	198	68.99
2. Unreliable	138	48.08
3. Difficult to get on/off the bus	102	35.54
4.Poor service	67	23.34
5. Uncomfortable seats	65	22.65
6. Not-safe	63	21.95
7.Insufficient routes	46	16.03
8.Not link with other public transportation	39	13.59
9. Difficult to access	33	11.50
10.Too expensive	11	3.83
11. others	6	2.09

3.4 Reasons of not using public bus

All participants were asked the reasons if they would not use the public bus. They reported that they would not use public bus since it was too crowded, difficult to get on/off, and unreliable accounting for 49.50%, 35.25%, and 33.50% respectively. The in-depth details were shown in Table 15.

Table 15

Reasons of not using public bus (N = 400)

Frequency	Amount	Percentage
1. Overcrowded	198	49.50
2. Difficult to get on/off the bus	141	35.25
3. Unreliable	134	33.50
4. Not-safe	86	21.50
5.Poor service	60	15.00
6. Uncomfortable seats	45	11.25
7.Insufficient routes	42	10.50
8.Not link with other public transportation	38	9.50
9. Difficult to access	33	8.25
10. Too expensive	6	1.50
11. others	61	15.25

4. Attitudes of aging people

The participants were asked about their attitudes towards public bus service, bus mobility, medical convenience, shopping convenience, socialization convenience, recreation convenience, feeling independence, and their quality of life. The findings of this study were illustrated in Table 16.

Table 16

Attitudes of aging people (N = 400)

Variables	Mean	SD	Interpretation
1. Satisfaction on public bus service	2.90	0.83	Moderate
2. Bus mobility	3.55	1.09	High
3. Medical convenience	3.54	1.01	High
4. Shopping convenience	4.09	0.82	High
5. Socialization convenience	3.62	0.99	High
6. Recreation convenience	3.69	1.03	High
7. Feeling independence	3.61	1.02	High
8. Quality of life			
Life overall	4.05	0.86	High
Health	3.93	0.93	High
Social relationship	4.30	0.79	Very High
Independence, control over life, freedom	4.19	0.78	High
Home and neighborhood	4.16	0.82	High
Psychological and emotional well-being	4.22	0.68	Very High
Leisure and activities	3.90	0.99	High
Religion and spiritual	4.30	0.76	Very High

According to Table 16, the satisfaction on public bus service of the participants was quite moderate (Mean = 2.90, SD = 0.83). However, reliability of the bus was the least satisfied issue.

The participants reported that their bus mobility level is slightly high (Mean = 3.55, SD = 1.09) since the bus stop was not quite far from their place, the road network was good, and there was good footpath to get to the bus stop.

When considering medical (Mean = 3.54, SD = 1.01), shopping (Mean = 4.09, SD = 0.82), socialization (Mean = 3.62, SD = 0.99), and recreationconvenience (Mean = 3.69, SD = 1.03) with regard to using public bus, they reported that it was at high level. They

also reported high level of feeling independence with regard to using of public bus (Mean = 3.61, SD = 1.02).

Last but not least, they reported that they had very high level of quality of life, especially three dimensions namely religion and spiritual (Mean = 4.30, SD = 0.76), social relationship (Mean = 4.30, SD = 0.79), and Psychological and emotional well-being(Mean = 4.22, SD = 0.68).

5. Confirmatory factor analysis (CFA)

The confirmatory factor analysis (CFA) was used to test the construct validity of all measurement models and to study the relationship between observed variables and there underlyinglatent construct(s).The CFA was performed using maximum likelihood method to estimate all measurement models. In this research, eight latent constructs were examined prior to conducting structural equation modeling analysis;

5.1 Satisfaction on public bus service

The overall hypothesized model fit did not appeared well. The χ^2 test yielded a statistic of 560.270 (df = 35), which had a correspondence *p*-value of .000. This *p*-value rejected the null hypothesis of the good fit (the null hypothesis is that the implied covariance matrix is equivalent to the observed covariance matrix. Hence, failure to reject the null is therefore a sign of a good model fit). The RMSEA of .194, GFI of .785, CFI of .797, and RMR of .087 also suggested that the model did not fit the data well (Figure 2).

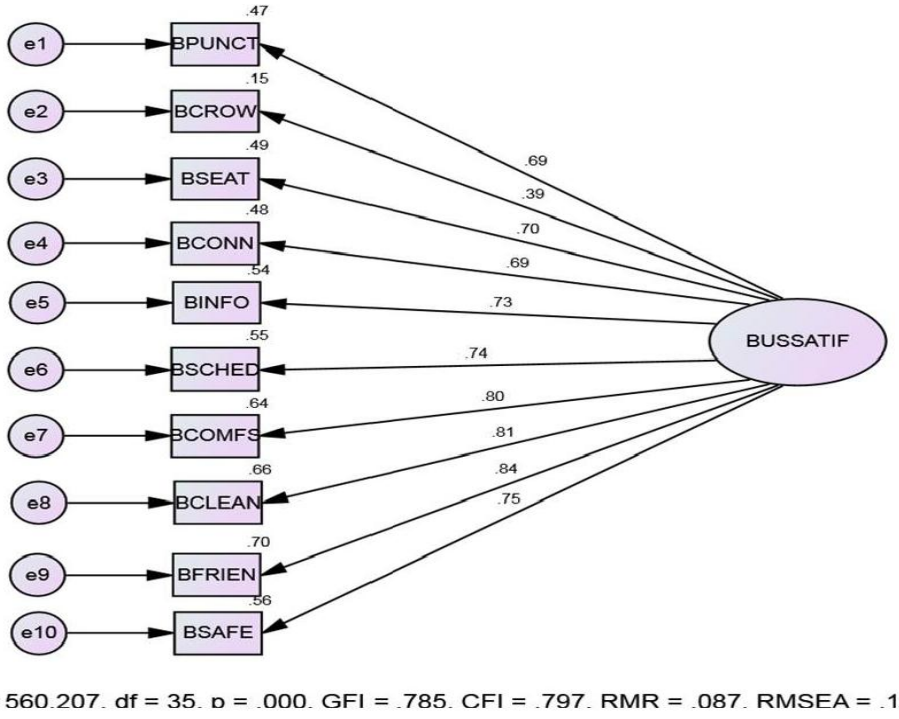
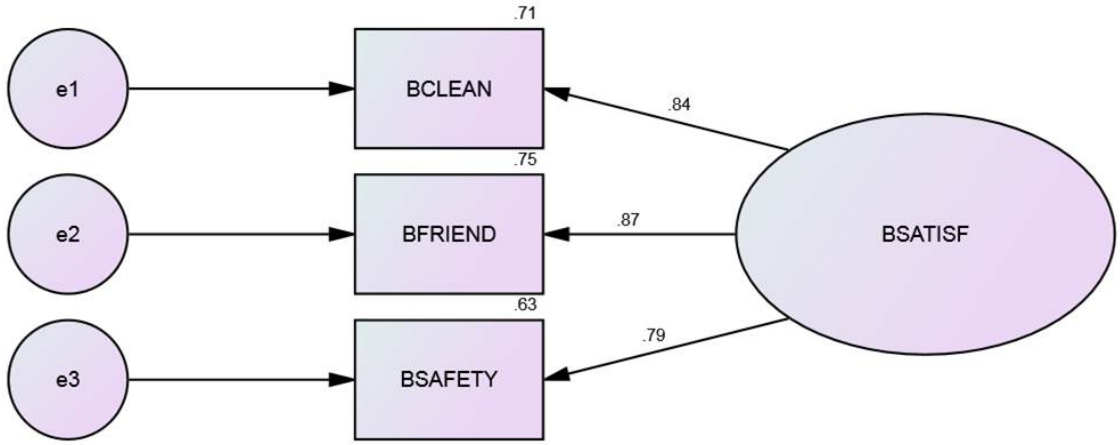


Figure 2 Hypothesized model of satisfaction on public bus service

The model was revised and the program advice to shortlist the loading factors. The revised model fit appeared quite good. The χ^2 test yielded a statistic of 3.730 (df = 1), which has a correspondence *p*-value of .053. This *p*-value is too high to reject the null hypothesis of the good fit. The RMSEA of .083, GFI of .994, CFI of .995, and RMR of .050 also suggested that the model fit the data well (Figure 3).



Chi-Square = 3.730, df = 1, p = .053, GFI = .994, CFI = .995, RMR = .050, RMSEA = .083

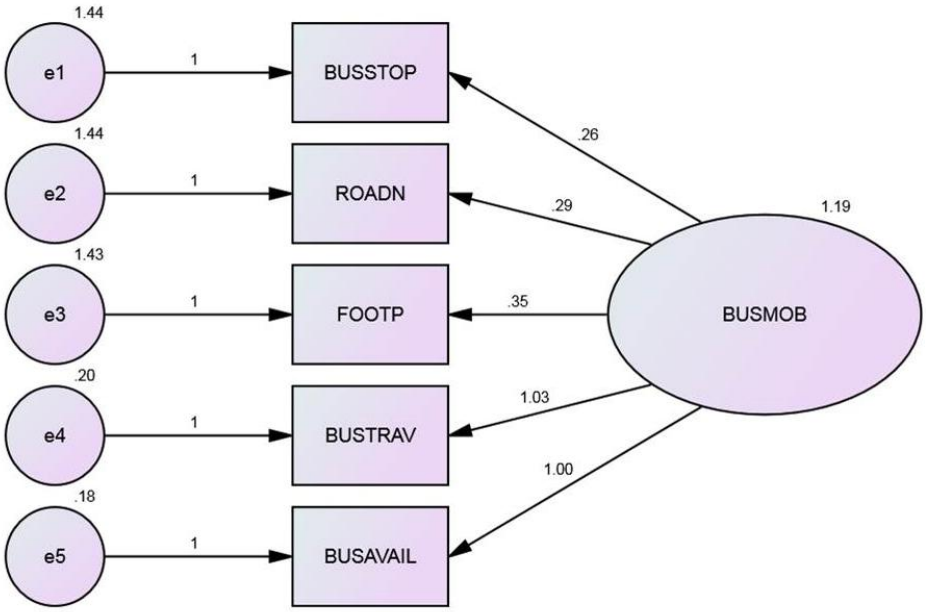
Figure 3 Revised model of satisfaction on public bus service

Friendliness of public bus driver and staff (BFRIEND) had the highest standardized loading (.87) suggesting that it is reliable indicator of satisfaction on public bus service. Cleanliness (BCLEAN) and safety of public bus (BSAFETY) were also had strong standardized loading (.84 and .79). Hence, they were also reliable indicators of satisfaction on public bus service.

The squared multiple correlations (R^2) provided information about how much variance of an observed variable the factor can account for. All observed variables had very high R^2 (BFRIEND = .75, BCLEAN = .71,BSAFETY = .63)

5.2 Bus mobility

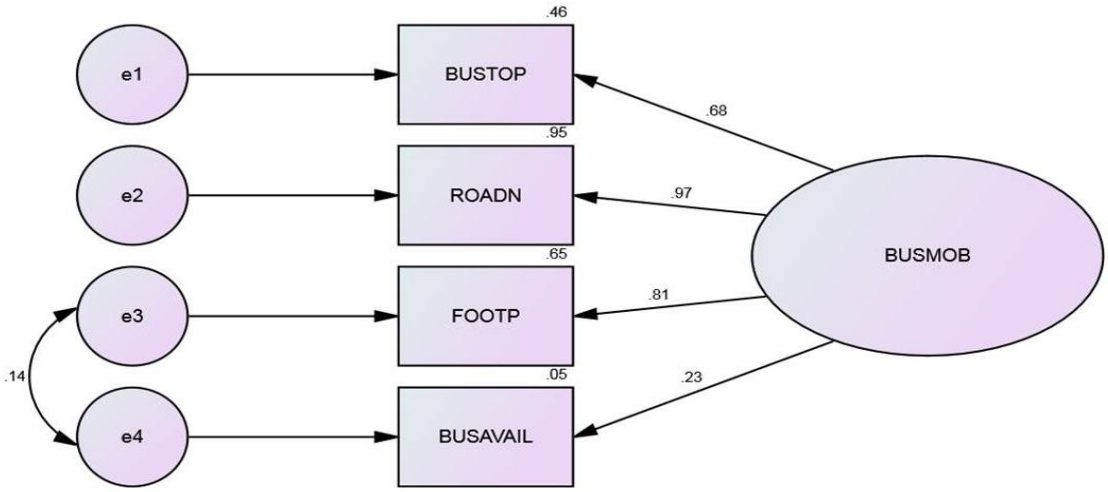
The overall hypothesized model fit did not appeared well. The χ^2 test yielded a statistic of 582.042 (df = 5), which had a correspondence *p*-value of .000. This *p*-value rejected the null hypothesis of the good fit. The RMSEA of .538, GFI of .657, CFI of .521, and RMR of .419 also suggested that the model did not fit the data well (Figure 4).



Chi-Square = 582.042, df = 5, p = .000, GFI = .657, CFI = .521, RMR = .419, RMSEA = .538

Figure 4 Hypothesized model of bus mobility

The model was revised and the program advice to shortlist the loading factors. The model fit appeared quite good. The χ^2 test yielded a statistic of .210 (df = 1), which has a correspondence *p*-value of .647. This *p*-value is too high to reject the null hypothesis of the good fit. The RMSEA of .000, GFI of 1.000, CFI of 1.000, and RMR of .007 also suggested that the model fit the data well (Figure 5).



Chi-Square = .210, df = 1, p = .647, GFI = 1.000, CFI = 1.000, RMR = .007, RMSEA = .000

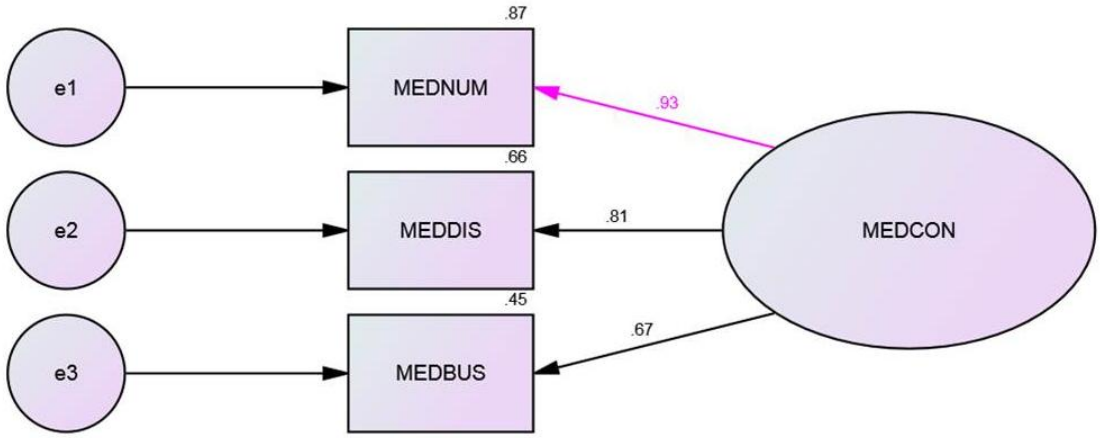
Figure 5 Revised model of bus mobility

Road network (ROADN) had the highest standardized loading (.97) suggesting that it is reliable indicator of bus mobility. Good footpath (FOOTP) and not far bus stop (BUSTOP) were also had strong and moderate standardized loading (.81 and .68). Hence, they were also reliable indicators of bus mobility. However, availability of bus (BUSAVAIL) had very low standardized loading accounting for .23 suggesting that it is an unreliable indicator of bus mobility.

The squared multiple correlations (R^2) provided information about how much variance of an observed variable the factor can account for. Road network had the highest R^2 (.95) followed by FOOTP (.65), BUSTOP (.46), and BUSAVAIL (.05) respectively.

5.3 Medical convenience

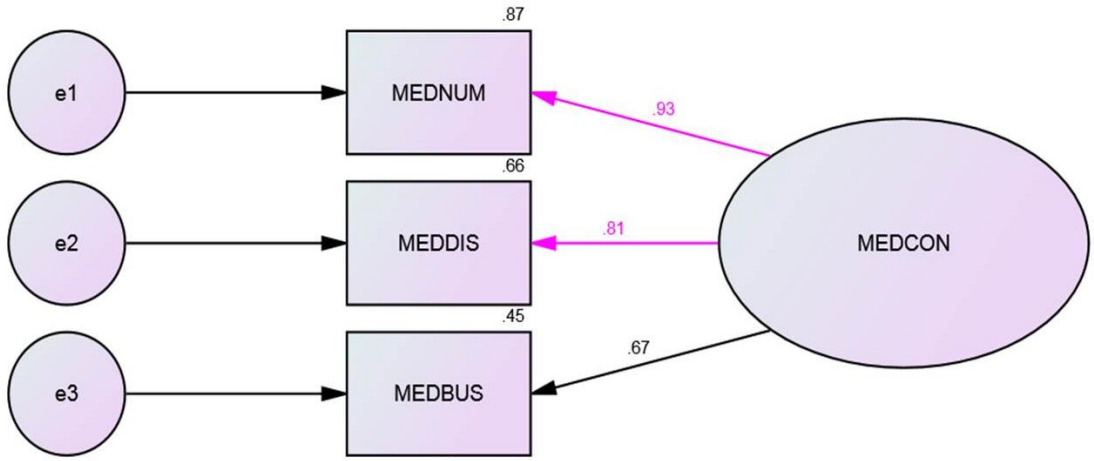
The overall hypothesized model fit did not appeared well. The χ^2 test yielded a statistic of 33.110 (df = 1), which had a correspondence *p*-value of .000. This *p*-value rejected the null hypothesis of the good fit. The RMSEA of .284, GFI of .950, CFI of .939, and RMR of .221 also suggested that the model did not fit the data well (Figure 6).



Chi-Square = 33.110, df = 1, p = .000, GFI = .950, CFI = .939, RMR = .221, RMSEA = .284

Figure 6 Hypothesized model of medical convenience

The model was revised and the model fit appeared quite good. The χ^2 test yielded a statistic of .210 (df = 1), which has a correspondence *p*-value of .074. This *p*-value is too high to reject the null hypothesis of the good fit. The RMSEA of .074, GFI of .980, CFI of .976, and RMR of .007 also suggested that the model fit the data well (Figure 7).



Chi-Square = 2.112, df = 1, p = .074, GFI = .980, CFI = .976, RMR = . 007, RMSEA = .074

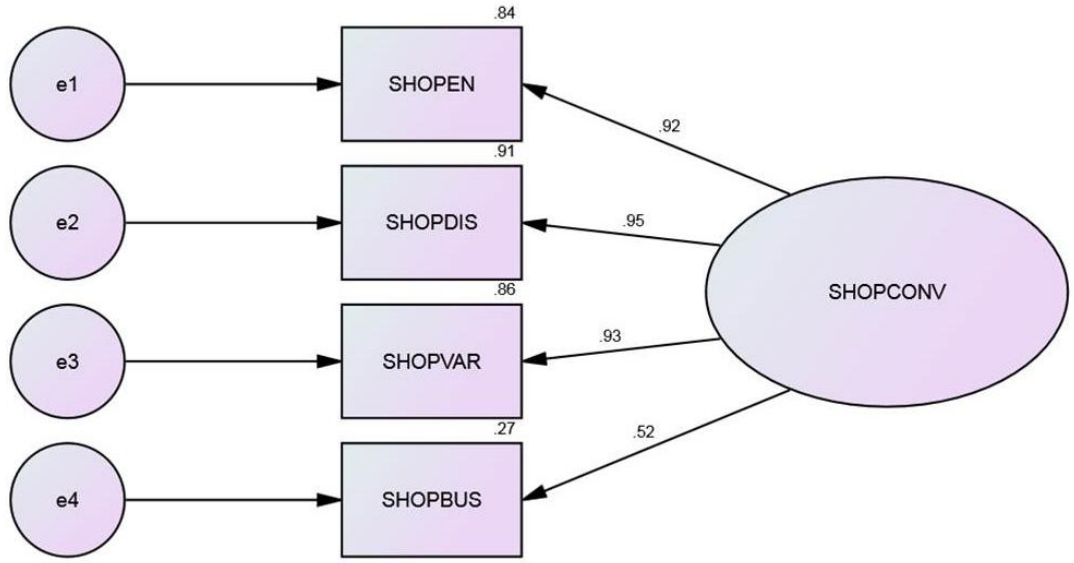
Figure 7 Revised model of medical convenience

Number of medical services nearby aging people accommodation (MEDNUM) had the highest standardized loading (.93) suggesting that it is reliable indicator of bus mobility. Distance of medical services (MEDDIS) and availability of bus to the medical services (MEDBUS) were also had strong and moderate standardized loading (.81 and .67). Hence, they were also reliable indicators of medical convenience.

The squared multiple correlations (R^2) provided information about how much variance of an observed variable the factor can account for. MEDNUM had the highest R^2 (.87) followed by MEDDIS (.66), and MEDBUS (.45) respectively.

5.4 Shopping convenience

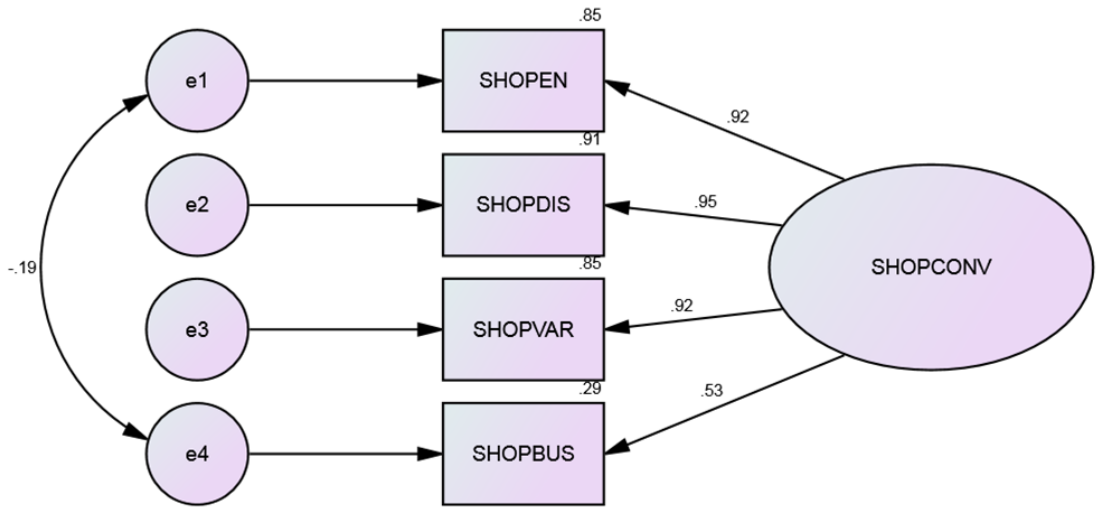
The overall hypothesized model fit did not appeared well. The χ^2 test yielded a statistic of 13.073 (df = 2), which had a correspondence *p*-value of .001. This *p*-value rejected the null hypothesis of the good fit. The RMSEA of .118, GFI of .984, CFI of .992, and RMR of .018 also suggested that the model did not fit the data well (Figure 8).



Chi-Square = 13.073, df = 2, p = .001, GFI = .984, CFI = .992, RMR = .018, RMSEA = .118

Figure 8 Hypothesized model of shopping convenience

The model was revised and the model fit appeared quite good. The χ^2 test yielded a statistic of .210 (df = 1), which has a correspondence *p*-value of .074. This *p*-value is too high to reject the null hypothesis of the good fit. The RMSEA of .074, GFI of .980, CFI of .976, and RMR of .007 also suggested that the model fit the data well (Figure 9).



Chi-Square = 2.605, df = 1, p = .107, GFI = .997, CFI = .999, RMR = .008, RMSEA = .063

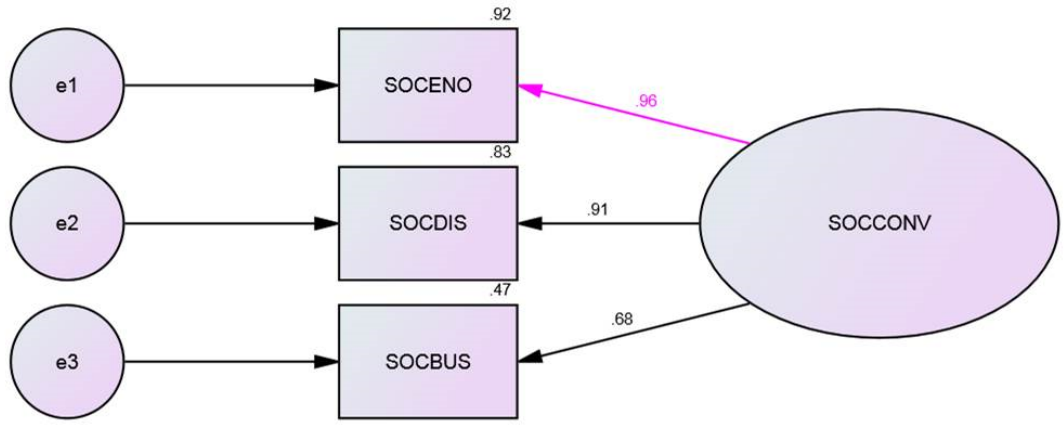
Figure 9 Revised mode of shopping convenience

Distance from aging people accommodation to shopping center (SHOPDIS) had the highest standardized loading (.95) suggesting that it is reliable indicator of shopping convenience. Enough shops and supermarkets in aging people area (SHOPEN) and varieties of goods and services (SHOPVAR) were also had strong standardized loading (.92 for both of them) whereas the availability of bus to shopping centers (SHOPBUS) had the weakest standardized loading (.53). However, they were also reliable indicators of shopping convenience.

The squared multiple correlations (R^2) provided information about how much variance of an observed variable the factor can account for. SHOPDIS had the highest R^2 (.91) followed by SHOPEN and SHOPVAR (.85), and SHOPBUS (.29) respectively.

5.5 Socialization convenience

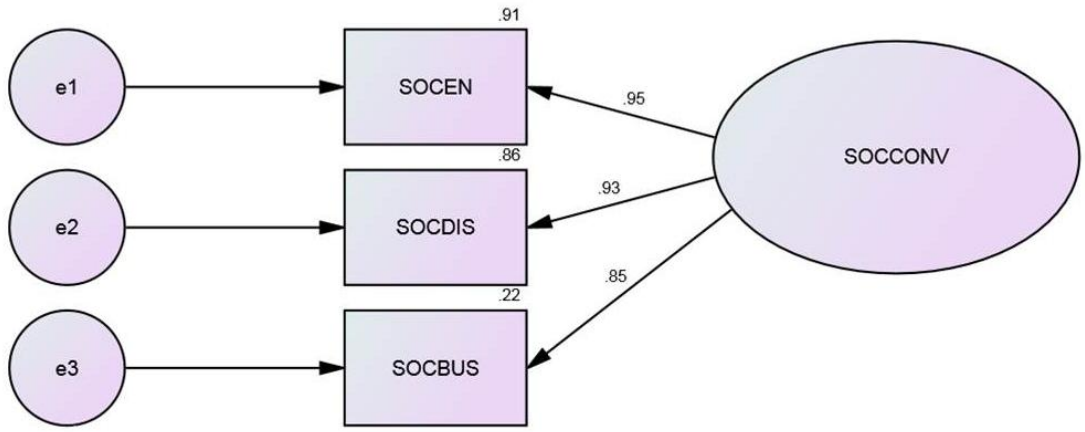
The overall hypothesized model fit did not appeared well. The χ^2 test yielded a statistic of 42.000 (df = 1), which had a correspondence *p*-value of .000. This *p*-value rejected the null hypothesis of the good fit. The RMSEA of .321, GFI of .938, CFI of .945, and RMR of .284 also suggested that the model did not fit the data well (Figure 10).



Chi-Square = 42.000, df = 1, p = .000, GFI = .938, CFI = .945, RMR = .284, RMSEA = .321

Figure 10 Hypothesized model of socialization convenience

The model was revised and the model fit appeared quite good. The χ^2 test yielded a statistic of 1.191 (df = 1), which has a correspondence *p*-value of .275. This *p*-value is too high to reject the null hypothesis of the good fit. The RMSEA of .022, GFI of .998, CFI of 1.000, and RMR of .014 also suggested that the model fit the data well (Figure 11).



Chi-Square = 1.191, df = 1, p = .275, GFI = .998, CFI = 1.000, RMR = .014, RMSEA = .022

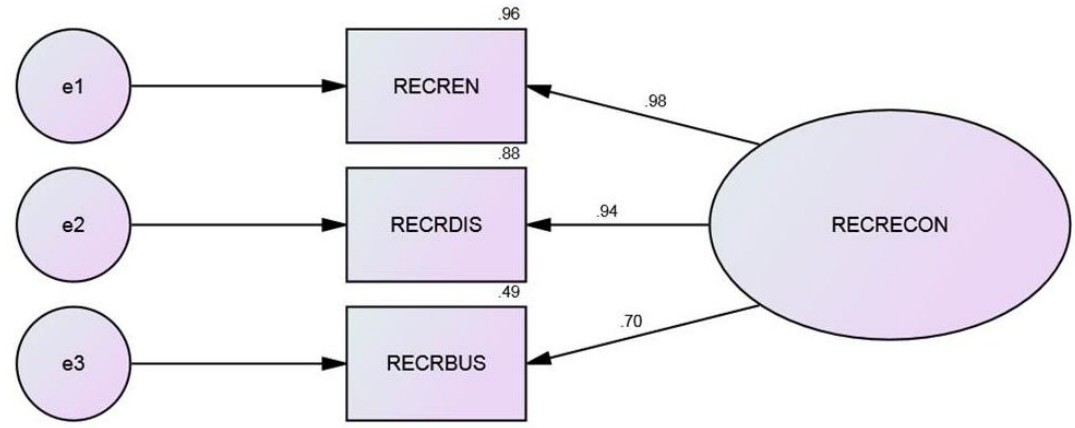
Figure 11 Revised model of socialization convenience

Enough places or facilities, such as restaurants, hotels, clubs, associations, and related facilities, for socialization (SOCEN) had the highest standardized loading (.91) suggesting that it is reliable indicator of socialization convenience. Distance of socialization places or facilities from aging people accommodation (SOCDIS) also had strong standardized loading (.93). The availability of public bus to socialization facilities (SOCBUS) had the weakest standardized loading (.85). However, it was also reliable indicators of socialization convenience.

The squared multiple correlations (R^2) provided information about how much variance of an observed variable the factor can account for. SOCEN had the highest R^2 (.91) followed by SOCDIS (.86) and SOCBUS (.22) respectively.

5.6 Recreation convenience

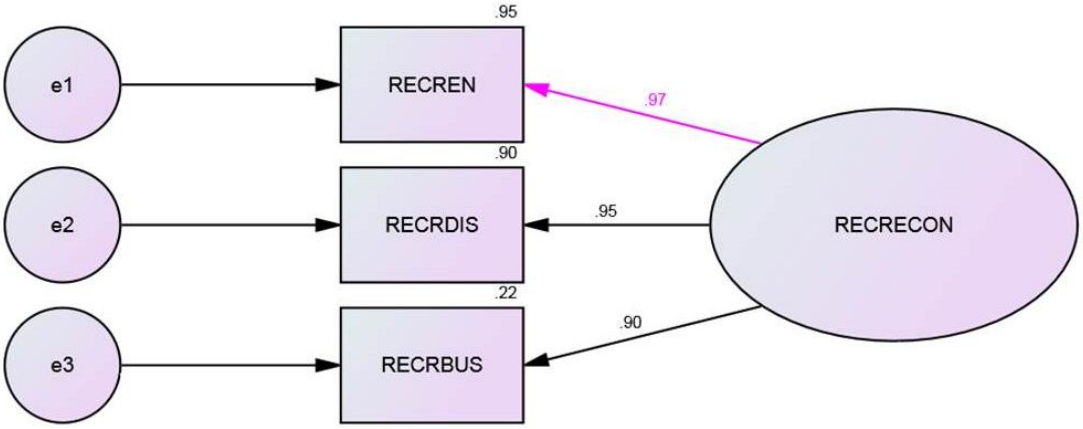
The overall hypothesized model fit did not appeared well. The χ^2 test yielded a statistic of 55.177 (df = 1), which had a correspondence *p*-value of .000. This *p*-value rejected the null hypothesis of the good fit. The RMSEA of .368, GFI of .921, CFI of .942, and RMR of .364 also suggested that the model did not fit the data well (Figure 12).



Chi-Square = 55.177, df = 1, p = .000, GFI = .921, CFI = .942, RMR = .364, RMSEA = .368

Figure 12 Hypothesized model of recreation convenience

The model was revised and the model fit appeared quite good. The χ^2 test yielded a statistic of 1.013 (df = 1), which has a correspondence *p*-value of .314. This *p*-value is too high to reject the null hypothesis of the good fit. The RMSEA of .006, GFI of .998, CFI of 1.000, and RMR of .012 also suggested that the model fit the data well (Figure 13).



Chi-Square = 1.013, df = 1, p = .314, GFI = .998, CFI = 1.000, RMR = .012, RMSEA = .006

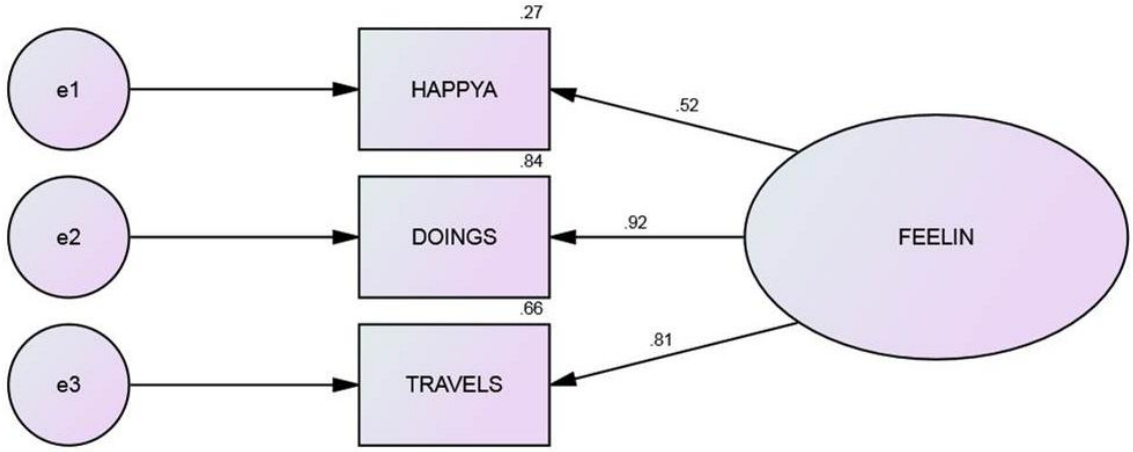
Figure 13 Revised model of recreation convenience

Enough places or facilities, such as public parks, sport centers, and related facilities, for recreation (RECREN) had the highest standardized loading (.97) suggesting that it is reliable indicator of recreation convenience. Distance of recreation places or facilities from aging people accommodation (RECRDIS) also had strong standardized loading (.95). The availability of public bus to recreation facilities (RECRBUS) had the weakest standardized loading (.90). However, it was also reliable indicators of recreation convenience.

The squared multiple correlations (R^2) provided information about how much variance of an observed variable the factor can account for. RECREN had the highest R^2 (.95) followed by RECRDIS (.90) and RECRBUS (.22) respectively.

5.7 Feeling independence

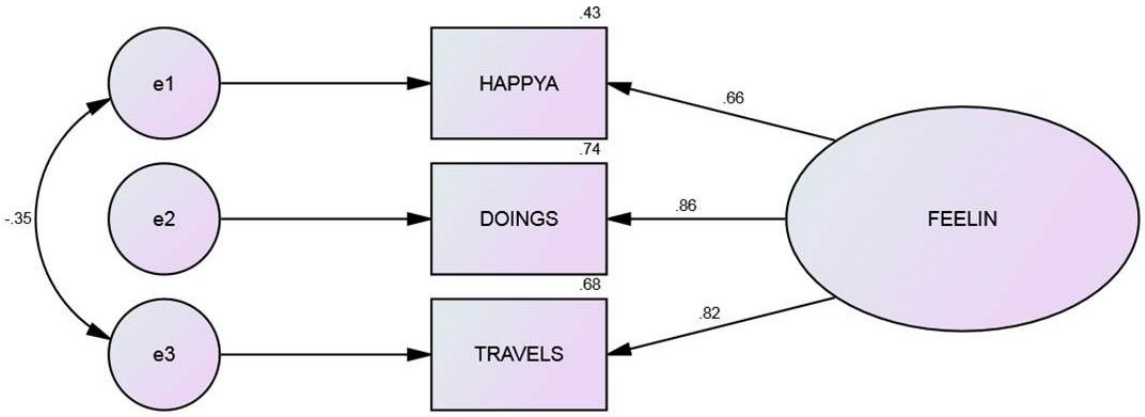
The overall hypothesized model fit did not appeared well. The χ^2 test yielded a statistic of 7.152 (df = 1), which had a correspondence *p*-value of .007. This *p*-value rejected the null hypothesis of the good fit. The RMSEA of .124, GFI of .988, CFI of .985, and RMR of .063 also suggested that the model did not fit the data well (Figure 14).



Chi-Square = 7.152, df = 1, p = .007, GFI = .988, CFI = .985, RMR = .063, RMSEA = .124

Figure 14 Hypothesized model of feeling independence

The model was revised and the model fit appeared quite good. The χ^2 test yielded a statistic of 8.130 (df = 1), which has a correspondence *p*-value of .004. This *p*-value rejected the null hypothesis of the good fit. The RMSEA of .134, GFI of .987, CFI of .983, and RMR of .129 also suggested that the model poorly fit the data (Figure 15).



Chi-Square = 8.130, df = 1, p = .004, GFI = .987, CFI = .983, RMR = .129, RMSEA = .134

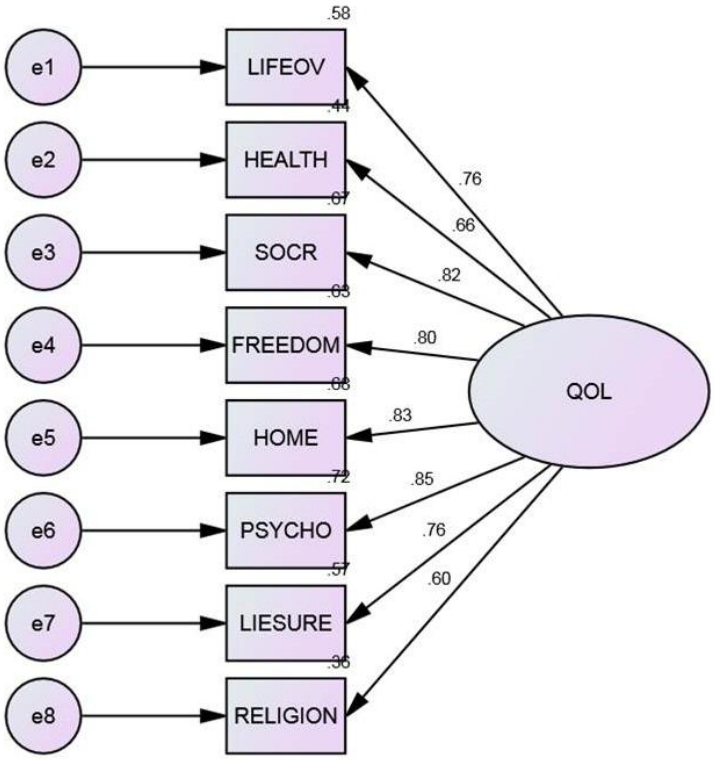
Figure 15 Revised model of feeling independence

Doing everything on my own (DOINGS) had the highest standardized loading (.86) suggesting that it is reliable indicator of feeling independence. Can go everywhere I want (TRAVELS) also had strong standardized loading (.82). Happy to live alone (HAPPYA) had the weakest standardized loading (.66). However, it was also reliable indicators of feeling independence.

The squared multiple correlations (R^2) provided information about how much variance of an observed variable the factor can account for. DOINGS had the highest R^2 (.74) followed by TRAVELS (.68) and HAPPYA(.43) respectively.

5.8 Quality of life

The overall hypothesized model fit did not appeared well. The χ^2 test yielded a statistic of 133.177 (df = 20), which had a correspondence *p*-value of .000. This *p*-value rejected the null hypothesis of the good fit. The RMSEA of .119, GFI of .914, CFI of .942, and RMR of .032 also suggested that the model did not fit the data well (Figure 16).



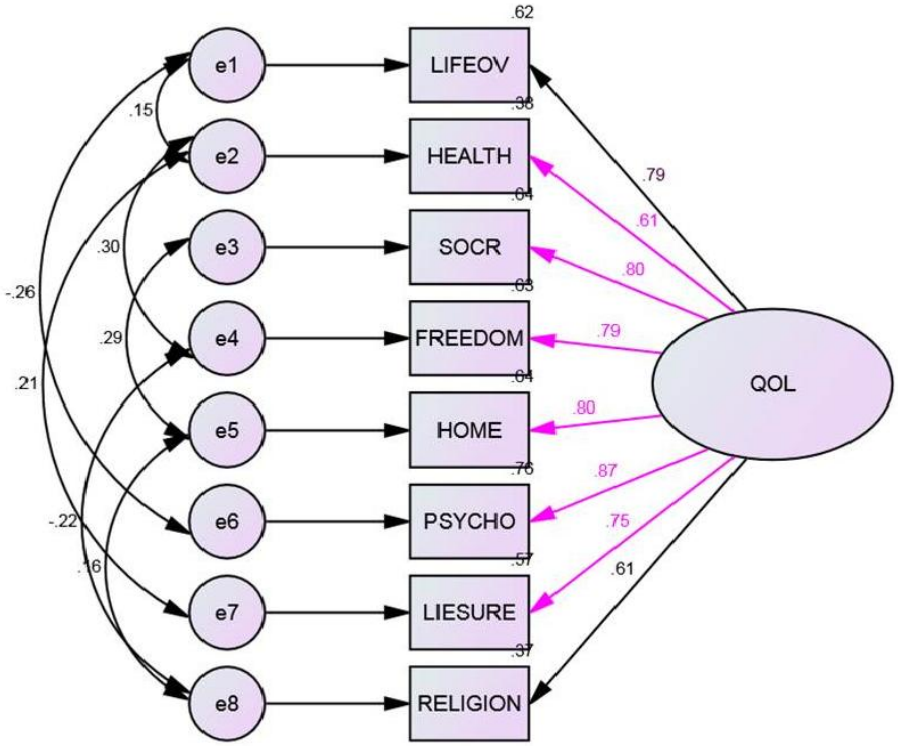
Chi-Square = 133.177, df = 20, p = .000, GFI = .914, CFI = .942, RMR = .032, RMSEA = .119

Figure 16 Hypothesized model of quality of life

The model was revised and the model fit appeared quite good. The χ^2 test yielded a statistic of 18.940 (df = 13), which has a correspondence *p*-value of .125. This *p*-value was too high to reject the null hypothesis of the good fit. The RMSEA of .034, GFI of .988, CFI of .997, and RMR of .012 also suggested that the model fit the data (Figure 17).

According to Figure 17, Psychological and emotional well-being (PSYCHO) had the highest standardized loading (.87) suggesting that it is reliable indicator of quality of life (QOL). Home and neighborhood (HOME), social relationship (SOCR), and independence, control over life, freedom (FREEDOM), life overall (LIFEOV), and leisure and activities (LIESURE), also had strong standardized loading (.80, .80, .79, .79, and .75 respectively). Health (HEALTH), and religion and spiritual had the weakest standardized loading (.61). However, they were also reliable indicators of quality of life.

The squared multiple correlations (R^2) provided information about how much variance of an observed variable the factor can account for. PSYCHO had the highest R^2 (.76) followed by HOME and SOCR (.64), FREEDOM (.63), LIFEOV (.62), LIESURE (.57), HEALTH (.38), and RELIGION(.37) respectively.



Chi-Square = 18.940, df = 13, p = .125, GFI = .988, CFI = .997, RMR = .012, RMSEA = .034

Figure 17 Revised model of quality of life

6. Model testing

In this section, the proposed original model and modified models were tested and assessed to identify the best fitted model.

6.1 Testing the proposed model and fit indices

To achieve the parsimonious fit between the data and the theoretical model, all exogenous latent variables were allowed to covary in the proposed structural model. Hence, the full model including all indicators was tested. The hypothesized model showed poor model fit. The χ^2 test yielded a statistic of 2246.997 (df = 416), which has a correspondence *p*-value of .000. This *p*-value rejected the null hypothesis of the good fit. The RMSEA of .105, GFI of .687, CFI of .815, and RMR of .141 also suggested that the model poorly fit the data as shown in Table 18.

Table 18

Hypothesized model: SEM test output, fit indices and desired level of fit

Overall model fit	Acceptable scale for good/adequate fit	Hypothesized model fit
CMIN/df	< 2	5.40
RMSEA	0 ≤ RMSEA ≤ .05	.105
RMR	0 ≤ RMR ≤ .05	.141
GFI	.95 ≤ GFI ≤ 1.00	.687
CFI	.97 ≤ CFI ≤ 1.00	.815
Chi-square	2246.997	
df	416	

The hypothesized model in depicted in Figure 18 with estimated standardized regression coefficients in the path links in the SEM model.

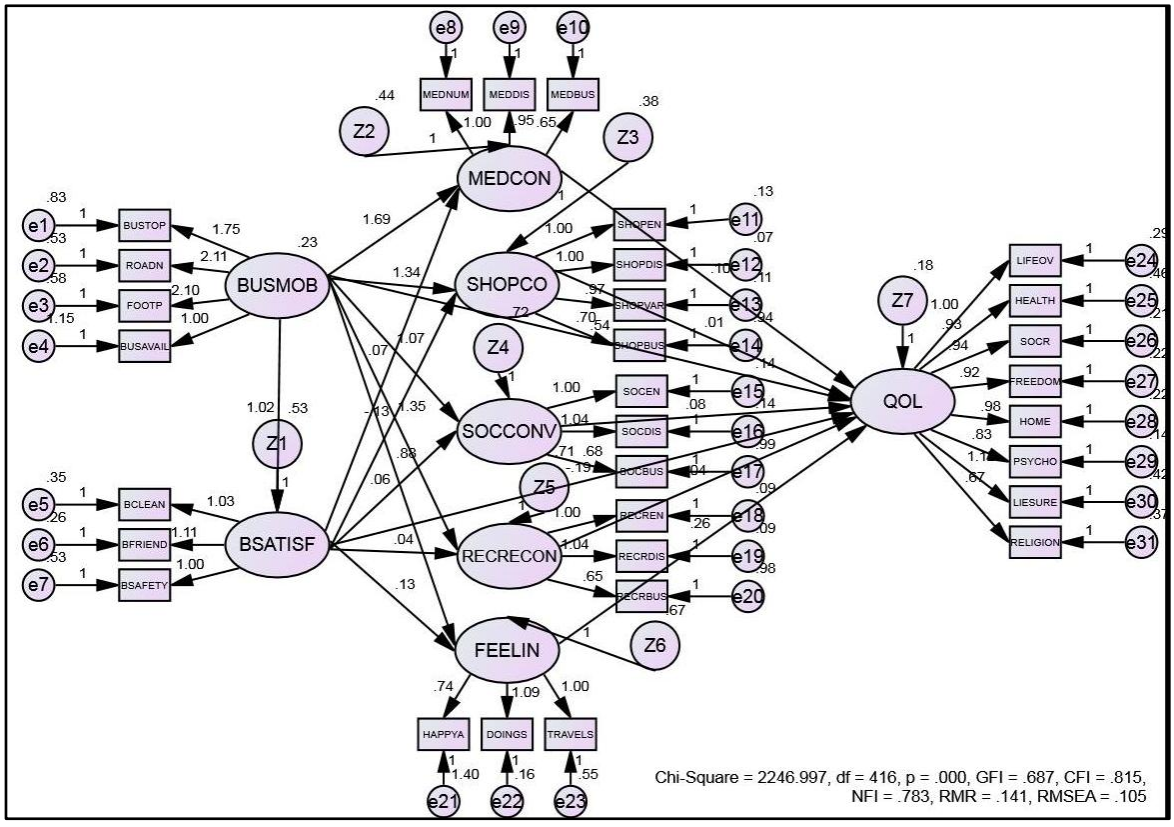


Figure 18 Hypothesized SEM model

6.2 Testing the revised model and fit indices

The model was revised and the model fit appeared quite good. The χ^2 test yielded a statistic of 336.878 (df = 305), which has a correspondence *p*-value of .101. This *p*-value was too high to reject the null hypothesis of the good fit. The RMSEA of .016, GFI

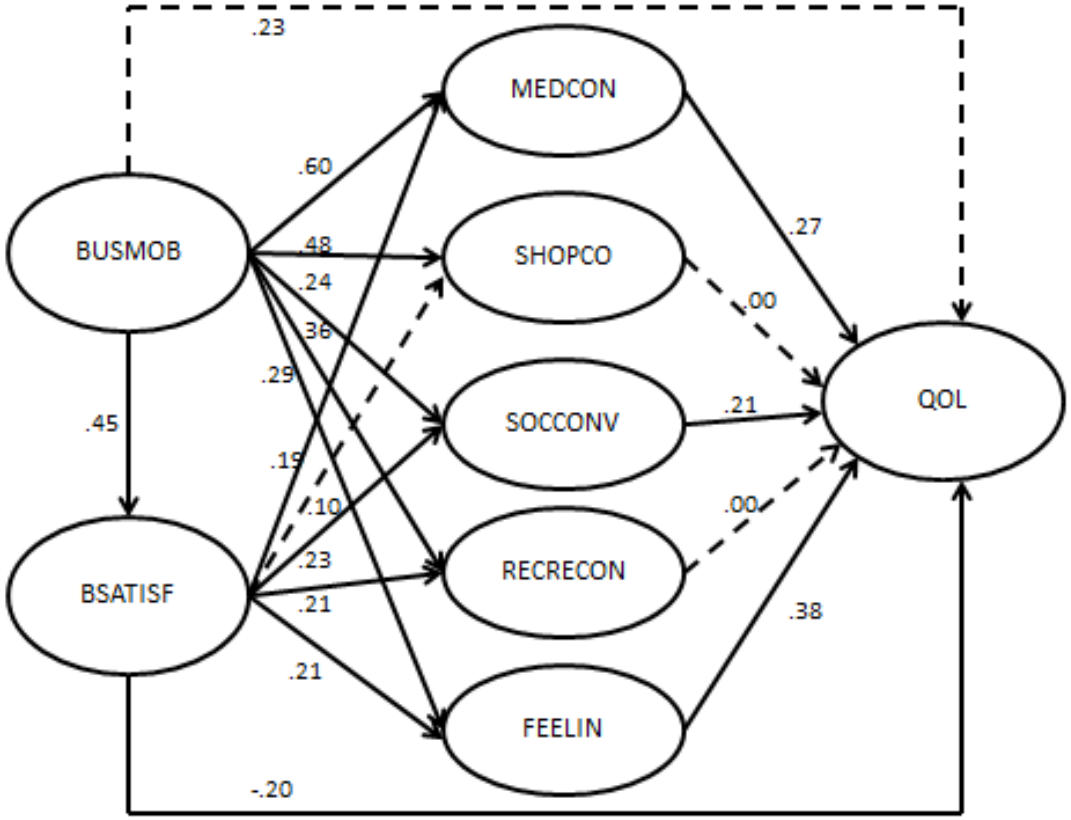
of .950, CFI of .997, and RMR of .055 also suggested that the model fit the data as illustrated in Table 19.

Table 19

Revised model: SEM test output, fit indices and desired level of fit

Overall model fit	Acceptable scale for good/adequate fit	Hypothesized model fit
CMIN/df	< 2	1.10
RMSEA	0 ≤ RMSEA ≤ .05	.016
RMR	0 ≤ RMR ≤ .05	.055
GFI	.95 ≤ GFI ≤ 1.00	.950
CFI	.97 ≤ CFI ≤ 1.00	.997
Chi-square	336.878	
df	305	

The revised model is depicted in Figure 19 with estimated standardized regression coefficients in the path links in the SEM model.



Chi-square = 336.878, df = 305, p = .101, GFI = .950, CFI = .997, RMR = .055, RMSEA = .016

- - - - Non-significant

____ Significant

Figure 19 Revised SEM model

6.3 Model comparison and summary of model fit

This section summarizes the hypothesized and revised model fit indices which is as shown in Table 20.

Table 20

Overall measurement and structural model fit indices

Fit indices	Model	
	Hypothesized	Modified
Chi-square	2246.997	336.878
df	416	305
CMIN/df	5.40	1.10
RMSEA	.105	.016
RMR	.141	.055
GFI	.687	.950
CFI	.815	.997

6.4 Effects of variables on quality of life of aging people

This sectionpresents the direct effect (DE), indirect effect (IE), and total effect (TE) of each variable on the others and the quality of life of aging people as in Table 21.

Table 21
Effects of variables on quality of life of aging people

Var.	R^2	Effect	Variables						
			BUSMOB	BSATISF	MEDCON	SHOPCO	SOCCONV	RECRECON	FEELIN
BSATISF	.20	DE	.450	-	-	-	-	-	-
		IE	-	-	-	-	-	-	-
		TE	.450	-	-	-	-	-	-
MEDCON	.49	DE	.595	.188	-	-	-	-	-
		IE	.085	-	-	-	-	-	-
		TE	.680	.188	-	-	-	-	-
SHOPCO	.29	DE	.483	.102	-	-	-	-	-
		IE	.046	-	-	-	-	-	-
		TE	.529	.102	-	-	-	-	-
SOCCONV	.16	DE	.238	.233	-	-	-	-	-
		IE	.105	-	-	-	-	-	-
		TE	.343	.233	-	-	-	-	-
RECRECON	.21	DE	.357	.210	-	-	-	-	-
		IE	.094	-	-	-	-	-	-
		TE	.451	.210	-	-	-	-	-
FEELIN	.18	DE	.289	.209	-	-	-	-	-
		IE	.015	-	-	-	-	-	-
		TE	.384	.209	-	-	-	-	-
QOL	.54	DE	.231	-.197	.273	-.004	.214	.000	.376
		IE	.313	.180	-	-	-	-	-
		TE	.544	-.017	.273	-.004	.214	.000	.376

DE = Direct effect
IE = Indirect effect
TE = Total effect

According to the data in Table 21, bus mobility (BUSMOB) is the most influent factor on quality of life of aging people (QOL) with total effect of .54. Even bus mobility has no direct effect on QOL but it has indirect effect on the QOL via other variables. Satisfaction on public bus services (BSATISF) has negative direct impact on QOL with

the total effect of -.02. Feeling independence (FEELIN), medical convenience (MEDCON), and socialization convenience (SOCCONV) are also influent factors affecting quality of life of aging people in accordance with the total effects of .38, ,27 and .21 respectively. However, SHOPCO and RECRECON had no direct effect on the QOL.

CHAPTER 5 CONCLUSION

1. Summary of the report

Since aging people nowadays have been facing with difficulties in using public transport which may affect their quality of lives, this research, therefore,proposed to examine the effect of bus mobility on the quality of life of aging people.

In the early stage, the research team found that no specific policy on public bus service for aging people. The 11th National Economic and Social Development Plan only mentioned about improving public transport services for better quality of life but no specific policy, plan, and project on transportation for aging people. The BMA also has focused on providing public transport for the Bangkok residents in general as well as paid more attention on facilitating traffic flow rather than accessibility and mobility of people with difficulties. Likewise, the BMTA does not have specific policy on improving and providing facilities of buses for aging people. On the other hand, the National Commission on the Elderly's policy does concern about public transportation for aging people However, this commission has some difficulties in implementing the policy since it has no power, staff, and authority to take full responsibility on this issue.

According to the review of public policy on public bus services, bus mobility, satisfaction on public bus services, and quality of life of aging people, the possible antecedents were identified as bus mobility, satisfaction on public bus services, medical convenience, shopping convenience, socialization convenience, recreation convenience, and feeling independence. A research model was developed and some interrelationship between each variable was proposed in the model for empirical testing.

The samples of this study were 400 aging people residing in Bangkok Metropolitan. The majority of the respondents were female (61.25%). Their mean age was 69.30. About 58% of the respondents were married. The highest level of education consisted of 3.50% master's degree, 24.00% bachelor's degree, 19.30% high school or equivalent, and 53.20% primary school. The mean income of the participants was about 11,530 Baht per month. Approximately 47% of them were living with partner. About 40% and 38% had their own car and driving license respectively. About 89% out of 152 car owner had permanent driving license.

Data were collected using questionnaire and analyzed by employing descriptive statistics and structural equation modeling (SEM) techniques. The main findings of this study are as followings:

1.1 Traveling trend of aging people: Shopping and medical reasons were the two most important factors for aging people to make trips.

1.2 Using of public bus: The majority of participants (71.75%) reported that they have used this mode of transportation after retirement. In addition, the majority of them travelled by bus 3 times or less/month. They decided to use public bus since the fare is not expensive and this mode of travel is more convenient compared to other modes of public transportation. However, they found some difficulties in using public bus services, such as, overcrowded and unreliable issues. Difficulty in getting on and off the bus is also the vital obstacle for them to use public bus services.

1.3 Attitudes of aging people toward satisfaction on bus services, bus mobility, medical convenience, shopping convenience, socialization convenience, recreation convenience, feeling independence, and quality of life of aging people:

(1) Satisfaction on public bus services: The participants' satisfaction on public bus service was quite moderate in which friendliness of public bus staff had the highest factor loading followed by cleanliness of bus and safety respectively.

(2) Bus mobility: The participants reported that their bus mobility level is slightly high in which road network had the highest factor loading followed by footpath, not far bus stop, and availability of bus respectively.

(3) Medical convenience: The participants reported that they had high level of medical convenience in which enough medical services near their place had the highest factor loading followed by distance of medical services, and availability of bus services to medical services respectively.

(4) Shopping convenience: The participants reported that they had high level of shopping convenience in which distance of shopping centers had the highest factor loading, followed by enough shopping stores and variety of goods and services, and availability of bus to the shopping areas.

(5) Socialization convenience: The participants reported that they had high level of socialization convenience in which enough socialization centers had the highest factor loading followed by distance of socialization places, and availability of public bus services respectively.

(6) Recreation convenience: The participants reported that they had high level of recreation convenience in which distance of recreation centers had the highest factor loading followed by enough recreation places, and availability of public bus services respectively.

(7) Feeling independence: The participants reported that they had high level of feeling independence in which

(8) Quality of life: The participants reported that they had very high level of quality of life, especially three dimensions namely religion and spiritual, social relationship, and psychological and emotional well-being respectively.

1.4 Bus mobility had no direct effect on quality of life of aging people (QOL). However, it had indirect effect on the QOL through other variables. Furthermore, it also had direct effect on medical convenience, shopping convenience, socialization convenience, recreation convenience, feeling independence, and satisfaction on public bus services. Good road network had the highest factor loading followed by good footpath, appropriate distance of bus stop, and availability of bus respectively.

1.5 Bus mobility had direct effect on medical convenience, shopping convenience, socialization convenience, recreation convenience, feeling independence, and satisfaction on public bus service.

1.6 Satisfaction on public bus services had direct effect on medical convenience, socialization convenience, recreation convenience, feeling independence, and quality of life of aging peoplebut it had no direct effect on shopping convenience. To raise satisfaction on public bus services, friendliness of public bus staff, cleanliness of bus, and safety issues should be considered respectively. Furthermore, it also had indirect effect on quality of life of aging people.

1.7 Medical convenience, socialization convenience, and feeling independence had direct effect on quality of life of aging people. On the other hand shopping and recreation convenience had no direct effect on quality of life of aging people.

2. Recommendations

Some aging people still using public bus services, mainly for shopping and medical purpose, since it is cheap and convenient compared to other modes of transportation. However, they are still facing various obstacles. For instances, bus design which causes difficulty to get in and get off, poor services from public bus staff, poor public transportation network, less information of bus schedule and fare at the bus stop. In addition, overcrowded bus and reliability of public bus are also the vital issues that

affect using of public bus services.The study also found some important factors affecting quality of life of aging people, namely bus mobility, satisfaction on public bus services, medical convenience, socialization convenience, and feeling independence. Hence, recommendations on these issues are proposed as followings:

2.1 Public policy on public bus services: According to the review of literature on public policy, transportation policy for aging people in Thailand appears likely to continue the serious struggle for serious attention from general public and policy maker. There are several reasons why the policy on transportation for aging people is less concerned. Firstly, there are many hot issues in current situation of the country. The transportation policy, therefore, has to compete against policy on national security, national economy, social problems, health care, and crime. Secondly, transportation requires much attention from public and media. However, it rarely occupies high agenda status. Thirdly, transportation policy for aging people suffers difficulties to gain support from politicians and interest groups since they will not gain any benefits from promoting this policy. Finally, there is no single-issue leader to generate and mobilize public interest. Hence, transportation policy has not been moved into policy process. Policy makers in the country, therefore, should be educated about aging society and aging people. Consequently, they will understand the real desires and needs of aging people who are willing to use public bus if it meets their desires. Most important, policy maker should be educated on not only aging people but also handicapped who also faces difficulties in using public bus and other public transportation modes.

2.2 Bus network and facilities: The study found that aging people used public bus services mainly for shopping and medical purposes. Hence, bus network and facilities should be provided and linked with amenities where aging people use. The whole bus routes in Bangkok should be revised to facilitate public bus use among not only elderly and disabled persons but also other people in general. Shopping and medical amenities should provide facilities and enhance aging people and handicapped to access public bus easier.

2.3 Bus design: As aging people suffer from difficulties to get on and get off the bus as well as other related bus designs. The BMTA should pay more attention on public bus design. The bus floor should be designed to facilitate aging people and people with wheelchair to get on and get off the bus. Low-floor and low-entry bus should be introduced. The former one has the low floor throughout the length of the bus. The latter one has step-free access to only a part of the bus, most commonly between the front door and the middle door. However, to introduce this kind of bus successfully, the height of curbside should be paralleled with the bus floor. Hence, the BMA who is

responsible for public road in Bangkok should redesign and reconstruct the road and curbside that meet the requirements of low-floor/low-entry bus. Restricted law enforcement against other vehicles to use the public bus bay should be administered. The bus drivers must be solidly trained how to stop the bus at the bus stop paralleling with the curbside. In addition, kneeling system bus can also be applied to enhance easier access to and from the bus stop.

2.4Information at bus stop: Besides redesigning bus stop, the information about bus timetable, fares, and travel times should be provided at the bus stop so aging people can get easier information. This will enhance their self-confident to travel by bus on their own.

2.5 Mobility improvement: Bus mobility is the most important factor affecting the quality of life of aging people through other variables. It also has direct effect on satisfaction on public bus services, medical convenience, shopping convenience, socialization convenience, recreation convenience, and feeling independence of aging people.Road network, footpath or pedestrian walkways, and availability of bus are the most important attributes of bus. Hence, they should be improved as followings:

(1) Road/public transport network: The road network and public transport network should be improved. Public bus should be linked with other modes. This will enhance elderly to travel to their destinations easier. In addition, public bus routes should be revised to service people in residential areas, who mainly rely on multiple modes of travel to reach their destination. This will enhance and attract people to use public transport as well as provide the country's economic benefits.

(2) Pedestrian walkways: The walkways should be developed to make the movement of elderly safer. Hence, they can get to the bus stop nearby their places easier. The geographical informationsystems can be employed to identify high-aging people use areas, for example, senior centers, hospitals, and similar facilities as a targetfor improvements and safety problem resolutions. The planner can also use the information from the system to place benches for sitting between bus stops. Most important, the walkways should be connected with other facilities in the communities.

(3) Availability of public bus: In some locations, there is no public bus service available. The BMTA, therefore, should revise its bus route to meet the changes of urbanization. For some areas having bus availability still have problem on bus reliability. Countermeasures on this issue should be initiated by using vehicle tracking technology to track the movement of public bus so bus users can be informed the period of time they have to wait for the bus.

2.6Satisfaction on public bus service: Since aging people in Bangkok are more concerned about friendliness of public bus service staff, cleanliness of buses, and

safety, the policy makers therefore should take these issues into account. Public bus service staff should be trained regularly on service mind, aging people rights and privilege in using public transport, and aging people's psychology. These will enhance them to better understand the desire and movement of aging people. Public bus service agency, the Bangkok Mass Transit Authority, should control and monitor the service provision of its staff on the regular basis to ensure that they provide good quality of service for aging people and other age groups. Furthermore, the executives of the BMTA should ensure that the staff is friendly to aging people.

Dirty and not hygiene seats of public bus is the second most important factor affecting satisfaction of public bus services in the views of aging people. Hence, cleanliness standard of public bus should be established. Each public bus's cleanliness, not only interior but also exterior, must be checked prior to providing service. The principle of 5s and autonomous maintenance (AM) can be employed so that the bus drivers can do cleaning and autonomously maintain the bus on their own. However, they should be educated about the importance of employing these two principles until they are engaged.

Safety is also important factor that deters aging people not to use public bus. Risk driving behaviors should be diminished. Training on traffic law enforcement and safety driving should be provided for public bus drivers. The training programs must be provided for not only the new comers but also the old one on the regular basis. Restricted measurements and punishment against drivers reported having risk driving behaviors must be employed. For examples, banning of driving license for a period of time, retraining on safety driving, and providing psychological rehabilitation. If there is a driver who violated the rule and regulation on safety driving, stronger punishment must be employed.

3. Limitations

This study was conducted in Bangkok and the 400 samples were aging people who are of 65 of age and over. Some of them had difficulties to fill in the questionnaire that yielded some incomplete information.

4. Future research directions

4.1 Future research should focus not only on aging people but also on other groups of people in society who also have difficulties, especially disabled persons, and have low level of bus mobility. This will help responsible organization to apply the

recommendations in making decision on transportation policy which cover the desires of all groups in the society.

4.2 Comparative study among aging people in ASEAN countries should be conducted since each country might have special and different characteristics. The best practice of each country might be fruitful to be applied in other countries.

4.3 The future research should examine the mobility of other public transportation modes in Bangkok. In addition, bus mobility of aging people in other big cities in Thailand should be also conducted and compared with previous studies.

4.4 Specific issues, for examples, satisfaction on public bus services and accessibility of public bus should be examined.

5. Conclusion

This study aims to figure out whether bus mobility affects the quality of life of aging people in Bangkok or not. However, in the early stage of this study, review of public policy on transportation for aging people was conducted. It found that no specific policy on this issue was concerned by related agencies. This can be implied that public transportation for aging people is an issue that cannot attract the public and media as well as the policy makers since it has to compete with mainstream issues, such as crime, economic problems, and health issues. Hence, policy makers have paid less attention on this issue for a long time. When considering the quality of life of aging people in Bangkok, it is clearly affected by the bus mobility since some of them had to use public bus for shopping and medical purposes. The aging people quality of life is also affected by other factors namely feeling independence, medical convenience, and socialization convenience. If the bus mobility is improved, it will enhance the level of feeling independence, medical convenience, and socialization convenience which finally will improve the quality of life of aging people.

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