Public open spaces for the elderly in urban areas.

A case study of Ho Chi Minh City, Vietnam

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ABSTRACT

Public open spaces (POS) play an essential role in enhancing the elderly's mental, physical, and social well-being, through socialization, outdoor activities, and exercise. A sharp rise in Vietnam's demographic profile toward an aging population over the last decade has raised the need for increased attention to POS. Based on a growing trend of aging in Vietnam, Ho Chi Minh City (HCMC) - one of the largest cities with a 9% population of elderly aged 65 and above (reported in 2019), is a prime candidate for a well-planned system of age-friendly POS. However, the lack of green spaces and, more importantly, spatial quality has limited the use of POS among the elderly in HCMC, where an estimated green area is sub-optimal (1.36 m^2 of land per capita). Additionally, Vietnam government institutions - have neither established guidelines for age-friendly urban spaces nor paid more attention to improving green open spaces. The wide academic-practitioner gap continues to challenge architects, landscape designers, and urban planners to apply their valuable research findings to practice. Through a case study of HCMC, this research aims to identify a practical design method for POS to meet the elders' needs by comprising (1) the synthesis of age-friendly design guidelines, (2) impact factors and degree of association to the frequency and time spent in POS, (3) reasons, activities, and opinions of the elderly about POS, (4) network between the POS attributes and actions of users, and (5) models of POS for the elderly.

In this paper, design guidelines, at their core, work as diffusion curves to bring academics closer to practitioners. At the same time, age-friendly policies for POS are rigorously reviewed to synthesize a framework that tailors effective procedures to match the needs of the elderly. This research uses qualitative and quantitative methods, including survey questionnaires, in-depth interviews, expert interviews, and observation. The experiment was implemented between 2017 and 2018 in ten different types of POS, collecting 353 responses from a survey questionnaire. The actor-network-theory method analyzed observation data collected from study areas to draw a network among built attributes and the users' activities. Statistical analysis was conducted using Chi-square and Fisher's exact tests to identify the most significant impact factors in using POS.

As a result, there is a significant association between social interaction and design features and frequency and time spent in POS among the elderly. Furthermore, the most influential design features in ten POS locations are open fields, pathways, vegetation, and benches, as they connect popular activities such as walking, slow-movement sports, and exercise and sports equipment. The new design guidelines are established by integrating the synthesized procedures and the results of an observational and statistical analysis to form concise language with the order of necessary factors. Remarkably, the method of this tailored approach has received multiple applause from professionals in landscape design for its relevance, acceptability, political expediency, viability, and adaptability. Future research directions are to broaden the application of the structure of POS to other age groups to minimize users' conflicts.

Keywords: *Public open spaces; age-friendly design guidelines; the elderly; impact factors on the use; Ho Chi Minh City*

KURZFASSUNG

Öffentliche Freiflächen (POS) spielen eine wesentliche Rolle bei der Förderung des geistigen, körperlichen und sozialen Wohlbefindens älterer Menschen durch soziale Kontakte, Aktivitäten im Freien und Bewegung. Der starke Anstieg des demografischen Profils Vietnams hin zu einer alternden Bevölkerung in den letzten zehn Jahren hat dazu geführt, dass POS mehr Aufmerksamkeit geschenkt werden muss. Ho-Chi-Minh-Stadt (HCMC), eine der größten Städte Vietnams mit einem Anteil älterer Menschen ab 65 Jahren von 9 % (Stand 2019), ist aufgrund des zunehmenden Alterungstrends ein idealer Kandidat für ein gut geplantes System altersgerechter POS. Der Mangel an Grünflächen und, was noch wichtiger ist, an räumlicher Qualität hat jedoch die Nutzung von POS durch ältere Menschen in HCMC eingeschränkt, wo die geschätzte Grünfläche suboptimal ist (1,36 m² Land pro Kopf). Darüber hinaus haben die vietnamesischen Institutionen weder Leitlinien für altersfreundliche städtische Räume aufgestellt noch der Verbesserung von Grünflächen mehr Aufmerksamkeit gewidmet. Die große Lücke zwischen Wissenschaft und Praxis stellt Architekten, Landschaftsplaner und Stadtplaner weiterhin vor die Herausforderung, ihre wertvollen Forschungsergebnisse in die Praxis umzusetzen. Anhand einer Fallstudie in HCMC zielt diese Studie darauf ab, eine praktische Gestaltungsmethode für POS zu identifizieren, die den Bedürfnissen älterer Menschen gerecht wird, indem sie (1) die Synthese von altersfreundlichen Gestaltungsrichtlinien, (2) Einflussfaktoren und den Grad der Assoziation mit der Häufigkeit und der Zeit, die in POS verbracht wird, (3) Gründe, Aktivitäten und Meinungen älterer Menschen, (4) das Netzwerk zwischen den POS-Attributen und den Handlungen der Nutzer und (5) Modelle von POS für ältere Menschen umfasst.

In diesem Papier fungieren die Gestaltungsrichtlinien im Kern als Diffusionskurven, um die Wissenschaftler den Praktikern näher zu bringen. Gleichzeitig werden altersgerechte POS-Politiken einer gründlichen Prüfung unterzogen, um einen Rahmen zu schaffen, der wirksame Verfahren auf die Bedürfnisse älterer Menschen zuschneidet. Diese Forschung verwendet qualitative und quantitative Methoden, einschließlich Fragebögen, Tiefeninterviews, Experteninterviews und Beobachtung. Das Experiment wurde zwischen 2017 und 2018 in zehn verschiedenen POS-Typen durchgeführt, wobei 353 Antworten auf einen Fragebogen gesammelt wurden. Mit der Methode der Actor-Network-Theory wurden die in den Untersuchungsgebieten gesammelten Beobachtungsdaten analysiert, um ein Netzwerk zwischen den baulichen Eigenschaften und den Aktivitäten der Nutzer zu zeichnen. Die statistische Analyse wurde mit Hilfe von Chi-Quadrat- und exakten Fisher-Tests durchgeführt, um die wichtigsten Einflussfaktoren für die Nutzung von POS zu ermitteln.

Das Ergebnis: Es besteht ein signifikanter Zusammenhang zwischen sozialer Interaktion und Gestaltungsmerkmalen sowie Häufigkeit und Verweildauer am POS. Darüber hinaus sind die wichtigsten Gestaltungsmerkmale an zehn POS-Standorten offene Felder, Wege, Vegetation und Bänke, da sie beliebte Aktivitäten wie Spazierengehen, Sportarten mit langsamen Bewegungen sowie Bewegungs- und Sportgeräte miteinander verbinden. Die neuen Gestaltungsrichtlinien werden durch die Integration der synthetisierten Verfahren und der Ergebnisse einer Beobachtungs- und statistischen Analyse zu einer prägnanten Sprache mit der Reihenfolge der erforderlichen Faktoren erstellt. Bemerkenswerterweise wurde die Methode dieses maßgeschneiderten Ansatzes von Fachleuten aus der Landschaftsgestaltung mehrfach für ihre Relevanz, Akzeptanz, politische Zweckmäßigkeit, Durchführbarkeit und Anpassungsfähigkeit gelobt. Zukünftige Forschungsrichtungen bestehen darin, die Anwendung des POS-Designs auf andere Altersgruppen auszuweiten, um die Konflikte der Nutzer zu minimieren.

Schlüsselwörter: *Öffentliche Freiräume; altersgerechte Gestaltungsrichtlinien; ältere Menschen; Einflussfaktoren auf die Nutzung; Ho-Chi-Minh-Stadt*

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I remember someone said an excellent thesis is a finished one. Finally, I finished it.

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LIST OF ABBREVIATIONS

ANT	Actor-Network Theory
CBC	Choice-based conjoint
CBD	Central Business Districts (Districts 1 and 3 of HCMC)
Non-CBD	Non-Central Business Districts (the remaining districts of HCMC)
DONRE	Department of Natural and Resource Environment
GIS	Geography Information System
GSO	General Statistics Office of Vietnam
ha	Hectare
m^2	square meter
m	Meter
HCMC	Ho Chi Minh City
POS	Public open spaces
PRISMA	Preferred Reporting Items for Systematic Reviews and Meta-Analyses
QCVN	(Vietnamese) National Technical Regulations (Quy chuẩn Việt Nam)
TCVN	(Vietnamese) Design Standard (Tiêu chuẩn Việt Nam)
SPSS	Statistics Package for the Social Sciences
SWOT	Strength, Weaknesses, Opportunities, and Threats
VN	Vietnam
VND	Vietnam Đồng

1 CHAPTER 1: INTRODUCTION

This introduction chapter provides a brief overview of the dissertation, presented by the motivation for conducting this topic, its rationale, research goals and objectives, scopes and limitations, and methodological structure and research organization.

1.1 Background and Motivation

At the beginning of the 21st century, the global population became "aging," with over 13% (962 million) people worldwide age 60 or older, in which Europe took the highest percentage (25%), followed by Northern America (22%), Oceania (17%), Asia, Latin America, the Caribbean (12%) and Africa (5%) (United Nations, 2017). The annual growth rate has increased by 3% globally, with the fastest in urban areas, especially in developing countries (Guzmán et al., 2012; United Nations, 2015).

The defined "older age" depends on each country's conditions, such as retirement age, view of the role of the elderly in society, and life expectancy at birth. "Aging population" is when the proportion of the population aged 65 and older accounts for 7% to 10% of the total population (Cowgill, 1974), widely used in Vietnam to define an aging society (GSO, 2015b).

It has been commonly acknowledged that the aging population raises the demand for healthcare and the number of dependents (L. Li et al., 2020; Rechel et al., 2009; Wittenberg & Comas-Herrera, 2003; Zheng, 2022). From 2020 to 2050, the increasing age of independents in Vietnam will slow economic growth if no reforms exist. The additional fiscal costs could be 4.6% of GDP by 2050 to expand the social programs and service delivery (The World Bank & JICA, 2021, p. 49). Table 1.1 shows the Projected changes in future long-term care expenditure from 2000 to 2050 in four European countries: Germany, Spain, Italy, and United Kingdom.

	Germany	Spain	Italy	United Kingdom
% increase between 2000 and 2050				
Number of dependents [a]	121%	107%	102%	87%
Central base case				
Total expenditure	437%	509%	378%	392%
Total expenditure as % of GDP [b]	168%	149%	138%	112%
Comparative base case				
Total expenditure, % of GDP	120%	115%	96%	102%

Table 1.1 Projected percentage increases in the numbers of older adults, service recipients, and expenditures between 2000 and 2050 under a standard core set of assumptions (central base case)

Notes: [a] Dependence is defined as the ability to perform activities of daily living and/or instrumental activities of daily living;
[b] GDP: gross domestic product.

Source: (Wittenberg & Comas-Herrera, 2003)

Concerns for increasing outdoor physical activities and social interaction to enhance the physical and mental health of the elderly need to be addressed to lessen problems caused by the aging population (Loukaitou-Sideris et al., 2016; Rappe et al., 2006; Sugiyama et al., 2008; Takano et al., 2002). Public open spaces (POS), such as parks, neighborhood gardens, streets, and waterbody, benefit the elderly more than other age groups due to the more significant proportion of time spent in the neighborhoods (Sarkissian & Stenberg, 2013). Additionally, physical activities in POS are known to promote well-being. For instance, walking helps reduce the risks of several serious diseases: 50% of heart attacks, 50% of diabetes, 30% of colon cancer, and 40% of femur fractures (Rappe et al., 2006). Living within walkable green areas positively influences urban senior citizens' longevity (Takano et al., 2002). Therefore, living nearby green spaces and having good care services from the community are some of the solutions for the aging society (Srichuae et al., 2016; United Nations Centre for Human Settlements (Habitat), 1993). More importantly, POS enhances urban residents' quality of life by providing creative places, reducing

crime and anti-social behavior incidents, promoting neighborhood social cohesion, improving air quality, and reducing urban heat island effects and water run-off (Montenegro et al., 2012).
Vietnam is one of Asia's fastest aging population countries, with an aging population of 9.9% in 2011 (Thuy-Ha Nguyen, 2017). Vietnamese people aged 65 and older represented 11.3% of the population (around 11 million) in 2019 and are expected to grow to 20% by 2038 (GSO, 2019; Trotsenburg, 2016). In contrast to some developed countries such as France, Switzerland, and the United States, where the demographic shift took 75 to 100 years, Vietnam has only 20 years to experience this phenomenon (Trotsenburg, 2016). Nearly 50% of Vietnamese urban elderly frequently feel lonely because they are not understood and cannot share their feelings with their family (Moc-Lan Hoang, 2011). As social interaction reduces the elderly's loneliness and boredom (Marcus; & Francis, 1990), the Vietnamese urban elderly need age-friendly places to support their quality of life, both mentally and physically. A survey in Hanoi from 2010 to 2011 shows that over 26% of park visitors are over 55[1], nearly 90% of whom visit daily, primarily for sports, exercise, and relaxation (T. L. Le, 2013). Although POS are necessary for the Vietnamese urban elderly, there are still many problems in quality, provision, and management in Vietnamese larger cities' public spaces. Consequently, some popular sceneries where many Vietnamese people perform their daily physical activities inside narrow alleys or unplanned vacant lands (see Figure 1.1) reflect the lack of access to urban green spaces. The reasons lie in the under-standard ratio of greenery in Vietnam's urban areas. For example, the average public green spaces per capita ratio in Ho Chi Minh City (HCMC) and Hanoi are 0.49m^2 and 0.9m^2, respectively (Duc-Nguyen Pham, 2018; Thanh, 2019). These numbers are much lower than the minimum recommended by the World Health Organization (WHO) of 9m^2 or the Vietnam design standard of 12 to 15m^2 (Vaglione et al., 2013; National Code, 2012). Many areas in scarce parks are commercialized for photography businesses, toys, and food street vendors by taking private spaces. When the users cannot afford or do not want to pay for these businesses, their access is restricted (Barbara & Drummond, 1999).

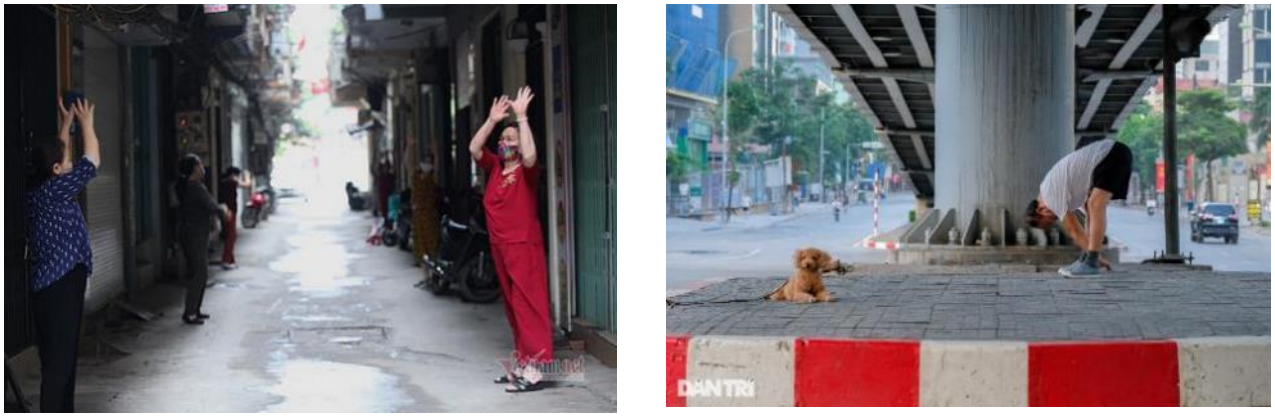

Figure 1.1 The elderly do physical exercise in alleys and under bridges
Source: Vietnamnet (left) and Thanh Tung-Dan-tri magazine (right)

Even though the problems of POS are recognized, studies on POS, especially towards the elderly in Vietnam, are still limited. No Vietnamese government institutes have mentioned Age-friendly design guidelines. The official definitions of "public open spaces" or "urban spaces" are unclear and inconsistent in Vietnam's legal documents (T. L. Pham, 2016; T. K. T. H. Tran et al., 2015). Any planned developments or investments with large green spaces benefit the middle- and high-income groups; meanwhile, frequent users like the elderly tend to be less critical or ignored in urban planning. In addition, the characteristics of POS in Vietnam differ from others because the boundaries between

[1] Vietnamese women retire at 55, men at 60.

public and private spaces are fluid and routinely transgressed (Drummond, 2000; Kürten, 2008). These blurred boundaries are explained in chapter 2.2.

1.2 The rationale of the research

Research on the association between the living of the elderly in dense urban areas lacking green spaces and their corresponding outcomes has increased over the past 20 years. There is considerable evidence that this association occurs between the elderly's use of POS and the attributes of the built-in environment. More specifically, the visiting frequency and time spent at POS are influenced by a series of factors: the design of POS, neighborhood characteristics, proximity, social interaction in POS, and user characteristics (Alves et al., 2008; Srichuae et al., 2016; Turel et al., 2007; Yung et al., 2017). However, the association seems not to be pre-set due to the various degrees of association shown in many studies. For instance, Srichuae et al. (2016) conclude that proximity and attributes of neighborhood characteristics significantly impact the visit frequency of the elderly when studying the mobility of the elderly in POS in Thailand. Alves et al. (2008) show that the orders of critical effects on the elderly's preference are primarily in design features and neighborhood characteristics before proximity. Similarly, Turel et al. (2007) present design features as the most decisive points, followed by neighborhood characteristics and social interaction. However, Yung et al. (2017) argue that social interaction factors are more important to the elderly's use of POS than the design, surrounding areas, and proximity factors.

Nevertheless, there are limitations to these studies. Srichuae et al. (2016) only focus on the distance to POS and its distributions, while Turel et al. (2007) examine the evaluation of the POS without considering the relations between the users' socio-economic status and environmental attributes. Alves et al. (2008) do not thoroughly investigate the respondents' opinions on their preferences. Furthermore, despite significant literature on the association between POS visitation and the built-in environment, few studies advise planners and landscape designers to develop senior-friendly parks (Loukaitou-Sideris et al., 2016). The gap between theory and practice is widening because the practitioners do not feel the research articles are helpful and hard to apply in reality (Asaad et al., 2017; Giles-Corti et al., 2015; Heide & Wijnbelt, 1996). Notably, no studies have discussed how to translate their findings into designing an age-friendly POS for similar global cities.

In lacking such studies, this research aims to investigate the elderly's needs for POS in HCMC, one of Vietnam's most prominent cities, where green spaces are sacred. More specifically, this research identifies the associations between POS attributes and the elderly's use, including visiting frequency and time spent at POS, and their requirements for POS in this city. From the needs, this research reviews and synthesizes the global age-friendly design guidelines to recommend innovative solutions for improvement. The study focuses on finding an effective method of designing models of age-friendly POS by surveying representative districts. Understanding the cause-and-effect relationships between these factors and POS can improve POS in urban planning and design and, to a certain extent, create a "city for all" where all generations are welcome to share public spaces comfortably.

> *"An aging-friendly city is not just friendly for the elderly. Buildings and streets without obstacles improve the mobility and independence of disabled people, both young and old. A safe neighborhood makes children, young women, and older people feel confident to go out and participate in leisure physical activities and special events. Families are less stressed when their older relatives have community support and the necessary health services. The whole community benefits from older people's voluntary or paid work or engagement—finally, the local economy profits from older customers. (OMS, 2009, p.6). " cited by* (Carvalho et al., 2012).

1.3 Research objectives and research questions

This study aims to find a way to design age-friendly POS models according to the needs of older people in HCMC, Vietnam.

The goal corresponds with the following research question:

- **How can POS in HCMC be designed in accordance with the needs of the elderly?**

There are six objectives and related questions in supporting the goals:

Objective 1: Synthesize the age-friendly design guidelines worldwide
Relevant question: What is the synthesis of age-friendly design guidelines worldwide?

Objective 2: Identify impact factors on the elderly 's use of POS, comprising visit frequency, time spent, and activities of the elderly (e.g., design features, user characteristics, proximity, social interaction, and neighborhood characteristics)
Relevant question: Which factors impact the elderly's use of POS?

- **Objective 3**: Identify the needs of the elderly in different types of POS in HCMC, including reasons to visit, activities, expectations, and evaluations of current POS conditions.
  Relevant questions:
  Why do the elderly in HCMC visit POS?
  What are they doing there?
  What are their opinions about the current POS condition?

- **Objective 4**: Identify the association between impact factors, visit frequency, and time spent.
  Relevant question: How are factors associated with visit frequency and time spent in POS?

- **Objective 5**: Identify the network between the design features of POS and the activities of the elderly there.
  Relevant question: How do design features of POS connect to the elderly's activities?

- **Objective 6**: Identify the models of POS in a type of design guidelines based on the findings of impact factors, the needs, and the synthesis of age-friendly design guidelines worldwide.
  Relevant question: Which models of age-friendly POS can be designed in accordance with the needs of the elderly in HCMC?

1.4 Scopes and limitations

To adequately evaluate the results of this thesis and classify them in terms of their significance, the scopes and limitations mentioned below must be taken into account.

Scopes

1. This study looks at the quality and quantity of different POS in the city to varying levels by evaluating planned and unplanned spaces comprised of city parks, districts' parks, neighborhood parks (pocket parks), roundabouts, streets, alleys, vacant lands, and the yards of public (or religious) buildings providing free and easy access to the elderly.

2. The elderly are people aged 60 or 65 and above, depending on the country's regulations. In this research, the observed subjects are over 60 years of age, referred as elderly according to Vietnamese Law No. 39/2009/QH12. They should be in "*normal health condition*," meaning they can self-move without assistance and control their self-thoughts.
3. This research studies optional and social activities, not necessary activities in POS. These survey activities include taking a walk to enjoy fresh air, relaxing, sitting and sunbathing, greeting and having conversations with friends and family, or even watching other people's activities. Necessary activities in POS, e.g., waiting for a bus, going to work, and shopping (Gehl, 2011), are omitted as these activities are compulsory and not strongly influenced by environmental attributes.
4. Not all factors mentioned by other scholars have not been surveyed, including park size, quietness in POS, pollution, and maintenance due to the diverse type of POS that the research addresses.
5. The collected documents are written in English, and Vietnamese, with a few in German, reviewed as grounded theory.

Limitations

Subjects

1. Although POS serves all people, including toddlers, teenagers, and adolescents, the research focuses on the elderly's use and needs of POS exclusively. There might be conflicts of interest in interaction among varied aged groups (e.g., the young versus the elderly). Thus, further research on urban open spaces is needed to address all POS users.

Methods

2. All data collected from the survey questionnaire are self-reported data, susceptible to bias, and cross-sectional design can preclude causal inference. The self-selection bias in the residential location might induce different results. For example, people who like greenery will choose to live nearby green spaces and visit POS more often. The questionnaire survey includes questions about the long-term use of their favorite POS to reduce this bias. The result shows that one-third of respondents have been using POS for less than five years, while the rest have been for five years or more. Therefore, the self-selection bias can be acceptable with this sample.
3. The guidelines created based on research findings have not been applied in any practical park. The experts in landscape design only evaluate the procedures. It might be a lack of empirical evidence for the results of this study.

1.5 Methodological structure and organization of the study

The research applied a mixed method of qualitative and quantitative research with a case study approach, including a survey questionnaire, observation, in-depth interview, and desktop review. Based on findings from previous studies, impact factors on the use of POS from the elderly's perspective were synthesized into five hypotheses. From December 2017 to February 2018, the survey was conducted in ten study areas representing different types of POS in HCMC to test these hypotheses. Data were collected through on-site observation and survey questionnaires. The survey questionnaires aimed at 380 respondents aged 60 and older, among which 353 valid responses were collected. The questionnaire assessed the frequency, time spent, reasons for visiting POS, and their thoughts on POS distribution, design features, and programs. Interviews with seven users and one non-user elderly were conducted while collecting on-site questionnaires to understand their experiences better. Observation along with photographic methods was applied to record the physical activities.

Statistical analysis tests, i.e., Chi-square tests and Fisher's exact tests, were used to analyze the data from the questionnaire survey to verify the hypotheses.
Actor-Network Theory (ANT) was adjusted to present the network between POS design features and the elderly's activities. The results were used to design the models of age-friendly POS, including age-friendly design guidelines matching the needs of the elderly in Vietnam. In September 2021, five experts, including an experience architect, a landscape lecturer, an officer in the HCMC Department of Urban Planning and Architecture, a landscape architect, and an urban planner, were interviewed remotely to assess their opinions and gather recommendations for the new design guidelines implemented in HCMC and many other Vietnamese cities during the COVID-19 pandemic. The landscape lecturer and an architect from HCMC gave feedback for the survey. Chapter 4 describes the methodology in detail.

The following matrix represents the structural collection of data in this survey.

Research questions	**Critical information set**	**Data sources**	**Collection methods**	**Findings**
What is the synthesis of age-friendly design guidelines worldwide?	Synthesis of age-friendly design guidelines	Previous POS design guidelines for the elderly	Desktop review	Sub-chapter 5.1
Which factors impact the use?	Groups of impact factors to the frequency and time spent	Previous studies Survey questionnaire results	Desktop review Survey questionnaire on site	Sub-chapter 5.4
Why do the elderly visit POS? What are they doing there? What are their opinions about the current POS condition?	Reasons to visit Activities Opinions, expectations, and evaluations	Survey questionnaire results Photos Interview results of users and non-users	Survey questionnaire on site Photo and note-taking Interview	Sub-chapter 5.3
How are factors associated with the frequency and time spent in POS?	Degrees of association	Data analysis results	Chi-square tests Fisher's exact tests	Sub-chapter 5.4
How do design features of POS connect to activities?	A network between design objects and the elderly's activities	Observation results extracted from photos and notes	Photos and note-taking ANT method	Sub-chapter 5.5
Which models of age-friendly POS can be designed according to the needs of the elderly in HCMC?	Models of design guidelines for the elderly	Synthesized age-friendly design guidelines Findings from the needs of the elderly	Desktop review Expert interview	Sub-chapter 5.6

Table 1.2 Research data gathering matrix

The research is organized into seven chapters, shown in Figure 1.2 below. **Chapter 1** gives an overview of the reseach topic. It emphasizes the reasons and essentials for choosing this topic and the goals of designing the models of POS to match the needs of the elderly. The research's scope and limitations are also discussed in this chapter to clarify a holistic understanding of the research.

The theoretical part consists of chapters 2 and 3. The beginning of **Chapter 2** introduces the nature of POS through its definitions, characteristics, development process, and roles in the elderly's lives. The central part of this chapter is the review of impact factors that influence the use of POS. Through similar works from other scholars in this field, this chapter analyzes and synthesizes research findings of associated attributes grouped into five aspects: proximity, neighborhood characteristics, user characteristics, design of POS, and social interaction. These aspects associated with various degrees of the use of POS are the initial information to create five hypotheses for this research. **Chapter 3** discusses the global age-friendly design guidelines of POS and the approaches to develop and integrate more sophisticated design guidelines for aging-friendly POS worldwide. It also mentions the problems between the research translation gap and the practitioners' practical use.

The experimental procedure is described in chapters 4 and 5. **Chapter 4** summarizes study approaches to POS from 1980 and methodology, followed by the analysis to determine the most suitable method for this research. The core of this chapter is the experimental process that details the plan to collect and analyze data for testing hypotheses. Data collection methods include quantitative and qualitative methods: observation, survey questionnaires with the users and non-users, desktop review, interviews with users and non-users about the use of POS, and interviews with the landscape design experts about age-friendly design guidelines. Mapping is also used to calculate the distance from users' locations to their favorite parks and the provision of parks in the survey sites. Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) method is used to review and synthesize relevant guidelines and studies. Chi-square tests and Fisher's exact tests are used to verify hypotheses for the statistical significance of impact factors. In this chapter, the study areas for the survey are presented in sketch plans and short information. **Chapter 5** contains the synthesis of design guidelines worldwide, a report of the survey questionnaire, a mapping of distance to POS, statistical test results, the tailored design guidelines matching the needs of the elderly in HCMC, and the results of the expert interview. The data of 353 valid responses from survey questionnaires are then analyzed to verify five hypotheses. Then, new design guidelines are created based on survey findings and POS's global age-friendly design guidelines. The experts in landscape design review these guidelines for transferability to other cities in Vietnam and similar countries worldwide.

Chapter 6 discusses the results and describes age-friendly design guidelines for HCMC. It provides more details on the findings compared with other scholarly studies to explain the phenomenon and recommends how to apply these results for further studies. **Chapter 7** summarizes the main findings and imperative solutions with recommendations for further study directions.

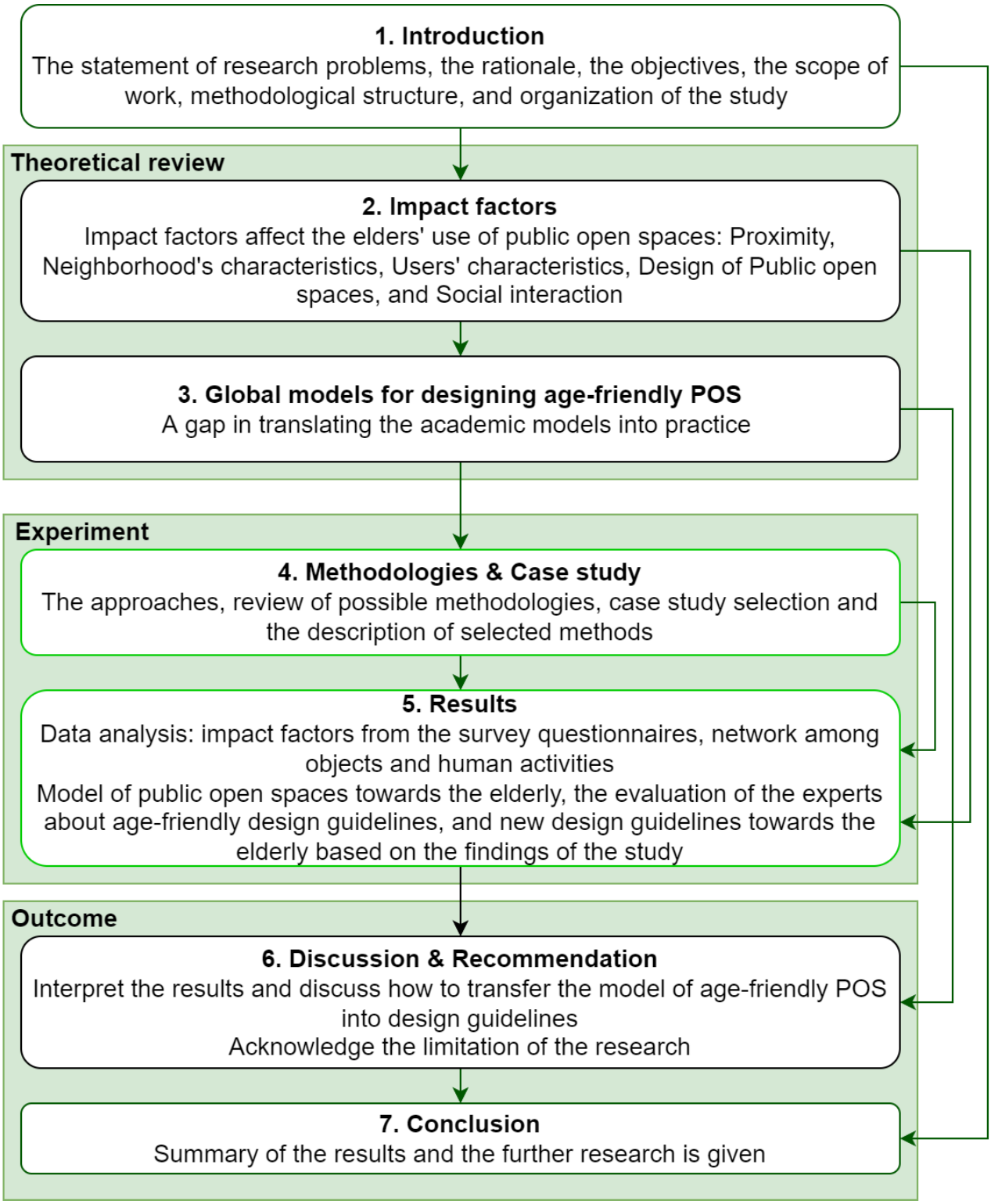

Figure 1.2 Structure of the study

2 CHAPTER 2: IMPACT FACTORS AFFECT THE ELDERLY'S USE OF POS

This chapter describes a comprehensive overview of POS in many countries, particularly Vietnam, before developing five hypotheses for testing. The first part, sub-chapter 2.1, comprises the definition, categorization, functions, and changing POS for the elderly. It draws a concept about what and how POS works to prepare for part 2.2, looking at factors synthesized from previous studies that affect the use of POS. For five series of these influences, this part investigates 29 factors in detail and explains the inconsistency among findings of pertinent studies. This chapter aims to provide an overview of the impact factors on the use of the elderly in diverse types of POS, which can be meaningful input for developing age-friendly design guidelines.

2.1 What is "Public open space"?

The characteristics of POS, including definition, categorization, and roles, are slightly different among varied countries and legal documents, even changing overtime in one country and one legal document (Drummond, 2000; Kurfürst, 2011; T. L. Pham, 2016; Tonnelat, 2004; T. K. T. H. Tran et al., 2015). This part reviews scholarly studies to give a perspective on POS in Vietnam.

2.1.1 Definition

According to Tonnelat (2004), the notion of "public space" comes from the Greek Agora and the Roman Forum, where public affairs of the city are discussed among an assembly of equal citizens. In medieval and pre-industrial towns, it was hardly specialized in varied activities of trading, playing, political meetings, education, punishment, and execution. Until the 18th and 19th centuries, with the Industrial Revolution, public discussion was transformed under the bourgeois, then affected by the democracy that did not form the forum in physical public spaces (Habermas, 1991). Furthermore, with the spread of improved public and private transportation, the spatial scale of people for daily interaction expanded significantly. In addition, the economic and political constraints produced new patterns of residential segregation and integration. With the changing nature of spaces, semi-public spaces managed by private-public or entirely private partnerships emerge. The notion of public space transforms into a legal perspective as being recognized as a space accessible by the public, not the state's public domain and its subdivisions (Altman & Wandersman, 1987; Tonnelat, 2004). The first definition of "open spaces" was used for public space, meaning the streets, parks, recreation areas, plazas, and other publicly owned and managed outdoor spaces (Tonnelat, 2004). The first use of the term "public open space" was possibly in 1833 by the Select Committee on Public Walks in London, and then a more explicit definition appeared in 1906. "Any land, on which there are no buildings or of which not more than the one-twentieth part is covered with buildings and the whole of the remainder is laid out as a garden or is used for purposes of recreation or lies waste unoccupied" (Turner, 1992). Similar terms to "Public open space" are "urban open space," "open space," "public open urban space," "public realm," "public sphere," or even "urban green space," which falls between "open space" and "natural green space" (Nicol & Blake, 2000).

The nature of urban space relies on the reasons for the existence of cities; that is, to live close to a large number of other people, in which private and public spaces are formed and organized (Franck, 2010). It can be understood that "a private space is one in which you set your own rules and are free to associate and talk as you please, free from public control." In contrast, "public space is a more contested subject," which "simply refers to spaces publicly owned and regulated and open to everyone" (John Gastil, 2008). Thus, a contrast between "public-ness" and "private-ness" leading to the term "public open space" are distinguished by three dimensions: access, agency, and interest (Benn & Gaus, 1983; Madanipour, 2003). "Access" to a place providing physical activities is the key to defining "public space" or "urban open space." Open space is open when accessible because a place cannot become public without being accessible. It becomes a private space when public access is controlled

or restricted (Francis, 1991; Larice & Macdonald, 2013; Lynch, 1984; Wither et al., 2012). "Agency" refers to the standing agents, or the ability to make connections and take action entitles the subject, in which "public" means closer to "common" (Benn & Gaus, 1983; Madanipour, 2003; Tonnelat, 2004). Public space is controlled by the state and its behalf while being used by the community (Larice & Macdonald, 2013; Madanipour, 2003). "Interest" can be seen as inter-subjectivity (Kohn, 2004). Public space is a space for public recreation or similar purposes and for people to contact each other, including strangers, acquaintances, or friends (Local Government (Building and Miscellaneous Provisions) Act 1993 - SECT 80 80. Interpretation of Part 3, 1993).

However, the notion of "public open space" coming from the Western concept is hardly defined in Vietnam's context because of the blurred boundaries between public and private spaces (Drummond, 2000; Kürten, 2008). Vietnam's public spaces do not represent the public discussion or expression as Greek agora or Roman forum. It is also practically infiltrated by individual commercial activities, such as food stands or private motorbike parking in public corridors, streets, or laneways. Meanwhile, the public interfered with the private domestic life in Vietnam through regulations of birth strategies, household registration, focusing on the domestic duties of Vietnamese women (Drummond, 2000), and encouraging the age of getting married[2](Decision 588/QD-TTg Approving the Birth Rate Adjustment Program toward 2030, 2020).

The cause of ambiguous boundaries between public and private spaces comes from the history of POS in Vietnam (Kurfürst, 2011, p. 61; Ly, 2004). In the feudal period, spaces were not controlled directly by the emperor but by the village, conventions, and Council of Notables, including the village communal house and a temple with ritual meaning and restricted access. There were no places for Western styles of public discussion or expression. The origin of so-called public spaces (ritual places) was destroyed in colonial periods. Western public spaces were established in Vietnam with squares, monuments, and parks. Consequentially, public spaces lost their sacred meaning as they used to be in the traditional rural. POS were transformed to adapt to the government, with more symbolism in the post-colonial period (Kürten, 2008). POS in Vietnam has changed since the "Doi Moi" (renovation time) policies in 1986, shifting from a centrally planned to a market-oriented economy. As a result, the emergence of informal spaces, e.g., pavements and streets, are formed, which conflicts with the idea of the communist party, leading to the transition of the state role to private (Waibel, 2006). After the "Doi Moi" policy in 1986, public spaces became complicated as street vendors used them due to the loose control by the authorities (Drummond, 2000, p. 2382). Therefore, public spaces in Vietnam can be defined into two categories: (1) traditional rural as alleys, local markets, pagodas, temples, and communal; and (2) modern with Western styles, such as squares, monuments, and parks (Kurfürst, 2011, p. 61; Ly, 2004). The changing of POS from the feudal period to the post-renovation time led to the lack of an official definition of POS in Vietnam documents.

Until contemporary urban planning, public spaces have been concerned with Vietnam's urban planning laws and regulations. Public (open) spaces are translated in Vietnamese as "*Không gian công cộng (ngoài trời)*" or *"không gian (mở) công cộng*". They can be known as "public spaces" or even as "urban spaces." The first mention of "public spaces" in Vietnam policy was in 2003 in Construction Law, then appeared in Decree 42/2009/ND-CP and 38/2010/ND-CP. Tran et al. (2015) also pointed out that the "public spaces" norm is not defined clearly in the policy language. There is a "lack of a consistent and clear definition of what constitutes urban public spaces in a policy document." More specifically, the public spaces can be understood as three kinds of definitions as the followings: (1) "*Land use for public*

[2] Decision 588/TTg dated on 28 April 2020: Decision of the Prime Minister about encouraging people to get married before 30

purpose" (đất sử dụng vào mục đích công cộng)[3], *(2) "Urban landscape" (cảnh quan đô thị)*[4] and (3)*"Public-use greenery'" (cây xanh sử dụng đô thị)*[5]. The differences in POS definition refer to the differences in controlling and management authorities. For example, greenery in HCMC, such as green corridors, is managed by HCMC Greenery Parks Company Limited. In contrast, land use for public purposes such as city parks belongs to the People's Committee of HCMC.

In 2009, a Decree issued by the Vietnam Ministry of Construction allowed this expression to appear more precisely: "Public space of urban area including community living space, parks, gardens, squares and walking areas organized as open space, with places for leisure, recreation for the spiritual life of the urban population[6]." This definition matches the experts' understandings of spaces in VN that can be considered POS on the public spaces project for the youth in Hanoi in 2009 by Boudreau et al. (2015). "Parks, squares, plazas, lakes, playgrounds of residential areas, public markets, green spaces, sidewalks, and streets all constitute public spaces," while "water and theme parks" is lesser agreed upon because of the ownership and the degree of accessibility (Boudreau et al., 2015; T. K. T. H. Tran et al., 2015).

2.1.2 Categorization

"Typology" and "Classification" are two methods to categorize open spaces. "Typology" refers to the types of open spaces regardless of the inner characters. In fact, by using the typology method, they mainly focus on the spaces' types, such as squares, plazas, atrium, indoor marketplaces, streets, residential parks, and markets (Francis, 1991). Open space has different characteristics, influencing how open space is used and valued (Nochian et al., 2015). "Classification" refers to the spaces' characters as "functional attributes, social attributes, and perceptional attributes" (Salama & Azzali, 2015). Table 2.1 summarizes POS into two types of categorizations.

Group	Type	
Typology (Erjavec, 2001; Francis, 1991; Gaubatz, 2008)	▪ Traditional (Francis, 1991)	• Public parks, Neighborhood parks, Playgrounds, Pedestrian Malls, and Plazas (Francis, 1991)
	▪ Innovative (Francis, 1991)	• Community open spaces, Neighborhood open spaces, Farmers' markets, Town trails, Vacant/undeveloped open spaces, Streets, Waterfronts, Found areas (Francis, 1991), Schoolyards, playgrounds of cultural and other public institutions, open spaces in industrial zones (Erjavec, 2001), Transit malls, commercial areas, and transitional spaces (Gaubatz, 2008)
Classification (Salama & Azzali, 2015)	▪ Functional attributes	• It is related to the use of those spaces: Architectural and landscape elements, accessibility, and gathering nodes
	▪ Social attributes	• Related to user experience and social inclusivity: age, gender, cultural background, location, transportation options
	▪ Perceptual attributes	• Related to the human experience: comfort, security, safety, and local identity

Table 2.1 A typology and classification of Urban spaces

[3] Article 12.2.f - Land Law: 'land used for transport, land with historical-cultural relics, land for community activities or public entertainment and recreation, for markets, for other public facilities'

[4] Article 3.14-Law on Urban Planning: a specific space having multi-directional views in an urban area, such as space in front of an architectural complex, plaza, street, pavement, sidewalk, park, greenery area, orchard, public garden, hill, mountain, earth mound, isle, natural land strip, coastal land strip, lake, river, canal, stream in urban areas and collective space in the city.

[5] Article 2.6.1-1 – TCXDVN 362:2005: squares, parks, public gardens, promenades, etc. including water surface area in their premises and areas of river landscape greenery planning for urban inhabitants' access and use for physical training, rest, recreation, relaxation, etc.

[6] Article 6.d – 34/2009/TT-BXD

Source: (Francis, 1991; Salama & Azzali, 2015)

Vietnam Standards use typology methods to categorize parks accordingly to their sizes. According to Vietnam Design standard, parks are classified as follows: central city park (15 ha), multifunctional park (11-14 ha), district park (10 ha), pocket park (3 ha), public garden (0.5 ha), a public garden in a small town (2 ha), and city forest park (50 ha) (National Code, 2012).

This paper chooses the typology method when evaluating the types of parks. POS in Vietnam applies the criteria of "access, agency, and interest," as listed above. POS in this paper include parks, squares, plazas, lakes, playgrounds of residential areas, public markets, yards of public religious buildings, green spaces, sidewalks, alleys, and streets.

2.1.3 POS play essential roles in the urban elderly's life

When people get older, they often encounter mental and physical health problems. Approximately 36% of Vietnamese urban elderly had at least one difficulty performing a function based on the Vietnam Population and Housing Census report in 2019 (General Statistics Office, 2021). According to a survey conducted by Giang (2013) in Hanoi, Vietnam, 65% of the elderly self-evaluate themselves in weak health conditions, while 31%, 42%, and 65% of the elders in groups 60-69, 70-79, and over 80 face difficulties walking within 200-300m, respectively. Regarding mental health, the elders often feel more lonely, bored, and isolated than the young people (Marcus; & Francis, 1990). The social network of the elders focuses on the responsibility and duty to care for other family members. Approximately 50% of them rarely visit relatives, friends, and neighbors (T. T. T. Nguyen, 2016). Giang (2013) also reports that only over 30% of elders have one person to share their emotions with, of which 24% are not their family members. More importantly, 11% of surveyed elderly receive rude words from their family, while 3.4% refused to talk to, and 1.6% faced being beaten and threatened by family members. The drastic changes in the household arrangement increased the number of alone elders to 33% in 2016. These data emphasize the importance of meeting and talking to other people outside of their household, which is essential for the mental health of the elderly (T. T. T. Nguyen, 2016). The growth of the older inhabitants of inner cities raises the demand for interacting with others to reduce their loneliness and boredom (Marcus; & Francis, 1990). To promote mental health, nearly one-third of the elderly from Mai's (2016) survey needs a place for social interaction and entertainment.

The slow development of sports facilities and insufficient cultural and historical sites, museums, and scenic places of interest reduces the outdoor activities of the elderly (JAHR, 2018, p. 198). Most senior activities occur mainly indoors, such as reading the newspaper, watching TV, or taking care of the grandchildren (JAHR, 2018, p. 202; Nguyen Quoc Anh, 2006). Moreover, the little income source prevents them from joining any pay-to-visit facilities, as 70% of the elders in Vietnam have not been subsidized by the welfare system (Vietnam News Agency, 2017). In 2019, 21.78% of the urban elderly continued to work, with the majority working as vulnerable workers, including self-employed and family workers[7], with 56% and 15%, respectively (General Statistics Office, 2021).

In the context of reducing physical condition, insecure income, and feeling isolated, the elders in densely populated cities need to socialize in healthy urban spaces that are less expensive (Marcus; & Francis, 1990). In Hong Kong, one survey about activity patterns of the elderly shows that POS have a significant role besides their homes, friends' places, shops and markets, pharmacies, and food and eatery (Maing, 2017). Because outdoor activities positively affect older people's self-rated health in long-term institutional care (Rappe et al., 2006), good access to neighborhood open spaces is more prone to walking and physical activity. Time spent at neighborhood parks and outdoor gardens can positively influence seniors' mental health by reducing stress and improving their well-being

[7] International Labor Organization defined Vulnerable workers include self-employed and family workers

(Loukaitou-Sideris et al., 2016). Evidently, more than 3,100 seniors in Tokyo, Japan, show that green spaces help people live longer for approximately five years (Woolley et al., 2003). The supportive environment can contribute to 30% of life satisfaction for the participants, especially for older adults (Sugiyama & Thompson, 2005). Lively POS provide opportunities for social interaction, which can help mitigate the isolated feeling of the elderly (Jones, 2016).

Additionally, POS benefit across economic, social, and environmental spheres resulting in improved quality of life for citizens. These benefits include employing property prices, boosting commercial trading, and raising land value and levels of investment. POS provide creative places to reduce criminal and anti-social behaviors, promote social interaction in the neighborhood, encourage the use of sustainable modes of transport, reduce air pollution and heat islands effects, and support water run-off (Montenegro et al., 2012; San-Francisco Planning-Department, 2014; Woolley et al., 2003).

2.1.4 Change of POS

Francis (1989) set five groups involved in the interest of public spaces: users, non-users, managers and owners, public officials, and designers. Owners, managers, and designers control existing spaces more than the other groups. The primary concern of space managers is who uses the spaces, as the design and management should be used in favor of affluent users, compared to less desirable users such as teenagers, the elderly, and the homeless (Francis, 1989). Thus, access to POS has been limited, narrowing the range of social groups who can use the spaces and have the ability to pay. For instance, the opposite example of managerial spaces is the lockable downtown park that is only open for specific hours, and users are guided by strict behavioral codes (Francis, 1988; Larice & Macdonald, 2013). However, local governments cannot maintain and prevent the poor or the dangerous from entering. It is manifested in contemporary American cities by creating spaces designated as public but privately controlled and managed for a private purpose: the simulation of consumption (S.W.Lim, 2014, p. 24). Another manifestation is the growth of many quasi-public spaces in shopping malls in Asian cities or gated communities in Brazilian and South African cities due to the demand for safety and comfort (Landman, 2017; S.W.Lim, 2014). These transformations come from the commercial users and consumers, which partly lead to the segregation of income class by the inequality, insecurity, and crime in society (Ash Amin, 1994, pp. 418–423; Larice & Macdonald, 2013, p. 355).

The city government's ownership transfer to private developers explains the increasing private control over public space. At the neighborhood scale, some parks and gardens have become owned as community land entrusted by residents who are legally responsible for preserving and maintaining the sites as permanent and publicly accessible open spaces. Owners can also invite specific people into space who endow a sense of caring and responsibility. Alternatively, the process conflict between development and management is also a reason for privatization (Francis, 1989).

In Vietnam, similarly, public spaces are invested by the government to serve the citizens, but the complex controlling and management processes lead to conflict in developing the publicness of POS. Privatizing POS concentrates more on consummation purposes than relaxation, while the users and non-users take no role in POS design, control, and management (see Figure 2.1). In HCMC, urban parks are used for the wrong purposes by the sub-management agencies; for example, 50% of Phu Lam Park (District 6) are used as a restaurant, and 40% of 23rd September Park (District 1) are used as paid entertainment areas, like water performance shows and cinemas. All these areas are invested by private companies but controlled by the authorities (Q. Nguyen, 2018). This inappropriate use of space occurred due to the lack of supervision from the highest control department and the conflict and complexity in supervising, controlling, and maintaining urban parks (Ho, 2018). Many paid services and activities such as group exercise, dancing group, or food & beverage take place in big-size parks when

the leader of groups must book a place for a fee of 300,000VND per month (equivalence to $13)[8]. On the contrary, those activities are free and volunteer in standard and small-size parks (neighborhood parks). Adolescents' outdoor dancing classes or teenagers' and children's activities can disturb the elderly by taking away their desire for quietness and alone time (T.-H. Nguyen, 2015).

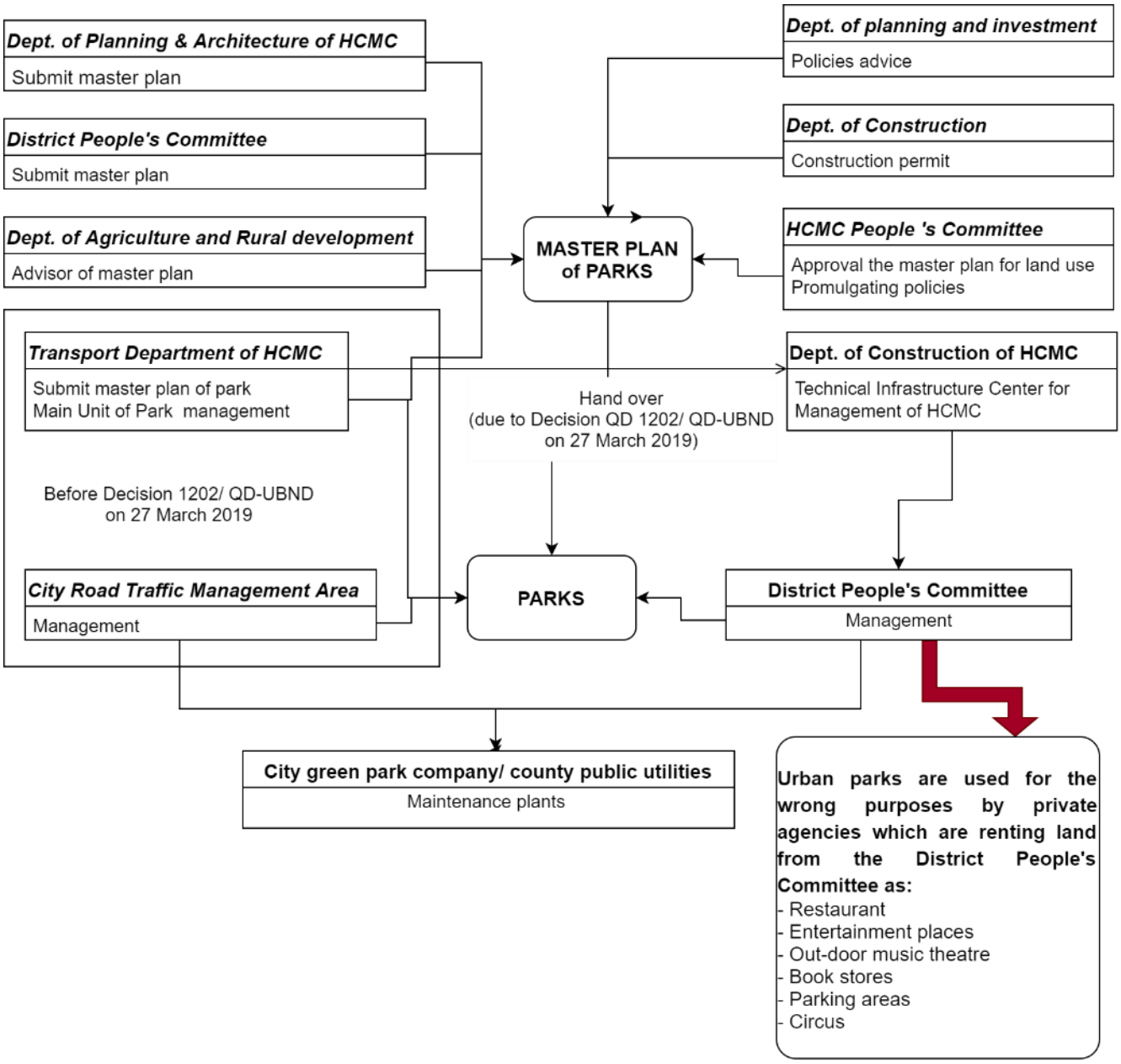

Figure 2.1 Schematic of mechanism system of urban park management in HCMC
Source: author draws based on the information of Huy Thinh (2019) and the Decision 199/2004/QĐ-UB.

The changes in POS have occurred since the Doi Moi[9] (renovation) policy in 1986, which opened the door for foreign countries to invest and posed a stop to controlling goods from the state government. The culture presented in the Doi Moi era is considered a superficial Western mass culture by many

[8] Exchange rate as of 16 October 2021
[9] Doi Moi (in Vietnamese is Đổi Mới and is translated into English as Renovation or Reforms) policy is the reform of the economic system in Vietnam that commenced in 1986. The economy was shifted from a centrally planned to a market-oriented one, inside the framework of state regulations. This policy promoted a multi-sector economic system, emphasizing the state sector while encouraging the private sector.

older people in Hanoi (M. Thomas, 2001). It opened a new era for bustling street life in urban Vietnam and showed "the destabilization of state control in a struggle for meanings in public space" (M. Thomas, 2002). With many private economic activities emerging (e.g., street vendors), enthusiastic economic actors, from transnational corporations to small local businesses and informal sector participants, have tried to occupy public space since. As a result, people cannot easily walk along or cross the roads due to overcrowded vehicles and the occupation of the pavement (Givental, 2013). Social activities (e.g., family cooking, eating, washing, and even private party events such as weddings or funerals) can occur right in the streets and alleys without interference from the locals and authorities (Kürten, 2008).

2.2 The impact factors on the use of POS for the elderly

People often use POS for their outdoor entertainment when it meets their needs. Carr et al. (1992) define five purposes of visiting POS: comfort, relaxation, passive engagement, active engagement with the environment, and discovery. The comfort in POS is the driving factor that has the most impact on the length of staying, given by providing maximum sunlight and suitable equipment to sit on comfortably and safely. Consequentially, relaxation is achieved by being separated from vehicular traffic while engaged in natural features (trees and water). Passive engagement with the environment differs from relaxation as it does not require active involvement in the encounter, such as watching people, activities, arts, and the passing scene. In contrast, active engagement represents the active involvement of people or activities in the POS, such as chatting, playing chess, or exercising together. Lastly, discovery is the basic need of human beings and represents the desire for stimulation: observing different things or uses in a successful and facilitated POS (Carr et al., 1992).

Therefore, when the POS fulfil one or more of these purposes, it will attract more people to come. However, if the outdoor areas have poor quality, only strictly necessary activities (e.g., going to work, traveling back and forth) occur and verse (Gehl, 2011). Thus, meeting the elderly's needs is the crucial key to the urban planning criteria of POS. Notably, the frequency of POS visits is also influenced by the characteristics and surrounding environment, referred as distance to POS, travel time, connection to POS, microclimate inside and outside POS, design features, natural elements, programs, and activities inside POS (Alves et al., 2008; Srichuae et al., 2016; Turel et al., 2007; Yung et al., 2017; Zhu et al., 2017). To a certain extent, these attributes (or so-called variables) can be divided into five groups of impact factors: (1) proximity, (2) neighborhood characteristics, (3) users' characteristics, (4) design of the POS, and (5) social interaction (Byrne & Sipe, 2010; F. Li et al., 2005; Loukaitou-Sideris et al., 2016) described in Figure 2.2. Because the influence level of the five group factors on the use of POS in the elderly varies from study to study, Table 2.2 summarizes the most pertinent studies with different degrees of association.

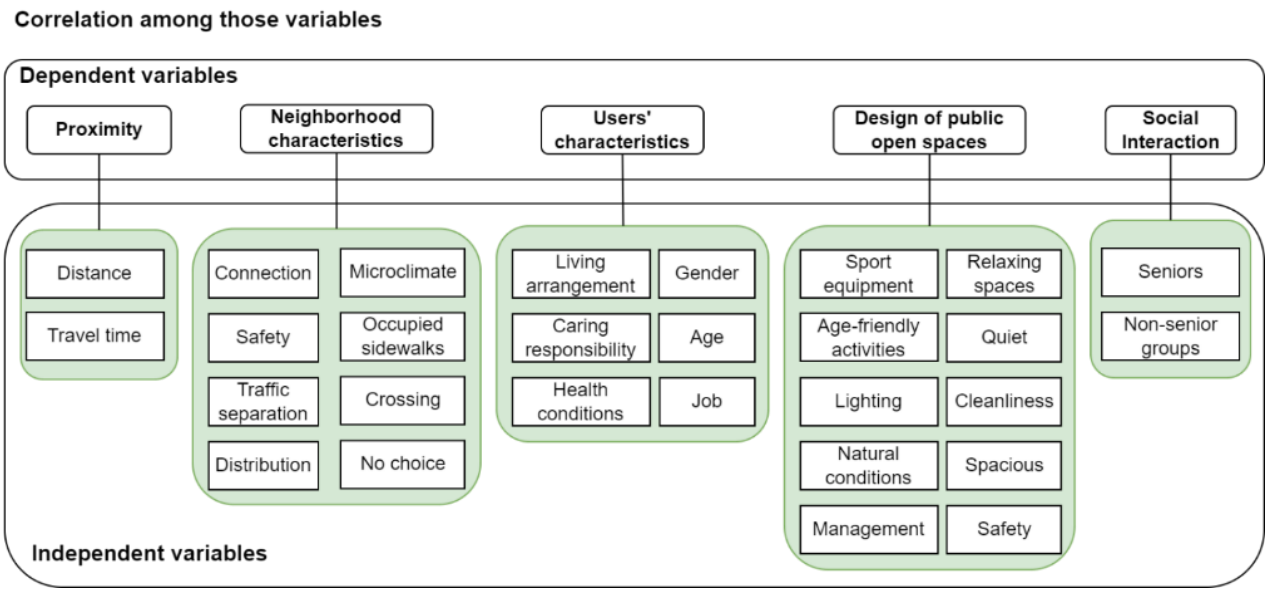

Figure 2.2 Category of factors influencing the choice of visiting POS

Country and authors	Proximity	Neighborhood characteristics	Users' characteristics	Design of POS	Social interaction
The UK, Alves et al. (2008)	*	**	-	****	-
Thailand, Srichuae et al. (2016)	****	***	-	-	-
Britain, Sugiyama et al. (2008)	*	****	*	*	*
Turkey, Turel et al. (2007)	-	***	-	****	**
Hong Kong, Yung et al. (2017)	**	***	*	***	****
China, Zhu et al. (2017)	-	***	-	****	**

Notes:

****	Most important factor
***	Important factor
**	Less important factor
*	Not/ Least important factor
-	Not mentioned

Table 2.2 Summary of studies on impact factors on the choice of using POS for the elderly

Based on five groups of impact factors in Figure 2.2, five hypotheses with different degrees of association with using POS by the elderly are proposed. Each hypothesis is explained in the followings:

2.2.1 Hypothesis 1: regarding Proximity

H1: Proximity, including distance and travel time, will significantly impact the visit frequency and time spent at POS by the elderly.

Rationale

Srichuae et al. (2016)'s survey of 300 older people who live in Bangkok, Thailand, shows that **distance** from home is the only factor impacting the frequency of visiting small parks. Regarding optional activities like recreation and exercise, the distance can be 1.74 km, but it can reach 3 km for religious activities. All **travel time** should be around 10 – 30 minutes. However, Kaczynski et al. (2008) and Alves et al. (2008) report that distance is not a significant predictor in their survey of adults and older people in the US and the UK. The inconsistent findings of the three studies are explained in sub-chapter 2.2.6.

2.2.2 Hypothesis 2: regarding Neighborhood characteristics

H2: Neighborhood characteristics, including street layout, resident location, trip to the park with the safe route and minimal traffic, the availability of public transport, and microclimate, will be the significant impact factors to the visit frequency and time spent at POS by the elderly.

Rationale

Park use of the elderly depends on the characteristics of the neighborhood or the overall layout of outdoor spaces (Byrne & Sipe, 2010; Marcus; & Francis, 1990; T.-H. Nguyen, 2015). In Bogotá, Colombia, **resident location** significantly impacts the use of POS. People who live in areas with middle-size parks walk more than 60 minutes per week, while those with the highest connectivity walk less than 60 minutes per week. In addition, feeling **safe from traffic** encourages people to walk at least 60 minutes per week (Gómez et al., 2010). **Age composition** is also one of the critical factors. Older people who live in areas with a younger age are more likely not to use their nearby parks than older adults living in areas with older age (S. Moore et al., 2010). Compared to distance and traffic factors, **the trip to the park** plays a less critical role (8.2%) in using the POS for older people (Alves et al., 2008; Turel et al., 2007). Good paths with three elements of easy walking, enjoyable features, and no obstacles can increase walking time for the senior to over 2.5 hours per week (Sugiyama et al., 2008). The poor **quality of pavement and roads,** along with ongoing **pollution,** are the most severe problems that the elderly have to face (both are 21.1%), followed by **safety** (18.4%) (Turel et al., 2007). Inadequate **public services** gradually deteriorate the liveability of streets (Mahmoudi et al., 2015). The notion of community is significantly associated with the **security** aspect for the walkers (Sakip et al., 2015). The building's mass and height contribute to the environmental comforts such as sun, shade, and wind patterns (Gehl, 2011; Marcus; & Francis, 1990) that create a **microclimate** barrier for the elderly (King & King, 2011).

2.2.3 Hypothesis 3: regarding Users' characteristics

H3: Users' characteristics, including age, ethnicity, health status, household arrangement, income and lifestyle, life satisfaction, and socio-cultural aspects, will be the significant impact factors to the visit frequency and time spent at POS by the elderly

Rationale

Engagement with public spaces decreases with age due to agency and belonging, drastically affecting a person's identity and well-being in later life. Spatial agency or spatial alienation and distancing oneself from another's deprived neighborhood is increasingly problematic. The problem possibly arises from the strategy of preventing one's self-identity from being "stained" (Wanka, 2018). Boros et al. (2016) find that **ethnicity** has the most significant role compared to other important factors like age, family status, lifestyle, and place of residence. Participants tend to associate their familiarity and engagement with familiar people, close ethnic relationships, and business acquaintances (Ujang et al., 2018). In Turkey, **socio-cultural** aspects are also a slight problem for the elderly, with a minor proportion (6.1%) compared with other factors such as pollution, pavement and streets, safety, maintenance and management, and traffic (Turel et al., 2007). **Living conditions,** comprised of living alone or with family, and the **functional capabilities** in getting around make a difference in using POS. For example, the elderly living with someone place relatively higher importance on providing-facilities and a car park, while those living alone place somewhat higher significance on the distance to the park. Furthermore, the elderly with strenuous movement place the most importance on providing both seats at the park and en route (Alves et al., 2008). Meanwhile, the report of Sugiyama (2008) shows that **health status** is irrelevant to any open spaces attributes. In Tehran, Iran, the lower-**income** groups use public parks as their significant leisure activity. At the same time, the wealthy and educated residents have a sedentary lifestyle resulting in the least utilization of urban parks (Daneshpour &

Mahmoodpour, 2009). Hence, **physical problems** and **poverty** are the two factors restricting the elderly from using POS directly and indirectly, contributing to their limited and uninteresting lives (Carr et al., 1992).

2.2.4 Hypothesis 4: regarding the Design of POS

H4: The design of POS, including size, design features, programs, public space management, comfort, safety, pollution, and aesthetics of POS, will be the significant impact factors on the visit frequency and time spent at POS by the elderly.

Rationale

The **comfort** in POS is the main factor that affects the length of staying for two reasons: POS provides maximum sunlight and suitable equipment to sit on comfortably and safely, and comfort is the prerequisite for relaxation in POS (Carr et al., 1992). All three studies in different countries: Iran, England, and Turkey, emphasize the importance of "**safety**" in POS (Fallahi & Momtaz, 2018; Holland et al., 2007; Turel et al., 2007). Specifically, the elderly in England avoid dark or deserted places or lack seating, lighting, toilet facilities, and shelter (Holland et al., 2007). The study of **natural elements** concludes that nature enjoyment is the most influential dimension of time spent in POS (Zhu et al., 2017). The elderly prefer contact with nature and are attracted to a neighborhood park in light traffic en route, being free of nuisance and well maintained, with a cafeteria and toilets, and has many trees, beautiful plants, and wildlife (Alves et al., 2008). Besides, grassed areas, amenities, dog-related facilities, and off-leash dog areas attract people to visit regardless of POS **sizes** (Sugiyama et al., 2015). Therefore, size is not a significant predictor, but parks with more **design features,** such as the fountain, statues, and plant boxes, are more likely to be used for physical activity. **Park facilities** are more critical than **park amenities,** with trail features as the most robust relationship with park use for physical activity (Kaczynski et al., 2008). More importantly, the design factors positively correlate to social activity and users' perception (Hajmirsadegh et al., 2013), especially for the elderly, while walking for recreation is associated with a good path and good facilities in POS (Alves et al., 2008; Borst et al., 2008). However, in another study by Sugiyama et al. (2008), the quality of open space itself is not as relevant to walking activity compared to **the quality of paths**. Neighborhood open spaces may be used to "walk to" but not necessarily as a place to "walkabout." Choosing which areas to "stay in" in POS depends on the users' sense of nature's changes and **aesthetics**. For instance, most elderly prefer a quiet place with fewer people in the parks as opposed to crowded and loud places with many playgrounds for children, which poses a sense of disrespect to the elders (T.-H. Nguyen, 2015).

As for factors that hinder the visit frequency, **pollution** takes the highest percentage of 21.1% in the association survey between street quality and utilization (Turel et al., 2007). The POS quality degrades by poor **maintenance**, unskilled staff, missing expertise, and limited financial resources (Mahmoudi et al., 2015; Mandeli, 2019). For example**, daily fees** for public spaces affect low-income visitors more negatively than high-income visitors (More & Stevens, 2000).

2.2.5 Hypothesis 5: regarding Social Interaction

H5: Social interaction will significantly impact the visit frequency and time spent at POS by the elderly.

Rationale

Social interaction is the most significant criterion for designing age-friendly POS in Hong Kong (Yung et al., 2017) but the lowest influential dimension to time spent in POS in China (Zhu et al., 2017). In England, older people are susceptible to the presence of others in public places and tend to avoid the areas heavily used by teenagers and young adults (Holland et al., 2007). Furthermore, older people prefer greater exposure to green features during social integration to better connect with friends and neighbors (Kweon et al., 1998). According to Noon et al. (2018), 97% of elderly visit POS alone, of which 44% from two or more people groups, whereas the remaining stay alone; 69% of elderly are gender

homogenous, and older women prefer spontaneous social conversation, while older men prefer common games. Hence, a lack of multi-function spaces limits the diverse forms of social interaction in a city leading to many activities generated in the streets that do not provide spaces for sitting or staying without being commercialized (Ujang et al., 2018).

2.2.6 The causation of inconsistent results in the use of POS

The conflicting findings suggest the different parameters used in study designs, diverse urban characteristics, and varying in the sampled population in various studies (e.g., younger versus older adults) (Gómez et al., 2010). For instance, Alves et al. (2008) and Kaczynski et al. (2008) conclude that the "Distance" attribute is not a significant factor to visit frequency and time spent. In contrast, Srichuae et al. (2016) reveal that the visit of the elderly is only influenced by distance, leading to inconsistent results among different studies. This discrepancy may be caused by the differences in study design of categories such as walking minutes. While Alves et al. (2008) use distance categories of 0-5; 5-10; 10-15; and 15+ minute walks, Srichuae et al. (2016) use both measurements in minutes and kilometers; for example, travel time ranks of 10, 10–29, 30–59, and ≥ 60-minute walks and distance ranks of ≤0.5, 0.6–3, and 3.1–8 km. Dissimilar characteristics of sampled populations and cities also result in different outcomes. The two research surveys on 380 adults in Los Angeles, US, and 237 older people in the UK report that the influence of the "Proximity" factor is insignificant. Meanwhile, another study with a sampled population of 292 elderly highlighted the significant impact of the "Distance" attribute to the visit frequency and time spent in Bangkok, Thailand.

Regarding "Physical problems" or "Health status," the findings of Sugiyama et al. (2008) are different from Carr et al.'s (1992, p. 237). Carr et al. (1992) point out that "physical problems" is one of the factors that restrict the elderly from doing outdoor activities. Sugiyama et al. (2008) conclude that there is no association between health status and open space attributes, including pleasantness, nuisance, safety, quality of paths, and distance to neighborhood open space. The statistical analysis explains the contrasting results as confounding factors (variable "functional capability" of their study) in logistic regression analysis affect outcome measures in Sugiyama et al.' s study. Specifically, statistical analysis demonstrates the change of correlations between two variables, "neighborhood open space" and "number of unhealthy days[10] of participants," is from "correlated" to "no significant association" before and after being adjusted to the omitted variable "functional capability" (Sugiyama et al., 2008).

The disagreement in findings also occurs in the "Social interaction" factor. This factor is the least influential dimension to staying in POS in China (Zhu et al., 2017), yet the most significant in Hong Kong (Yung et al., 2017). The two studies' results conflicted because of diverse urban characteristics and study design. In Zhu et al. (2017) study, the priority of three dimensions (nature enjoyment, mobility, and social interaction) are ranked using collected responses from experts and older users in a survey questionnaire on one campus. On the contrary, Yung et al. (2017) examine the satisfaction of the older users in three parks based on short design criteria: short walking distance, safe pathways, a sense of connection to the local neighborhood, and different activity areas.

2.3 Summary

It is well known that POS play an integral function in urban life, especially for the elderly. Although the legal documents are ambiguous in Vietnam, POS can be categorized as parks, gardens, streets, alleys, roundabouts, and the courtyard of public buildings in three criteria: access, agency, and interest. However, changing POS from state to private control impacts the use of POS by limiting public access.

[10] Health status in their study was divided into two categories: unhealthy days and healthy days

Besides, the attributes influencing their visit frequency and time spent comprise age, living conditions, and the health status of the elderly, such as distance, distribution, surrounding environment features, microclimate, design features, connectivity, safety, and comfort. These attributes are formed into five groups: proximity, neighborhood characteristics, users' characteristics, design of POS, and social interaction. Five sets of listed factors are assumed to impact the use of the elderly in POS significantly, deriving five hypotheses of this research. These hypotheses will be tested with the results given in chapter 5 to verify the association degree of factors impact on the use. It aims to provide a priority order for factors to design age-friendly POS. Table 2.3 summarizes all impact factors grouped as five hypotheses.

Factors	**Definition**	**Previous studies; Country, Authors, and year of publication**	
		Impact the use significantly	Not impact the use significantly
Hypothesis 1: Proximity			
Distance	The length from the departure point to the favorite POS	Thailand, Srichuae et al. (2016)	The US, Kaczynski et al. (2008) The UK, Alves et al. (2008)
Travel time	The length of time from the departure point (mostly home) to the favorite POS	Thailand, Srichuae et al. (2016)	
Hypothesis 2: Neighborhood characteristics			
Resident location	Areas with middle-size parks and areas have high connectivity	Colombia, Gómez et al. (2010)	
Safety and Security	No risk of a traffic accident or criminal	Colombia, Gómez et al. (2010) Turkey, Turel et al. (2007) Malaysia, Sakip et al. (2015)	
Age composition	The mixed of many generations living together in a neighborhood	Canada, Moore et al. (2010)	
Trip to the park	Easy walk, enjoyable features, and no obstacles	Britain, Sugiyama et al. (2008)	The UK, Alves et al. (2008) Turkey, Turel et al. (2007)
Quality of pavement and roads		Turkey, Turel et al. (2007)	
Pollution		Turkey, Turel et al. (2007)	
Public services	Numbers and stations of public transportation (bus, trains)	Malaysia, Mahmoudi et al. (2015)	
Microclimate		Worldwide, King & King (2011) Denmark, Gehl (2011)	
Hypothesis 3: User characteristics			
Age		Austria, Wanka (2018)	
Gender			The UK, Alves et al. (2008)
Ethnicity	Hungarian and non-Hungarian ethnic groups (Gypsy, Roma) Malay, Chinese and Indian ethnicities	Hungary, Boros et al. (2016) Malaysia, Ujang et al. (2018)	
Living conditions	Own home or shelter/care home	The UK, Alves et al. (2008)	

Factors	Definition	Previous studies; Country, Authors, and year of publication	
Household Arrangement	Living alone or not	The UK, Alves et al. (2008)	
Health status		The US, Carr et al. (1992) The UK, Alves et al. (2008)	Britain, Sugiyama et al. (2008)
Income		Iran, Daneshpour & Mahmoodpour (2009) The US, Carr et al. (1992)	
Hypothesis 4: Design of POS			
Safety		England, Holland et al. (2007) Iran, Fallahi & Momtaz (2018) Turkey, Turel et al. (2007)	
Comfort		The US, Carr et al. (1992) England, Holland et al. (2007)	
Nature enjoyment		China, Zhu et al. (2017) Australia, Sugiyama et al. (2015) The UK, Alves et al. (2008)	
POS size			Australia, Sugiyama et al. (2015) The US, Kaczynski et al. (2008)
Park facilities	Features settings for physical activity primarily (e.g., trails and paths, open space, grassy area, water area, playground, courts, and pool)	The US, Kaczynski et al. (2008) The UK, Alves et al. (2008)	Britain, Sugiyama et al. (2008)
Park amenities	Features providing comfort, convenience, or pleasure (e.g., fountain, picnic area, restroom, table, bench, dustbin, shelter or pavilion, historical or educational feature, landscaping, parking lot, signs)	Iran, Hajmirsadegh et al. (2013) Vietnam, T.-H. Nguyen (2015)	The US, Kaczynski et al. (2008)
Quietness		Vietnam, T.-H. Nguyen (2015)	
Pollution		Turkey, Turel et al. (2007)	
Maintenance		Malaysia, Mahmoudi et al. (2015) Saudi Arabia, Mandeli (2019)	
Daily fees		The US, More & Stevens (2000)	
Hypothesis 5: Social interaction			
Social interaction		Hong Kong, Yung et al. (2017)	China, Zhu et al. (2017)
Non-senior group	Teenagers, adolescents, the middle-age, vendors, drugs, and the drunks	England, Holland et al. (2007)	
Friends and acquaintances		The US, Kweon et al. (1998) Isreal, Noon et al. (2018)	

Table 2.3 Summary of impact factors in previous studies

3 CHAPTER 3: GLOBAL MODELS FOR DESIGNING AGE-FRIENDLY POS

Models of POS are translated into design guidelines as a research application. This chapter briefly reviews the global urban design guidance of public spaces for the elderly in part 3.1. Part 3.2 describes the updated Vietnamese standard as of September 2021. Part 3.3 discusses the gap between theory and practice to provide solutions for narrowing down that gap. It constructs the foundation for developing global design guidelines and guidelines for POS matching the needs of the elderly in Vietnam, which is given in chapter 5.

3.1 Global design guidelines for the elderly

Research findings can be translated into design guidelines – one area of research application with performance criteria to urban design and programming (Francis, 1991). The design guidelines diverge from academic literature as they appear prominently translating the principles of an approach and the easily accessed by diverse stakeholders (A. Moore et al., 2022). For instance, Whyte (1980) 's findings on the need for adequate seating space and food vendors in open areas are interpreted in the New York City guidelines to provide amenities for urban spaces (Francis, 1991). Alternatively, the results from different data sources and group interviews with elders and seniors' care studied by Loukaitou-Sideris et al. (2014) are synthesized using design guidelines. It helps planners, landscape architects, open spaces advocates, and government organizations better understand the need to correctly design spaces for seniors and other urbanities (Loukaitou-Sideris et al., 2014).

All levels of planning, from regional, municipality, or district, a neighborhood, and design detail of street feathers, can integrate with urban design guidance (Poerbo, 2001). One of the urban design goals is to create a universal environment for all (A. Jacobs & Appleyard, 1987). This universal design, defined as "the design of products and environment to be usable by all people, to the greatest extent possible, without the need for adaptation or specialized design," seeks accessibility for all populations (Connell et al., 1997; Mace, 1997).

However, universal design content has many limitations in design for inclusion. For example, the applicability of universal design for playground design still lacks evidence for its success. Because universal design is considered a concept, the application of universal design is complicated when considering the necessity to design for its use (A. Moore et al., 2022). Additionally, the senior population needs specific guidelines for parks that work for them, given the reduction of their physiological capacity and physical movement (Loukaitou-Sideris et al., 2016). Therefore, Urban Design for the elderly has been implemented worldwide as the world's aging population continues to grow. For example, the United Nations Centre for Human Settlements (UN-Habitat) issued an "Improving the quality of life of the elderly and disabled people in human settlement" report in 1993. It is a source of policies and programs worldwide to support the needs of the elderly in the neighborhood and public spaces and provide guidelines for planning and policymaking. Neighborhood design that was initially children-friendly needs to be revised accordingly to the increasing number of older people; otherwise, the renovation to adapt to the more aging population will be expensive (United Nations Centre for Human Settlements (Habitat), 1993). In Swiss cities, they carried out the research project "Urb-aging - Designing urban space for an aging society" to develop integrated strategies for the requirements of the urban planning and design processes (Josep, 2009). In Hong Kong, they issued the "Elderly-friendly design guidelines" to raise awareness among designers and project proponents on how design decisions can help enhance the quality of the elderly's lives in the communities (Architectural Services Department, 2018). In Canada, the Township of Langley published an "Age-friendly strategy" for the designers to build an environment that met the needs of its older residents and still applied to all ages (Township of Langley, 2014).

The development of a guidance sequence derives from goals, objectives, design principles, prescriptive and performance design guidelines, advice procedures, and implementation tools (Poerbo, 2001). Many countries require different stages for developing design guidelines. For instance, Hong Kong's Architectural Services Department applies three stages (Architectural Services Department, 2018) (Figure 3.1), while Canada's Township of Langley (2014) uses eight steps to develop design guidelines for POS (Figure 3.2).

The development of Elderly-friendly design guidelines from the Hong Kong Architectural Services Department:

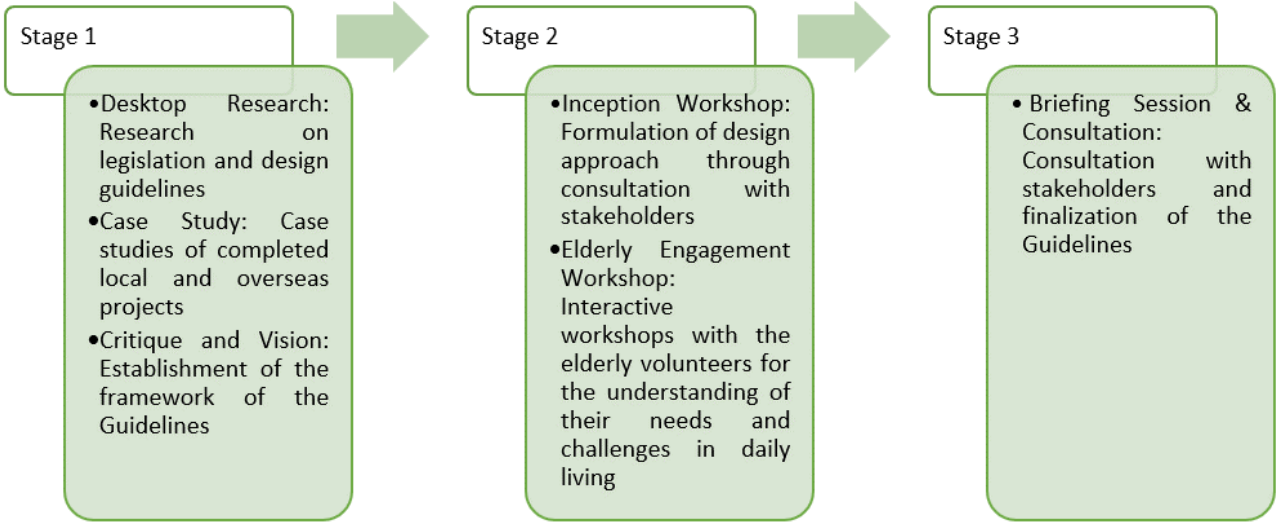

Figure 3.1 Three stages for developing design guidelines
Source: (Architectural Services Department, 2018)

The development of an Age-friendly strategy for the Township of Langley:

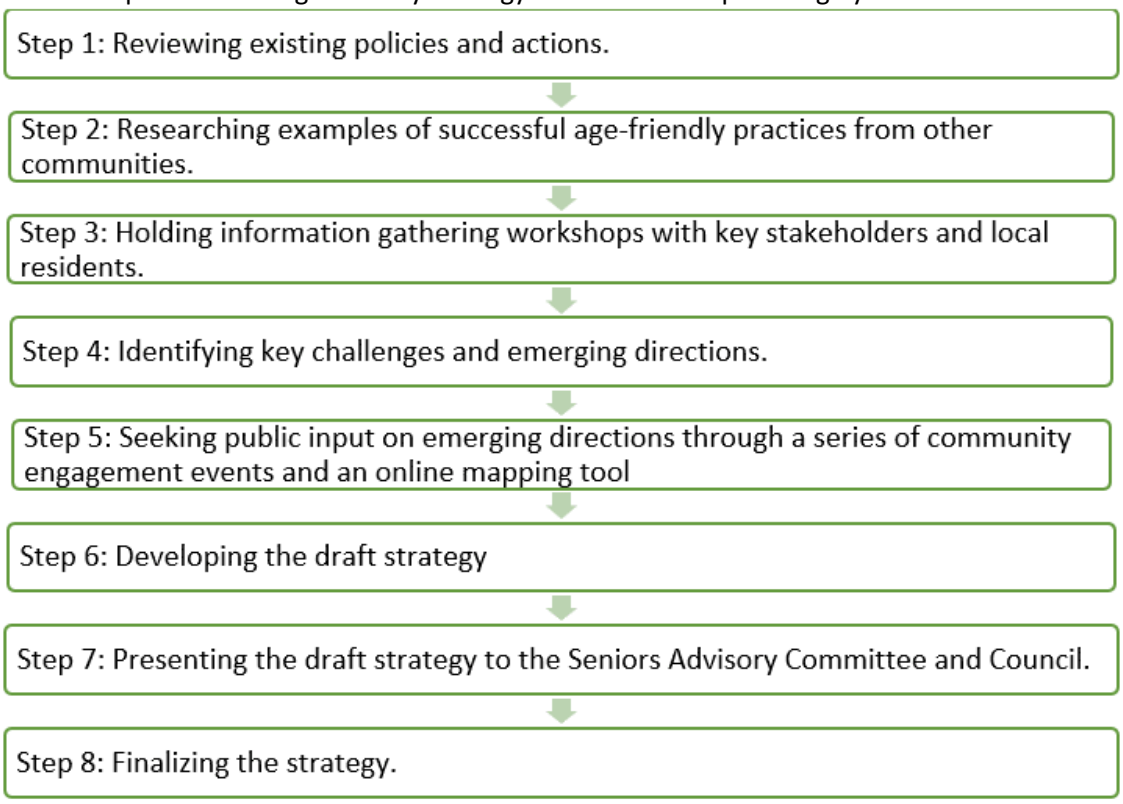

Figure 3.2 Steps to develop the Age-friendly strategy
Source: (Township of Langley, 2014)

The logic behind the various stages or steps is explained by the standard requirements to specify the needs and demands of users while reviewing previous policies, studies, and guidance, checking the supply ability, preparing the draft, and organizing workshops for consultation. Each urban district has different characteristics; therefore, the calling for a case-by-case study is necessary (Yung et al., 2016), as responsive planning and design should focus on urban features rather than standardized planning guidelines.

3.2 A gap between POS design guidelines and practice

Design guidelines are considered the theory that guides the practitioners to apply it to the practice. The transformation from theory to practice and vice versa has many issues. There are still conflicts between the theorists (policymakers, researchers, and educators) and practitioners (architects, designers, planners, and landscape architects) (Bolan, 2007; Foroughmand Araabi, 2015; Hjort et al., 2018; Jill Grant, 1994; Schön, 1983; Van De Ven & Johnson, 2006).

3.2.1 Conflicts between profession and practice

There are always conflicts between theory and practice. The practitioners face a unique situation while the theorists generally try to abstract and generalize experience (Bolan, 2007). The practice's complexity, uncertainty, instability, and uniqueness always change and mismatches professional knowledge (Schön, 1983, p. 24). The theorists, including educators and academics, ensure that professional theory provides substantive direction to practice. However, the practitioners find theory challenging to apply to their daily work (Jill Grant, 1994). During the urban planning process, the architects or designers neither integrate the proper interdisciplinary collaboration nor have a suitable method to incorporate it into a system (Hjort et al., 2018). Some evidence -base findings of Hjort et al. (2018) show that the architects did not integrate or use the proper method to integrate the right interdisciplinary collaboration during the planning process. It led to the studied spaces attracting users successfully, but not the initial target groups. "Within academia, planning theory is marginalized; within a practice, it is virtually ignored" (Klosterman, 2011).

The gulf between academic research and practice in the profession is widening. Findings from academic studies are not helpful to practitioners in solving practical problems. Professional knowledge workers also do not keep up with relevant theoretical research and practice (Van De Ven & Johnson, 2006). Other opinions think that the differences between the researchers and designers become fewer than they used to be. However, the communication problems still lead to the distinctive contributions of the two groups being blurred (Heide & Wijnbelt, 1996).

The researchers disagree about the roles of designers, who regard themselves as integrators. Both express their roles in different media, verbally and graphically, respectively (Heide & Wijnbelt, 1996). The practitioners develop their knowledge in a specific site and practical. They are not interested in academic discussion, discourses, academic language, and academic publications. The theorists are keen on publications that are not necessarily linked to real specific projects and practices. The language of academics is formal and lengthy, whereas practice is preferred with visualization, presentation, and report-writing (Araabi, 2018). The practitioners also have less time to read academic texts and articles. At the same time, the theorists who debate the merits of planning theory are not the only users of elements of planning theory (Jill Grant, 1994). When working together, they can learn to understand each other (Heide & Wijnbelt, 1996).

Universal design guidelines, considered the inclusion guidelines, face different limitations in application. For example, a review of design guidelines for public playgrounds shows that literature

guidelines come with inconsistent design approaches, principles, and recommendations. In reality, many children are not provided equal opportunities to get an advantage the playing in the public playground because many studied playgrounds follow universal guidelines for playgrounds did not meet the needs of the children. Those playgrounds are typically designed, planned, and managed by adults (A. Moore et al., 2022).

3.2.2 The solutions for narrowing the gap between theory and practice

The goal of urban design is practical. Therefore, pure abstract theory needs to transfer into practice to improve the built environments (Foroughmand Araabi, 2015). The unique dimensions of experience need to be investigated to link theory and practice. The "most meaningful "theories" of planning are those constructed in the minds of practitioners and played out by their actions in the everyday tasks that make up professional planning activity" (Bolan, 2007). Architects should focus more on an evidence-based approach than aesthetics to activating architecture (Hjort et al., 2018). Evidence-base for open space planning policies means producing a complete analysis of existing open spaces with their function and sizes, collating them in a database of sites with associated information (CABE, 2009). Using the best possible research to inform design is evidence-based (Marcus & Sachs, 2014, p. 16). Landscape architecture has become a discipline of evidence-based to reach the goal of a scholarly relevant profession for all theorists and practitioners (R. D. Brown & Corry, 2011).

Giles-Corti et al. (2015) propose ten strategies to lessen the gap in research translation into policies, as the followings:

1. Understanding the “policy world”
2. Linking with policymakers and practitioners
3. Working with knowledge involvers: agents, supporters, and activists
4. Establishing the plans jointly with policymakers and practitioners
5. Attempting interdisciplinary studies
6. Studying the health-economic impact factors
7. Evaluating policy reform through experiments
8. Researching community needs and preferences
9. Highlighting specific policy implications
10. Creating interdisciplinary programs on the built environment and health (Giles-Corti et al., 2015).

There is a need to have an assessment tool indicating some successful criteria of the urban design process that can evaluate various urban design practices. The tool can be from literature review, such as UN-Habitat's documents on urban design and toolkit for successful public space. This tool provides an overview understanding of urban design success considerations. A case study review helps verify the assessment criteria outline, reducing the gap between urban design disciplines and practice (Asaad et al., 2017).

An example of a difference in theory and practice is the principles that make the public space vibrant. There were eight principles, but it is challenging for the practitioners to fulfill all principles. The reviewed documents for concluding the codes did not address other issues, such as the institutional framework of a society and modes of governance or professionals' opinions. With the limited resources for executing the elaborated schemes, the designers need to prioritize the principles through a prioritization mechanism. Analytical Hierarchy Process (AHP) can be an adequate tool to explain human behavior. AHP assumes that human preferences can be ranked consistently, a reliable decision-making tool to promote citizens' participation in the developing design (El-Kholei & Yassein, 2022).

Another case study for connecting theory and practice is the success of Copenhagen city when cooperating with the studies from the School of Architecture, the politicians, and the planners. The city maker used the findings from systematically documenting public life to shape public policy in Copenhagen. This city has improved through the systematic data-driven concerning people and life in the city. First, they specify the problems of the lifeless cities and then gather knowledge of the subject. After 50 years, they can establish pervasive expertise and develop practical methods and tools that help policy and planning to attract people to public spaces (Gehl et al., 2013).

3.3 Vietnamese guidelines on POS

There is a lack of regulations, standards, and guidelines for the practical design of POS in Vietnam (T. L. Pham, 2016). The Vietnam laws have many limitations of regulations on POS documented in two major urban design guidelines: Vietnam Construction Code 2008 and Design standards on greenery planning for public utilities in Urban areas 2012. Vietnam Construction Code (QCXDVN 01-2008 BXD. Vietnam Building Code. Regional and Urban Planning and Rural Residential Planning, 2008) only discusses the sizes of public open spaces and the accessible distance in the neighborhood. In a particular city such as HCMC, the minimum size of the city park per capita area is 7 m^2, while the green space in the neighborhood unit is 1-2 m^2, with the maximum walking distance to the neighborhood park of 500 m. Design standards 2012 (National Code, 2012) focus on the proportion of land use for culture and education, sports, quiet places, performance area, children's yards, and services in the multifunctional park.

Since 2008, Vietnamese policies have improved public spaces' spatial quality, tightening management and limiting degradation and encroachment (T. T. H. Pham & Labbé, 2017). As parks have been recognized as a mandatory element in Vietnam's urban planning principles, parks, schools, and cultural centers holding routine services should be located reasonably within walking distance (Hoang et al., 2019). However, the private sector dominates the development of new and existing public and semi-public spaces, leading to poor quality and small size of neighborhood parks (Hoang et al., 2019; T. T. H. Pham & Labbé, 2017).

One of the strategies for lessening the gap between policies and practice proposed by Giles-Corti et al. (2015) is to understand the “policy world” and the links between policymakers and practitioners. The mechanism of public space urban planning should be investigated (as shown in Figure 2.1 in sub-chapter 2.1.4) to understand the current political planning system’s work. When there are so many institutions involved in the management process of POS, overlap and missing information can happen when the cooperation among them is not good. Public policies, such as rules, laws, or regulations, form environmental or policy aspects conducive to physical activity (F. Li et al., 2005). However, the implementation of procedures faces many challenges due to the inadequate orientation and policies on seniors from organizations and agencies and the limited budget for seniors' healthcare. Inter-sectional collaboration and coordination guidelines are significantly limited (V. H. Pham, 2017). Table 3.1 presents the SWOT analysis of the current situation of POS in HCMC in the context of developing guidelines for practical involvers.

Strengths	Weaknesses
• The interest of the elderly in using POS (Mai Tuyet-Hanh, 2016) • Positive perception of the elderly toward the current	• A decline in the number of POS (Luong, 2018) • Illegal privatization of POS (Q. Nguyen, 2018) • Lack of awareness regarding urban spaces for the elderly (V. K. Le, 2014)

situation of POS in HCMC (T.-H. Nguyen, 2015)	• Not only the elderly but all communities are still passive participants in the planning and management of POS. The community-based design process is still new in the master planning of HCMC (Huy-Thinh, 2019). • Lack of housing, goods, and services for daily use of the elderly (Trung Minh, 2017; Vietnam News Agency, 2017) and lack of POS for the elderly to use as a replacement (T.-H. Nguyen, 2015)
• **Opportunities**	• **Threats**
• High demand for using POS, not only by the elderly but also by all other age groups (T.-H. Nguyen, 2015) • Some regulations and research have started focusing on public space planning. Foreign organizations and NGOs are supporting studies on POS (T. T. H. Pham & Labbé, 2017)	• Overlapping in management of POS in Vietnamese laws (Thi Hien et al., 2015) • Differences between master planning and implementation of POS (Gibert, 2017) • Lack of funds for POS construction and rugged to mobilize the private sector's investment in developing POS (Ho, 2018; Q. Nguyen, 2018; V. H. Pham, 2017)

Table 3.1 SWOT Analysis

3.4 Summary

This chapter highlights the necessity to translate academic research into applied research, in which design guidelines are essential for practitioners, including architects, urban planners, and landscape designers, to apply in practice. However, the guidelines matching the needs of specific user groups face many challenges. For instance, universal design, used widely by several organizations, has limitations in its application. Furthermore, many conflicts exist between profession and practice, so the practitioners hardly use academic results for their design. The reasons causing the gap and the solutions are listed as the followings:

- The miscommunication between the professionals. When translating academic languages into the language for practitioners, it needs to be short, with graphics being a plus. It can be solved by creating an interdisciplinary environment and methods.
- The priorities of applied principles allow practitioners to choose the best one for their unique circumstances. Analytical Hierarchy Process can be an adequate tool
- Strategies to lessen the gap by understanding the policy world and practice through various methods and approaches
- Create an assessment tool of criteria for the success of practice design.

In the context of lacking documents on POS design for the elderly in Vietnam and the passive roles of users in urban planning, the guidelines should be tailored based on the need of specific groups of users, which are various case by case. Consequently, the global age-friendly design guidelines are synthesized as the framework for developing guidance to fulfill the needs of the elderly in HCMC, Vietnam. Chapter 5.1 will describes in detail the method of synthesis and principles of these guidelines, which can be used as a framework for tailoring design guidelines matching the needs of the elderly in HCMC. These synthesis guidelines will be constructed in sub-chapter 5.1 as a framework. Then, the next sub-chapter 5.6 will introduce the methods of understanding the needs, building the models, and translating these models into guidance for age-friendly POS in Vietnam as the framework for developing guidance to fulfill the needs of the elderly in HCMC, Vietnam.

4 CHAPTER 4: METHODOLOGY & STUDY AREAS

While chapters 2 and 3 have set a strong foundation for developing a new concept, chapter 4 encompasses an integrated experimental procedure to achieve the research objectives. Part 4.1 reviews various approaches and methods commonly used for POS studies. Part 4.2 describes the research categories in which the survey questionnaires and observation are conducted, leading to the determination of choosing suitable methods for the survey reported in part 4.3. Part 4.4 provides the detailed data collection and analysis process. Lastly, part 4.5 summarizes the central concept of the experiment.

4.1 Approaches & methods for POS

According to Francis (1991), types of research approach and methodology applied in urban open spaces studies are case study, applied research, and action research. Remarkably, most published research from 1978 to 1985 was merely classified as case studies, with only a few using comparative methods.
Case study research has been frequently employed to pursue various questions related to urban planning, such as analyzing urban behaviors and providing exemplars of best practices in physical planning. It helps translate knowledge into action and yields simulated outcomes influencing practice and ongoing research (Birch, 2012). Moreover, case study research uses references to outdoor settings to develop the questions based on urban spaces' use, perception, and environmental meaning. However, a case study approach without comparative methods can hinder the application of research findings because it may cause the reluctance to apply case study findings to other cases from planners and designers. For example, the results of an interview study of a neighborhood park are difficult to be applied in a behavior-mapping study of a plaza (Francis, 1991).
The applied research approach developed shortly after the case study, such as “post-occupancy evaluation,” appears to influence the redesign and management of open spaces (Francis, 1991). “Post-occupancy evaluation” is the process of improving and obtaining feedback on a built environment's performance (Rabinowitz, 1989). In other words, it investigates the users’ satisfaction or dissatisfaction with their dynamic environment after the design and construction processes are completed for many years. The user’s evaluation of the spatial improvement of the construction project is incorporated into the design process through questionnaires, interviews, behavioral observation methods, participatory observation, image analysis methods, and quasi-experimental methods (Zhang et al., 2021). The obtained data potentiates the designed environment through redesign and management programs (Özkan et al., 2015). In particular, the commission of the open space manager responds to many typical problems in open spaces (e.g., lack of use), while the consulting groups later establish the specialized evaluation, program, and redesign. Therefore, applied research often delays the research process and limits the tendency of clients to want to influence research findings, in addition to the same methodological problems posed in case study research (Francis, 1991).
In the 1990s, action research emerged with the methods and concepts combined from a case study and applied research approach. The feedback of research findings, of which users are contributed as active researchers and designers and directly involved in negotiating the changes in environmental values, is later incorporated into policy, design, and future research. This negotiation can be done through workshops during the research process (Francis, 1991). Action research assesses the needs of different groups of people, creating a participatory design process that contributes to a planning blueprint and better policies (Ku & Kwok, 2017). “In brief, it is a spiral of cycles of action and research consisting of four major moments: plan, act, observe, and reflect. The plan includes problem analysis and a strategic plan; action refers to the implementation of the strategic plan; observation includes an evaluation of the action by appropriate methods and techniques; and reflection means reflecting on the result of the evaluation and on the whole action and research process, which may lead to the

identification of a new problem or problems and hence a new cycle of planning, acting, observing and reflecting" (Ortrun Zuber-Skerritt cited by (Swann, 2002).
The plus and drawbacks of each approach are summarized in Table 4.1.

Approaches	Description	Plus	Drawback
Case study approach	Use outdoor settings as laboratories for testing basic questions of use, perception, and environmental meaning of urban space	Contribute any applicable design principles	Few studies used comparative methods; which makes it challenging to compare results; and hindered the application of research findings
"Post-occupancy evaluation" approach/ Applied study	Attempt to influence the redesign and management of open spaces directly	Respond to an observed problem in existing open spaces and develop design guidelines	Same methodological problems as case study research and the crash speed at which the research is done, and the tendency of clients to want to influence research findings
Action research	Include the feedback on research findings in policy, design, and future research	It helps users directly negotiate - changes in environmental values	Same methodological problems as a case study and applied research

Table 4.1 Summary of three approach types in urban spaces studies of Francis 1991

Every approach has specific limitations when producing knowledge. For this reason, the knowledge can be utilized and built on only when the consequential limitations and reflections of results conducted through deliberated approaches and choices are acknowledged and disclosed (Krehl & Weck, 2020).
There are many ways to collect data, for example, qualitative and quantitative methodological advances (Francis, 1991). In a behavioral study, some standard methods are questioning and observation. The questioning, such as survey questionnaires, can be distributed quickly and economically, while observations are time-consuming and take a considerable physical toll on the researcher (Hill, 1984). However, in the survey questionnaire, the issue of "self-selection"- the tendency of people to choose locations based on their travel abilities, needs, and preferences" cannot be addressed when examining POS and physical activity have been cross-sectional in design. The association when analyzing data from survey questionnaires does not necessarily mean causality. For example, residents who prefer walking can choose a neighborhood conducive to walking, hence more walking. Therefore, the results with observed associations might be biased because self-selection issues are not controlled (Cao et al., 2009; Litman, 2010). Additionally, "environmental autobiography" or "psychology design" methods, in which psychology is the principal design tool, contribute to the meaning of places for users. For example, triggering memories associated with family, love, and security might be one attachment to the place (Israel, 2003).
In 2013, Jan Gehl argued that direct observation was a better tool in studying public life than questioning the users to understand their needs and how city spaces were used (Gehl et al., 2013).). Media methods, such as time-lapse photography, filming, or video recording, deem valuable for simulation and evaluation in future research (Francis, 1991; Gehl et al., 2013; Whyte, 1980). Mapping methods provide spatial data on urban open space, real estate value, or density, which benefits open planning (Bradecki, 2009; G. Brown et al., 2018; Chen et al., 2018; Francis, 1991). More importantly, participatory methods, such as walking tours, become more effective in understanding open spaces' specific attributes (functional, social, and perceptual attributes) (Salama & Azzali, 2015).
Nevertheless, a gap between experts' evaluations and users should be considered. For instance, in studies related to the elderly, absolute integration gap values synthetically obtained from the survey data of both experts and elderly participants to the POS were significantly high (Zhu et al., 2017).

According to Moore (2004), the best research should "use a combination of empirical methods in triangulation to achieve greater trustworthiness in findings and interpretation." The qualitative and quantitative methods are briefly introduced in the following part.

4.1.1 Qualitative methods in urban planning

Some qualitative methods are widely used in urban studies that are reviewed to determine whether they are suitable to apply for this research:

- Desktop review
- Mapping
- Observation methods
- In-depth interview
- Actor-Network Theory.

Sub-chapter 4.3 will determine which methods are chosen for this research.

4.1.1.1 Desktop review

The desktop review method is a so-called "Literature review," "Secondary data," or "Grounded theory." This method was developed by sociologists Glaser and Strauss in 1957 (Kathy Charmaz, 2006) to predict, explain, or guide and provide a style for research on human behavior (Glaser & Strauss, 1957). The grounded theory approach is essential for all types of research, as it can generate new concepts and orientations for a specific field (Snyder, 2019).

4.1.1.2 Mapping

Nolli first presented a mapping of the city's form and system of public spaces in 1784. These tools help depict and analyze collected data for urban public spaces in contemporary architecture and urban planning accurately and effectively (Ji & Ding, 2021). For instance, a mixed-use area is shown as a Nolli type in Figure 4.1. It illustrates different types of public and private land use, including walkable public space, private space, green space, and roadway, to help the researcher understand the urban form of the survey area.

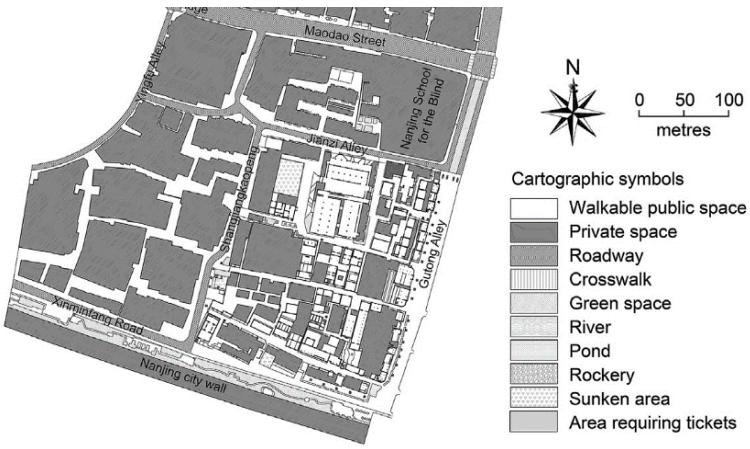

Figure 4.1 Example of Nolli-type map of the Laochengnan area
Source: (Ji & Ding, 2021)

Geography information system software (GIS) is used to achieve objectives and robust measures of the built environment (Gómez et al., 2010). It shows the location of POS, its areas, and its functions within

the urban form. Mapping by GIS displays the actual distance to POS from users' locations. It also reflects the objective proximity of respondents' POS and helps reduce the different measures between self-reported and objective proximity indicators (Lackey & Kaczynski, 2009).

4.1.1.3 Observation methods

Direct observation is the primary tool in studying public life. The researchers observe the participants' ongoing behaviors and activities in the natural situation. Whyte (1980) used filming methods that recorded the daily lives in his study of small urban spaces, while Lynch (1984) utilized distance maps, mental maps, and linkage diagrams to construct the theory of the connection between human values and the city's physical form. In 2013, Gehl et al. introduced practical tools for public life:

- Counting: Counting the number of people, counting how many often in a particular activity
- Mapping: Mapping what happens on the plan of the area being investigated
- Tracing: Tracing the movement patterns of the participants to understand the choice of direction, walking sequence, and many more
- Tracking: to measure the walking speed or certain activities that take place along the route
- Photographing: (photos and filming) illustrate situations as a document for site characteristics before and after
- Keeping a diary: to note details and nuances about human behavior in public space with brief narratives; and
- Testing: test selected walks to note the waiting time and possible hindrances on the way (Gehl et al., 2013, pp. 24–34).

4.1.1.4 In-depth interview

The in-depth interview aims to understand the lived experience of people and the meaning they extract from that experience. Moreover, the interview cannot comprise answering questions, testing hypotheses, or evaluating the values or the quantity of that value. In human behavior research, the researcher must first reach out and request an interview from the potential participant before transcribing the data for learning. An in-depth interview requires a great deal of time, occasionally money, to prepare and execute. Some other challenges may arise when an interviewer is shy or uncomfortable making an unsolicited call (Seidman, 1992, pp. 9–12).

4.1.1.5 Actor-Network Theories

Actor-network theory (ANT) suggests that not simply the human element but society, organizations, agents, and machines are all effects produced in patterned networks of diverse materials. Society and humans are generated in patterned networks of heterogeneous and interacting materials. The social structure is a relational influence that recursively produces and reproduces itself. The order of this structure is not complete, autonomous, or final (Law, 1992). In short, ANT is a research method focusing on the connections between human and non-human entities. Public space is not seen as a passive physical container for use but rather as an operational performance continually changing through various actors' associations. According to ANT, all the networks must be stabilized to exist. In the stable performance of public space, the connection among various actants (users, space's attributes, natural circumstances, and social relations) are examined, a process of revealing the roles

of those actants with the type of relations, negotiation, and prescription in urban contexts (J. Kim, 2019). Divergently, all elements in the social and natural worlds exist in constantly changeful networks of relationships. ANT analyzes the various influences among the objects in the space, in which all objects and users are treated similarly (Ernstson, 2008; J. Kim, 2019). Figure 4.2 shows a sample of ANT from a model by Kim (2019). Objects, including human and non-human actants, are observed, then translated into practical activities as a patterned network. However, because one activity can link to different networks, ANT analysis creates various stabilized networks of actions among actants.

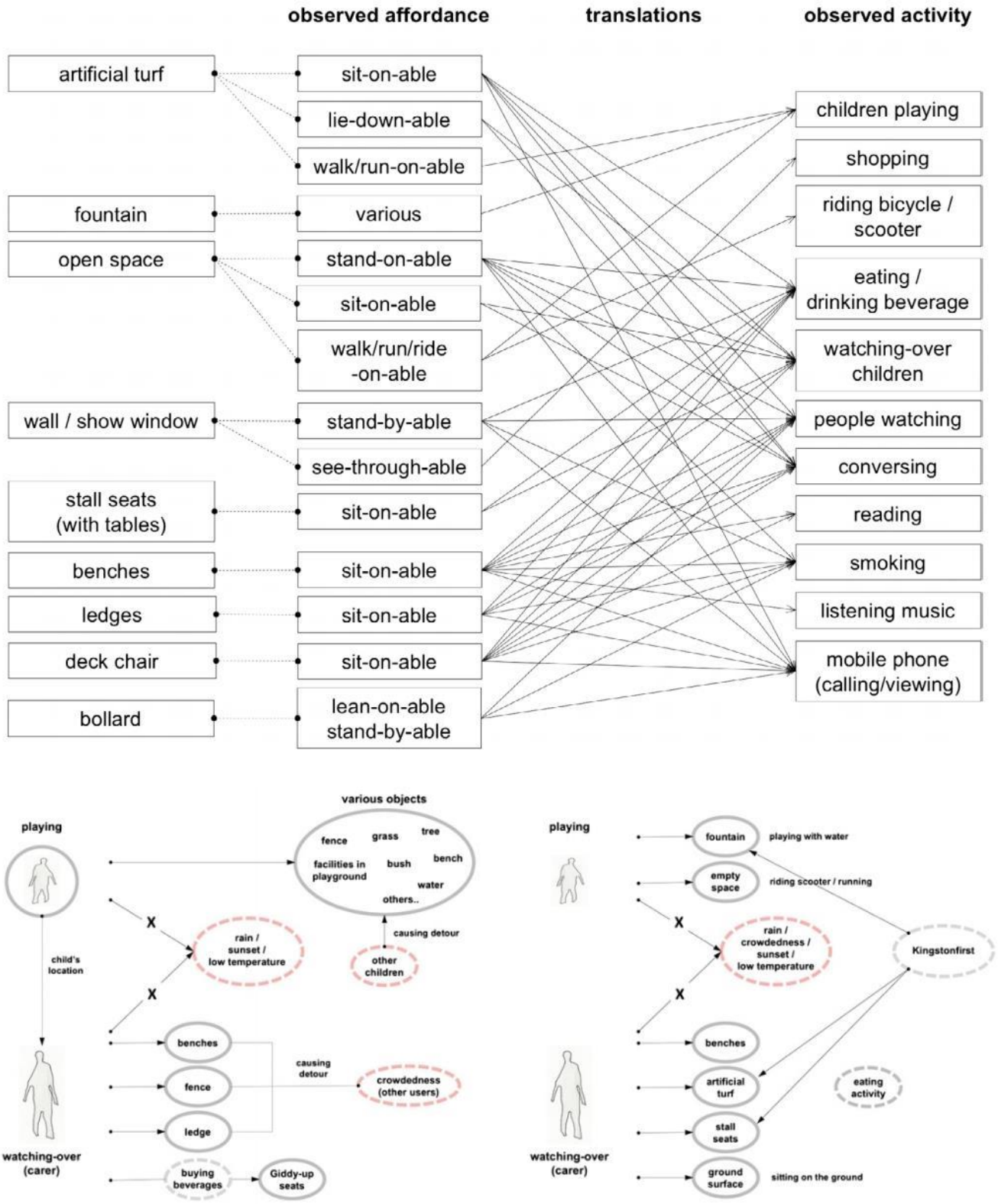

Figure 4.2 Sample of translations in ANT and different networks of the same activity
Source: Jihyun Kim, 2019

4.1.2 Quantitative methods in urban planning

This section briefly provides basic statistical analysis information by evaluating different types of variables in selected data, followed by the discussion of standard methods used in quantitative urban planning.

4.1.2.1 Types of variables

Variables can be categorized into four types: nominal, interval, ordinal, and ratio. Categorical variables consider nominal variables, which take on qualitative values representing discrete groups, while numeric variables include interval, ordinal, and ratio data, which take on quantitative values. Independent variables (factors) are determined and controlled, which allows researchers to assess the relationship between the dependent and independent variables (the outcome of interest in a research study) (Vanderstoep & Johnston, 2009, pp. 106–108)

Some relevant quantitative data analysis methods in urban planning research are reviewed to determine whether apply them for this research, including:

- Descriptive statistics
- Inferential statistics: Chi-square, Correlation, Difference of means, Analysis of variance (ANOVA), Regression (Ewing & Park, 2020), and Choice-based conjoint (Sawtooth Software, 2021)

The detailed concept of each method is presented below. The chosen methods are determined in sub-chapter 4.3.

4.1.2.2 Descriptive statistics

Descriptive statistics summarize studied samples without inferences based on probability theory (Kaliyadan & Kulkarni, 2019). They focus on the presented data description and provide answers to questions of who, what, where, when, and how but cannot address the question of why (Choi et al., 2020; Sapsford & Jupp, 2006).

It is commonly broken down into four types: frequency measures, central tendency, variability or dispersion, and cross-tabulation. A frequency distribution groups the samples into categories to represent a single variable, while central tendency comprises mean, median, and mode, specifying the typical score of the group. Variability or dispersion around the mean or median of a dataset indicates the spreading out of a group of scores by range, quartile deviation, variance, and standard deviation. Lastly, cross-tabulation summarizes the relationship between two categorical variables, showing whether two variables are related in inferential statistics (Choi et al., 2020).

4.1.2.3 Chi-square test for independence in contingency tables

The Chi-square test, the so-called “Independence test” or “Analysis of contingency tables,” is a critical test used to establish whether or not two variables of the contingency table (or cross-tabulation) are independent (Sapsford & Jupp, 2006). They specify whether the differences across categories are random chance or genuine. They test hypotheses and tell whether the results are statistically significant or practically essential. In case of questions of importance, additional analysis such as logistic regression should be concerned about (Duke et al., 2020). As a non-parametric statistics test, the Chi-square does not require homoscedasticity of variances in the data. It should be used when there are:

- Nominal or ordinal variables.
- Unequal sample sizes of the study groups
- The violation of data in the following parametric test assumptions: non-normal distribution of data, unequal variance or non-homoscedasticity, and continuous data collapse into a few categories. Thus the data are no longer interval or ratio (McHugh, 2013).

The equation of Chi-square is as the following:

$$\chi^2 = \Sigma \frac{(o-e)^2}{e}$$

In which χ^2 is Chi-square. *O* is the observed frequency of each category, and *e* is the expected frequency or the number of observations found if the null hypothesis was confirmed.

$$e = \frac{M_R \times M_C}{n}$$

In this equation for the expected value, M_R represents row marginal values or the sum of each row, M_C represents marginal column values, or the sum of each column, while *n* is the total sample size (Duke et al., 2020).

4.1.2.4 Analysis of Variance

Analysis of Variance (ANOVA) is a statistical test to determine the differences in group means when one or more parameter-dependent variables are independent (Sawyer, 2009). It determines whether the mean of a continuous variable depends on the individual case's group (given by a categorical variable). A continuous variable can be measured on an interval or ratio scale, while a categorical variable is measured on a nominal or ordinal scale, usually called categories or groups. Furthermore, an ANOVA test allows three or more groups to be tested simultaneously (Stoker et al., 2020).
The assumptions underlying ANOVA include parametric data measures that have all the followings:

- No relationship or dependency between observations within or between groups and randomly selected data,
- Dependent variables have no significant outlying values,
- The dependent variable must be approximately normally distributed in every compared group,
- The variance among the groups is roughly equal (Stoker et al., 2020).

However, if sample sizes are sufficiently large and equal numbers of subjects in each group, normality and variance assumptions are likely disregarded with impunity. A multiple comparison procedure can confirm a statistically significant ANOVA to identify which group means differ from each other (Sawyer, 2009).

To determine whether differences in means among groups are significant, ANOVA calculates an *F*-statistic as follows:

$$\text{Within Groups Variance} = \sum \frac{\Sigma(x_{ij} - \mu_j)^2}{n-k}$$

$$\text{Between Groups Variance} = \sum \frac{\Sigma n_j (u_j - \mu_t)^2}{k-1}$$

$$\text{ANOVA F statistics} = \frac{\text{Between Groups Variance}}{\text{Within Groups Variance}}$$

4.1.2.5 Correlation

Correlation presents the systematic linear relationship between two variables (Sapsford & Jupp, 2006). It is widely used in urban planning to determine whether the association between two numeric variables is due to chance or genuine, positive or negative, and strong or weak (Tian et al., 2020). Correlation coefficients have a value ranging from -1 to +1, a perfect negative correlation to a perfect

positive correlation, respectively, and a 0 value when there is no correlation. Spurious correlation occurs when both variables are correlated with a third variable (Sapsford & Jupp, 2006).
Correlation does not imply causation. The causation (cause-effect) happens when there is a supporting theory, a strong association, a time sequence, or a control for confounding variables (Tian et al., 2020). Correlation can only be used when two variables are continuous (i.e., interval or ratio scale) or ordinal, not nominal. Moreover, the correlational analysis can expand to regression methods to assess the relationship between an outcome (dependent) variable and one or more than one predictor (independent) variables (Tian et al., 2020)
The equation of the Pearson correlation coefficient *r* is:

$$r = \frac{n\Sigma xy - (\Sigma x)(\Sigma y)}{\sqrt{n(\Sigma x^2) - (\Sigma x^2)}\sqrt{n(\Sigma y^2) - (\Sigma y^2)}}$$

Where *n* is the number of data pairs, and *x* and *y* are the two variables (Tian et al., 2020).

4.1.2.6 Difference in means test (t-test)

T-tests examine whether the difference between two means occurs by chance or genuine (statistically significantly different) (Proffitt, 2020; Sapsford & Jupp, 2006). Based on the know means of samples, they test the differences between the unknown means of the two populations. Besides, they evaluate the differences between experimental and control groups, with and without groups, or the state of groups before and after being exposed to change. The mean difference between the values within two samples results in chance or the likelihood of being found in the corresponding populations. Hence, T-tests are simple but can validate hypotheses powerfully of the intervention or phenomenon's effect (Proffitt, 2020).

4.1.2.7 Regression

Regression is used to develop a model (in the form of an equation) which can use information about a set of independent variables to predict the dependent variable accurately. A prediction accuracy increases as an explained variation in the dependent variable increases. Unfortunately, regression models do not account for a substantial, residual, or error variance (Sapsford & Jupp, 2006). Linear regression and logistic regression are used in this research.

<u>Linear Regression</u>

Linear regression explores the details of relationships, evaluating two or more variables to understand how those variables are related or if no relationship exists. The regression model tests the hypotheses and explains the relationship by predicting the outcome of one event associated with another.
Modeling the relationship between dependent and independent variables with a linear equation helps explain the rationale behind the observed patterns. The model is explanatory when the variations of a dependent variable depend on the independent variable assessed to a certain degree. Regarding the prediction, the regression equation describes how well each independent variable performs as a predictor of the dependent variable. It also evaluates whether the functional or causal relationship is established from the hypothesis standpoint based on the lines with a positive slope. A successful application of regression analysis requires a balance of theoretical results, empirical rules, and subjective judgment (K. Park et al., 2020).

The formula for regression linear is presented as follows:

Simple Linear Regression:

$$Y = a + bX + \varepsilon$$

where
a = intercept with the *Y*-axis when *X* = 0; *b* = slope of the line (ΔY/ΔX); *X* = value of the independent variable; *Y* = value of the dependent variable, *ε* = error term.

Multiple Linear Regression:

The equation for a regression model with *k* variables is:

$$Y = b_0 + b_1X_1 + b_2X_2 + \cdots + b_kX_k + e$$

where *Y* = dependent variable; *X* = 1 to k independent variables; *b* = associated parameters; *e* = random error term

Logistic Regression

According to Sabouri et al. (2020), logistic regression models the probability of a categorical outcome based on predictors. Like linear regression, logistic regression specifies the relationships between the dependent and independent variables. However, logistic regression predicts the outcome's log odds and the outcome's probability with one or several independent variables. In contrast, linear regression only predicts the value of a dependent variable with one or several independent variables. The transformation from log odds to probability indicates that the probability is a nonlinear function of the independent variables.
The logistic regression equation:

$$In\ odds(Y|X) = b_0 + b_1X_1 + b_2X_2$$

where *Y* = dependent variable; *X* = 1 to *k* independent variables; *b* = associated parameters.

4.1.2.8 Choice-based conjoint analysis

Conjoint analysis originates "as a theory to decompose an ordinal scale of holistic judgment into interval scales for each component attribute." The theory shows the transformation based on the satisfaction of various axioms, such as additivity and independence (Hauser & Rao, 2004). It is primarily used in marketing research to understand the consumer's preferences. The method designs a set of hypothetical product profiles with specified consistent levels of involved attributes to get the responses from customers and their preferences in ratings, rankings, or choices of these profiles (Agarwal et al., 2015). The researchers can estimate the cause-effects of multiple treatment attributes and assess different causal hypotheses simultaneously through this analysis (Hainmueller et al., 2014). Choice-based conjoint (CBC) involves practical choice tasks for sets of characteristics of objects or situations that consist of several attributes. Respondents choose which is preferred within a given set while the utility generated from CBC compares the values of different attributes.
Since the customer decides their choices by comparing different values in multiple attributes, the utilities generated in the conjoint analysis depend on relative considerations of attribute importance rather than the self-explicated approach. Researchers have used choice experiment models previously to understand people's preferences (Alves et al., 2008). The principal characteristic in which the respondent prefers to choose concepts (products) from sets of concepts instead of rating or ranking distinguishes CBC analysis from the earlier conjoint analysis. Thus, over the last two decades, CBC has become the most widely used conjoint-related technique (Sawtooth Software, 2021).

4.2 Description of study areas

In this research, various study areas in HCMC with selected descriptions are chosen based on the case study method approach. The following section describes the study areas' population, climate, and characteristics.

As of April 1st, 2019, HCMC has 8,993,082 registered citizens, excluding undocumented citizens or immigrants. Among registered citizens, 841,005 elderly (9%) (GSO, 2019), with an average life expectancy of 76.5 years (PSO, 2017), live in an area of 2,061 square kilometers (GSO, 2018), resulting in a population density of 4,363 per capita per km^2.
HCMC is located in the southern part of Vietnam, which has a tropical climate with two seasons, the rainy and dry seasons, and an average annual temperature of 27.4 °C ±3.6 °C (Climate-Data.org, 2019). Hence, the survey can be implemented with the minor consideration of rainy or sunny days.
As of December 31st, 2020, HCMC has a total of 24 districts, including 19 urban and five suburban districts. Districts are comprised of 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, Binh Thanh, Thu Duc, Binh Tan, Go Vap, Tan Binh, Tan Phu, and Phu Nhuan, and sub-districts comprised Can Gio, Nha Be, Binh Chanh, Hoc Mon and Cu Chi (PSO, 2017). For the administration process, the districts are categorized into central business districts (CBD) and non-central business districts (non-CBD). CBD tends to have higher rates in commercial density, land price, retail, recreational and cultural services than non-CBD because of the integrated financial businesses, cultural and service institutions, and supporting facilities (Yaguang, 2011). The CBD of HCMC consists of districts 1 and 3, which were developed during the French's beginning of city settlement in 1798. CBD was initially designed with many public green spaces, but the greenery was downscaled overtime with the increasing population (PlanIC, 2018). By contrast, non-CBD comprising the remaining districts without sub-urban districts are posed with more low-income concentrations and densely packed, run-down neighborhoods such as districts 4 and 6 (UN-Habitat, 2008).
From 2012 to 2016, the green areas of HCMC had increased by 101.7 ha, where public parks took 4.8%, project parks took 18.2%, and the green belt took 77% (Nhat-Son, 2018). By the end of 2018, HCMC had 491.16 ha of parks, of which 369 were communal and pocket parks resulting in the green areas per capita of 0.49 m^2 (Thanh, 2019). However, if water features, such as canals, streams, rivers, and lakes, were to be viewed as green spaces, the areas of green spaces would have been reduced dramatically. In fact, more than 1,000 ha of green spaces were reduced to 500 ha (50%) within 20 years from 1998 to 2018. The disappearance of green spaces was due to backfilling canals or lakes (Luong, 2018).
Moreover, the emergence of public parks in the new urban areas in Phu My Hung and the new city in Thu Duc did not compensate for the disappearance of POS in the old districts. On the contrary, these new urban development projects have directly caused the inequality in greenery among districts such as Tan Phu district, District 5, and District 8, which have the slightest green spaces per capita, between 0.14 to 0.2 m^2. The accessibility to the parks is suboptimal, with the average walking distance of 879 m (calculation by GIS), a relatively short distance (Hoang et al., 2019).
Although HCMC is selected for a case study, the research cannot be conducted in the entire city. Certain parks and neighborhoods in representative urban districts are identified as study areas based on the population census in 2009 and land use statistics in 2014. Three criteria for choosing survey sites are:

- Lack of POS
- A high density of the elderly per square kilometer
- Differences in income and urban planning.

The density of the elderly per district is listed in Figure 4.3 below.

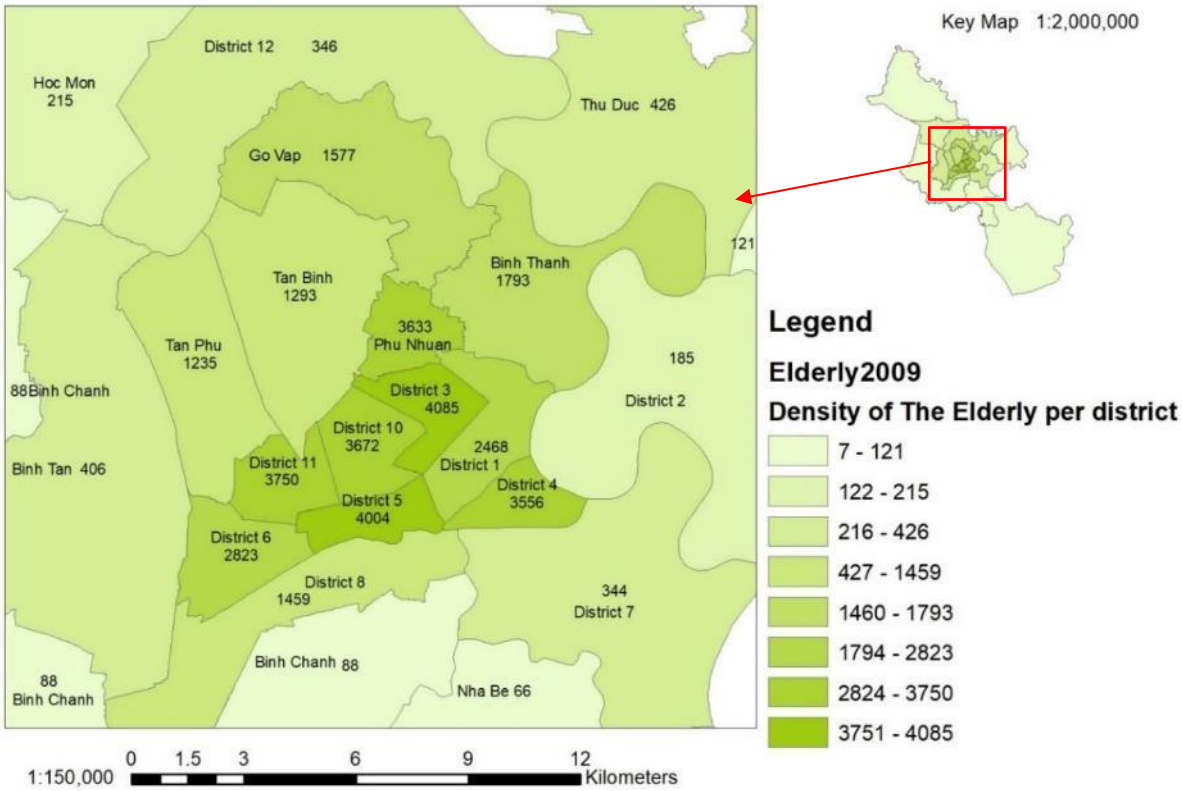

Figure 4.3 Distribution of the elderly in HCMC in 2009
Source: Generated by the author based on GIS data in 2009 of DONRE

Even though districts 5, 10, and 11 have a high density of the elderly but are not chosen as representative districts because of the fewer multifunctional parks. Districts 1, 3 in CBD and districts Phu Nhuan, 4, and 6 in non-CBD, which had 2,500 elderlies per hectare and above, were selected for a closer evaluation of POS.

Ten POS with similar functions and sizes, including multifunctional parks, district parks, and neighborhood units, are selected considering the residential location factor and the differences in income, land value, and supporting facilities between CBD and non-CBD (Table 4.2). Notably, one walking boulevard and roundabout are only investigated in CBD because there is no similarity in size and type compared to non-CBD. However, this does not affect the statistical result. Green spaces next to the rivers are also examined, with one green line along the river in CBD and one space under the bridge in non-CBD. Alternatively, the neighborhood units of Ward 5, District 3, and Ward 1, District 6 are studied with distributed survey questionnaires. The various physical attributes and activities inside POS are observed to assess the network between design features and users' behaviors.

Type of POS	CBD	Non-CBD
Multi-functional Park	10 ha (Tao Dan Park)	10 ha (Binh Phu Park)
District Park	6 ha (Le Van Tam Park)	6 ha (Phu Lam Park)
Greenery along the rivers	1.37 ha (Nhieu Loc Canal park)	2.21 ha (Ton That Thuyet and underbridge park)
Neighborhood Unit	25 ha (Ward 5, District 3)	22 ha (Ward 1, District 6)
Walking boulevard	4.29 ha (Nguyen Hue boulevard)	-
Roundabout	0.78 ha (Cong Truong Quoc Te Roundabout)	-

Table 4.2 Type of survey POS in CBD and non-CBD

Figure 4.4 Study areas

Figure 4.4 presents the locations of study areas in the city where the associated activities occur. Part 4.3.1.1 will later describe the characteristics of each type of study POS and the details of study areas, including size, history, and special features of that place.

4.2.1.1 Multifunctional parks

According to Vietnam's design standard, multifunctional parks with a size of 11 to 14 ha provide sufficient areas to serve many functions, including culture and education, sports, quiet places, performance, children's playgrounds, and services (National Code, 2012). At the same time, urban

planning and design pose various functions for activities such as recreation, play, movement, education, wildlife habitat setting, landscaping, agriculture, and community development" (Živković et al., 2019). Figure 4.5 delineates Tao Dan and Binh Phu Park, two multifunctional parks in CBD and non-CBD.

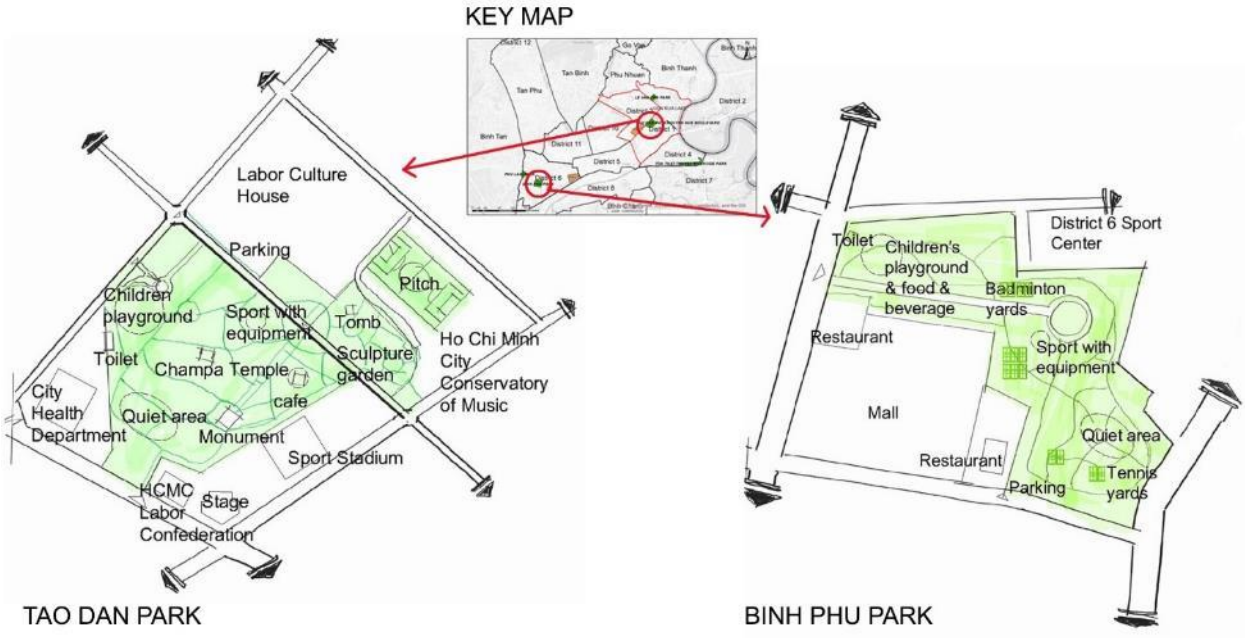

Figure 4.5 Multi-functional park plans
Source: Sketch by the author based on Google Maps 2021

Tao Dan Park, one of the best multifunctional parks of HCMC, was initially built as a royal garden in the Gia Dinh citadel in the 18th century. The French remodeled it to be the first public park in 1869. Today, the park is controlled by the District 1 People's Committee with approximately 10 ha of various cultural areas such as a temple model, monument, sculpture garden, a tomb, sports stadium, labor culture house, football field, and 1,000 growth trees (R. Tran, 2019b). Binh Phu Park, located in District 6 and controlled by District 6 People's Committee, consists of a multi-purpose gymnasium, tennis court, badminton court, children's playground, and food and beverage. According to the 2003 master plan developed by District 6 People's Committee, the park areas were 10.3 ha. However, in 2007, the two buildings located at the two main entrances - Seven Wonders Restaurant and Thai Restaurant, illegally occupied the part leading to a reduction of the green areas to 6 ha (Minh-Nam, 2006).

4.2.1.2 District parks

According to Vietnam design standards, district parks have a size of 10 ha with no requirement for land use (National Code, 2012). Figure 4.6 shows two district parks: Le Van Tam Park and Phu Lam Park.

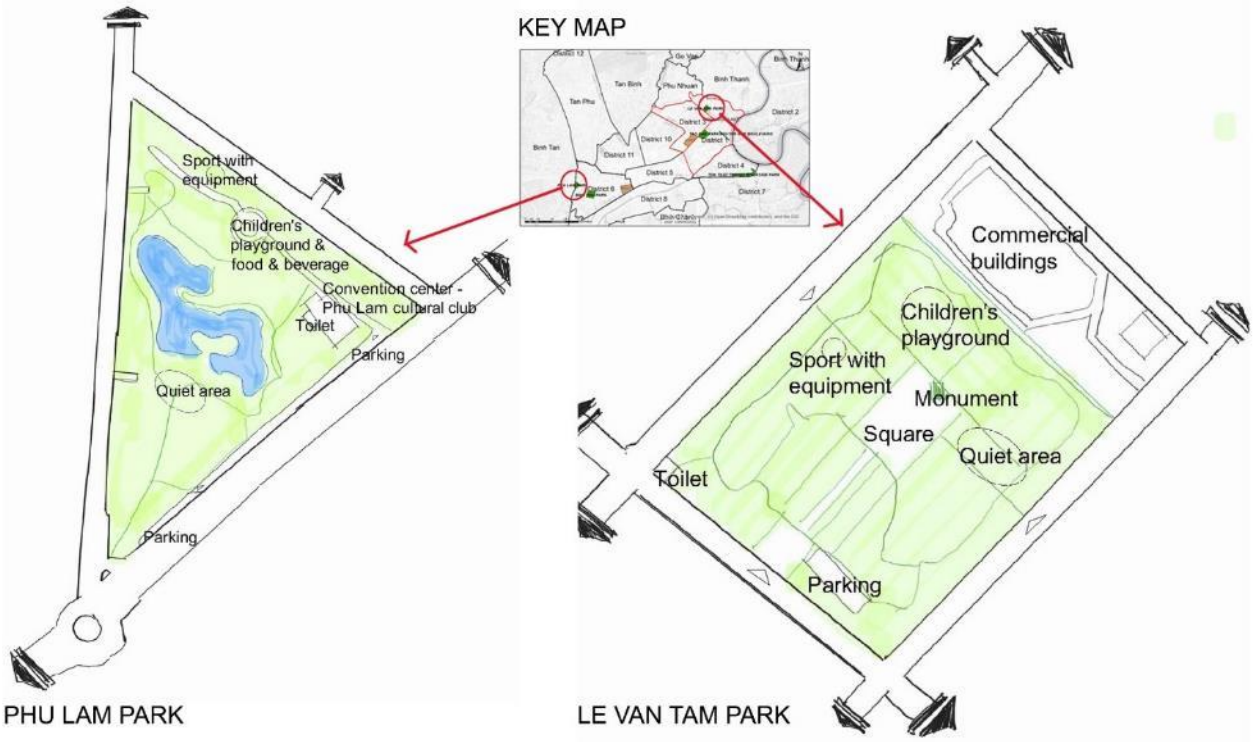

Figure 4.6 District Park plans
Source: Sketch by the author based on Google Maps 2021

Le Van Tam Park was created as a cemetery for the French military in 1859 before being converted into a park in 1983 and controlled by District 1 People's Committee. This park is approximately 6 ha, surrounded by flowers, grass, and tall trees, uniquely providing excellent areas for people to exercise, rest under shaded spots, and get fresh air in HCMC (R. Tran, 2019a). Phu Lam Park, carrying a triangle shape, has a size of 61.790 m^2, with a 10.100 m^2 lake included, and is also controlled by District 6 People's Committee. More than half of the area is commercialized for a fee, e.g., a restaurant and children's playground. Nevertheless, one large restaurant (1.900 m2 perimeter) has occupied a 1.400 m^2 area of the park illegally since 2007 with no legal permission to build (Huy, 2011).

4.2.1.3 Greenery along the rivers

Green spaces along the rivers are not defined in the Vietnam design standard **(National Code, 2012; National Technical Regulation on Construction Planning, 2021)**. They are only sizable green lands or greenery under the bridge with some sports equipment and benches for people to exercise or relax. Figure 4.7 shows two examples of green spaces along the rivers, widely used as pocket parks in CBD and non-CBD.

Nhieu Loc canal is an 8.7 km waterway that cuts across districts Tan Binh, 3, Phu Nhuan, and Binh Thanh to the Saigon River. Two streets along the river bank, approximately 8 km in length, were upgraded in 2012 with many sports equipment and greenery walkways for the locals. Hoang Sa Street in district 3, bordered by Tran Quoc Thao Street and Bridge number 8, provides a scenic byway with a length of 915 m. Ton That Thuyet Park has 2.21 ha, with 1.33 ha from the under-bridge park, 0.88 ha from the monument park, and a 3,000 m^2 playground for children inside the park.

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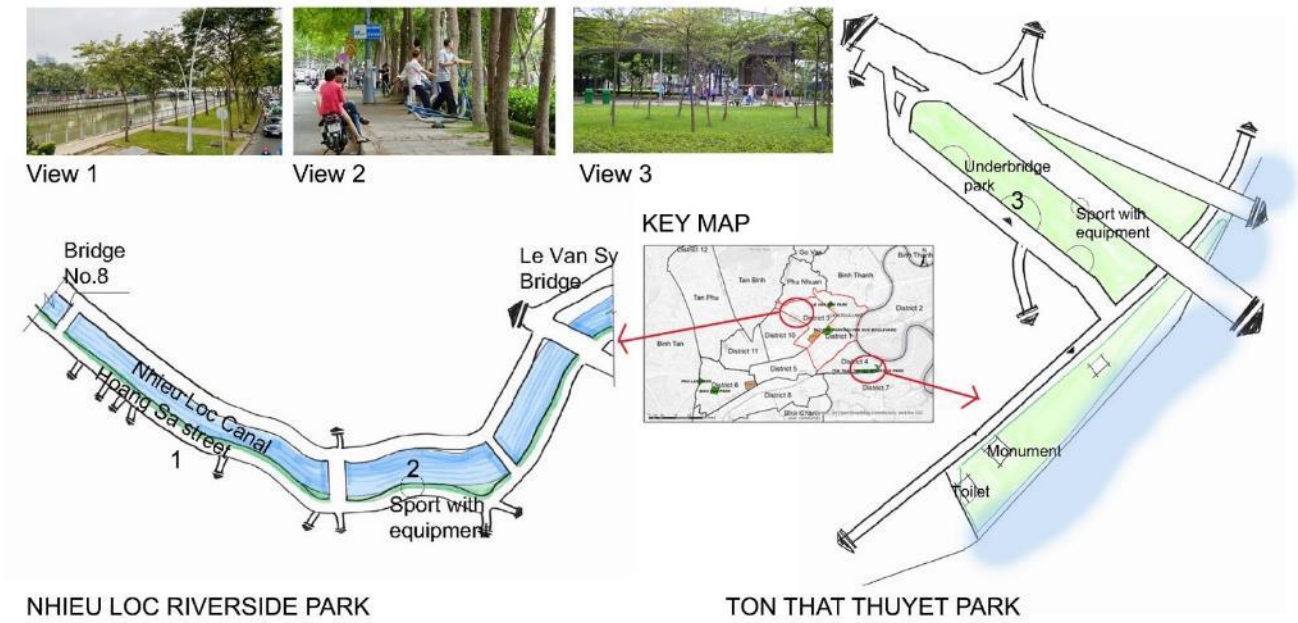


Figure 4.7 Riverside park plans
Source: Photos and sketch by the author based on Google Map 2021

4.2.1.4 Nguyen Hue Walking Boulevard

A walking boulevard (pedestrian zone or pedestrianized street) is a zone where vehicles are restricted to reserve the entire space for pedestrians. This particular zone allows children to play while promoting increased walking, given more available green or social space (Sisman, 2013).

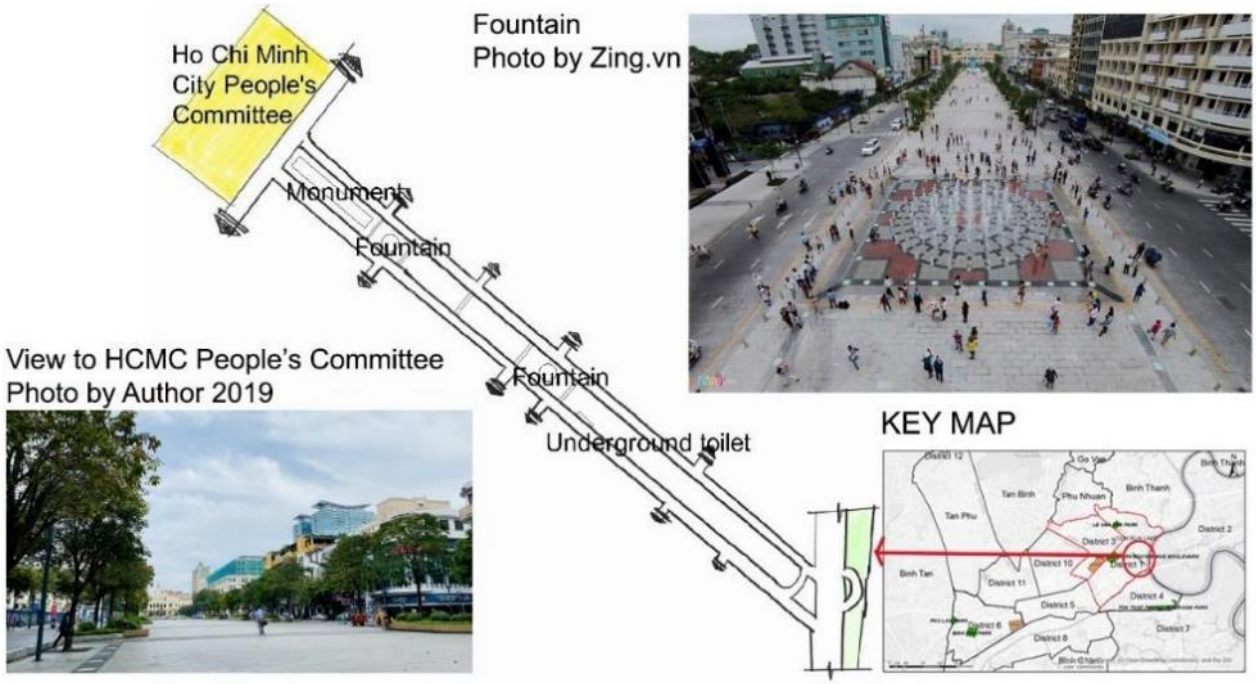


Figure 4.8 Nguyen Hue Walking Boulevard
Source: Sketch by the author based on Google Maps 2021

Nguyen Hue Street was one of the original streets of Saigon, which used to be a channel in 1790. In 1887, the French converted a canal into an avenue to expand Nguyen Hue Street. As of April 2015, Nguyen Hue's walking area was grown into a 670 m x 64 m perimeter prioritized for pedestrian and

entertainment purposes with limited uses of vehicles. The two fountains were built in the avenue center and front of the monument, increasing the cooling effect and adding decorations. Many events are celebrated here, especially during the Lunar new year, such as the flower festivals (Q. Tran, 2017).

4.2.1.5 Cong Truong Quoc Te Roundabout

A roundabout or traffic circle is a valuable tool to mitigate traffic as opposed to intersections. It also brings many environmental benefits by reducing noise and air pollutant emissions caused by idle cars. A well-designed roundtable can absorb runoff, cutting down on the amount of pollution. At the same time, the one transforming into roadway features with gardens, statues, and public art can add value by becoming a historical and cultural symbol for the community (Fromme, 2010).

Perspective of Cong Truong Quoc Te roundabout
Photo by Author 2019

KEY MAP

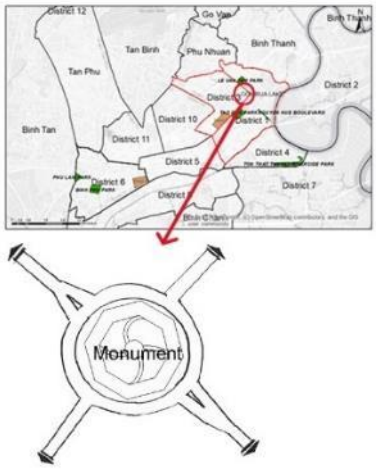


Figure 4.9 Cong Truong Quoc Te Roundabout
Source: Photo and Sketch by the author based on Google Maps 2021

Cong Truong Quoc Te Roundabout (often called Turtle Lake - Hồ Con Rùa), located in District 1, has a small fishpond, a fountain, monuments, and a tower in the center. The roundabout built between 1965 and 1967 with a size of 100 m in diameter is designed in an octagonal shape imitating a bowl of monsters with four walkways forming a spiral. The central tower consisted of five 34-meter-tall concrete columns resembling five hands spreading out with supported petals (Son, 2018). In addition, Cong Truong Quoc Te Roundabout attracts many students and food vendors because of the proximity to some universities.

4.2.1.6 Neighborhood Unit

A neighborhood is a group of people sharing common services and cohesion in a geographically bounded place. Based on the Garden City theory of Ebenezer Howard in 1898, if a model city has 30,000 inhabitants living on the size of 6,000 acres (equivalent to 2,428 ha), it has six sections called “Wards.” A Ward is defined as self-completeness when it has schools, religious institutions, or libraries within 1,000 acres (equivalent to 400 ha) of land and 5,000 residents (Y. Park & Rogers, 2015).
Per the Vietnam standards, the maximum population required for a neighborhood unit is 20,000 people, while the minimum is 4,000. Hence land use per person is from 15-28m^2. In addition, there must be a primary school, kindergarten, secondary school, public clinic, playground, sports yard, cultural sports center, and market in each unit with easy access. A neighborhood unit must have green

spaces per capita of at least 2 m^2 each and at least one park of 5,000 m^2. Besides, the residential area must have a public garden and a service area with a radius of less than 300 m (National Technical Regulation on Construction Planning, 2021).

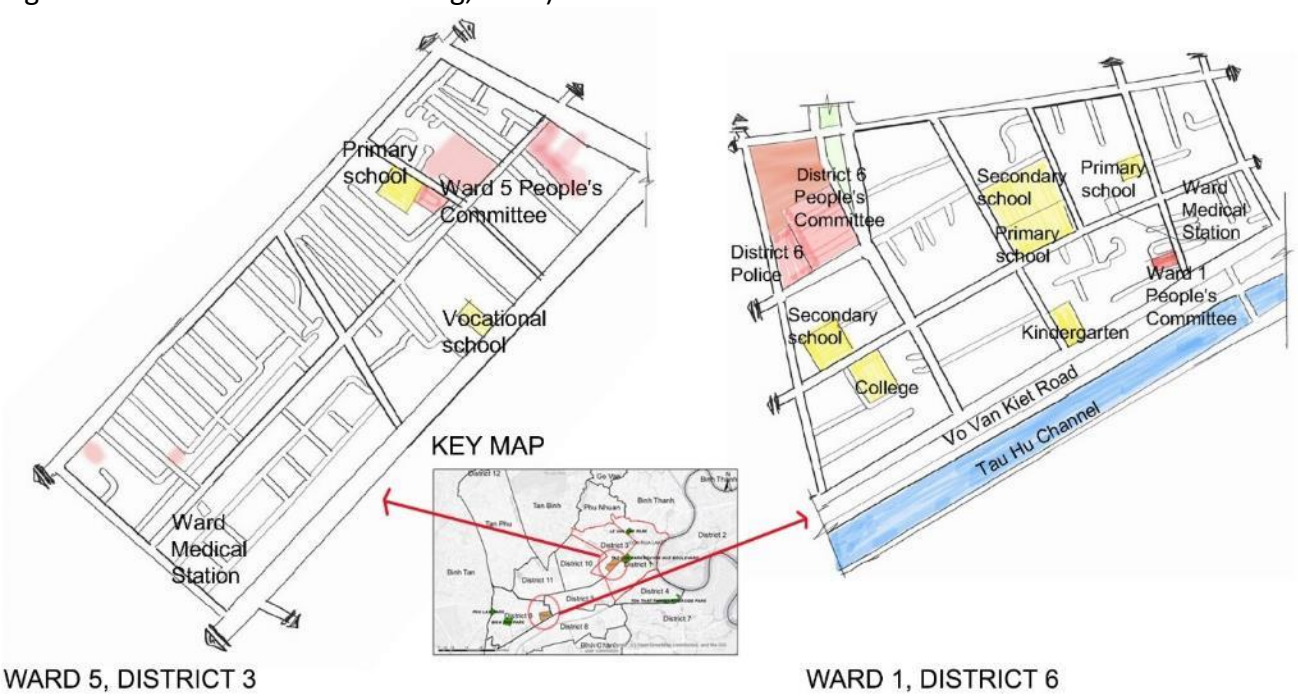


Figure 4.10 Neighborhood Units
Source: Sketch by the author based on Google Maps 2021

District 3, comprising 12 wards, is one of the oldest districts of HCMC, with the neighborhood unit mainly a residential quarter. It has a size of 4.94 $km^{2,}$ with 190,553 residents reported in 2009, of which 20,182 residents (11%) were elderly. Ward 5 is 25 ha, with 14,081 residents and 3,399 households reported in 2009, of which 1,525 residents (11%) were over 60 years of age. One secondary school and one college are in this quarter, but there is no park, childcare, or primary school (extracted from GIS data 2009 of DONRE).

Meanwhile, District 6 has a size of 7.17 $km^{2,}$ with 249,329 residents reported in 2009, of which 20,240 residents (8%) were over 60 years of age. Trade and service businesses are the strength of this district, While workers and experienced Chinese craft predominate in the labor workforce. Ward 1 of District 6 has a size of 22 ha, and 11,690 residents reported 2009 living in 2,678 households, of which 1,165 (10%) residents were the elderly. This quarter has one kindergarten, two primary schools, two secondary schools, one college, and one medical station serving the locals. One tiny pocket park covering 0.2 ha is located at the edge of the quarter (extracted data from GIS data 2009 of DONRE).

4.2.1.7 Summary of significant features and amenities of selected POS

Table 4.3 lists significant elements and amenities provided in the selected POS for the survey.

Features	Tao Dan Park	Binh Phu Park	Le Van Tam Park	Phu Lam Park	Nhieu Loc riverside park	Ton That Thuyet park	Nguyen Hue Walking boulevard	Cong Truong Quoc Te roundabout	Pocket parks	Sidewalks	Alleys
Pathways	Width with shadow and grass	Width with shadow and grass	Width with shadow and grass	Width with shadow and grass	8 m width with shadow and grass	Width with shadow and grass	Width with shadow and grass	2 m width, with shadow but no grass	Wide enough for walking in small groups	Less shadow and being occupied by the street vendors	Roadways are used as pathways for walking when less traffic
Greenery	Diverse fauna and flora with old tall trees	Diverse fauna and flora, but not many big trees for shadow	Diverse fauna and flora, but not many big trees for shadow	Diverse fauna and flora, but not many big trees for shadow	Diverse fauna and flora, but not many big trees for shadow	Diverse fauna and flora, but not many big trees for shadow	New tall tree and lawn	Old tall trees with shadows and plant boxes	A few old trees for shadows and bushes	Lawn	No
Sitting areas	Well-separated, quietness, and large with benches	Well-separated, quietness, and large with benches	Well-separated, quietness, and large with benches	Well-separated, quietness, and large with benches	No	Well-separated, quietness, and large with benches	Only benches	Only benches	Only benches	Benches, but rare	No
Water features	Fountains	Fountains	Fountains	Large pond	Fountains	Fountains	Fountains	Large lake	No	No	No
Kiosk	Vending machine for grocery, drinks, snacks	Vending machine for grocery, drinks, snacks	Vending machine for grocery, drinks, snacks	Vending machine for grocery, drinks, snacks	No	No	No	No	No	Grocery stands	Grocery stands
Children playground	Two children's playgrounds	One children's playground	Two children's playgrounds	One children's playground	No	Small children's playground	No	No	No	No	No
Natural sun-shading	Many big trees for shadow	Tall trees for shadow	Tall trees for shadow	Tall trees for shadow	Tall trees for shadow	Tall trees for shadow	Tall trees for shadow	No	Tall trees for shadow, but less	Less	No

Features	Tao Dan Park	Binh Phu Park	Le Van Tam Park	Phu Lam Park	Nhieu Loc riverside park	Ton That Thuyet park	Nguyen Hue Walking boulevard	Cong Truong Quoc Te roundabout	Pocket parks	Sidewalks	Alleys
Built sun-shading	Three large huts	Two large huts	Two large huts	Two large huts	No	No	No	No	No	Canopy from buildings	Canopy from buildings
Open fields	Well-designed with enough benches	Well-designed with enough benches	Well-designed with enough benches	Well-designed with enough benches	Not so large but have benches	Well-designed with enough benches	Large with benches	Occupied by the vendors	Combined with the badminton court	Wide pavement is used as an open field with benches	A roadway with fewer vehicles is used as an open field
Sport fields	Tennis courts, badminton courts, sports equipment	Badminton court, sports equipment	Tennis courts, badminton courts, sports equipment	Badminton court, sports equipment	No	Badminton court, sports equipment	No	No	Badminton court, sports equipment	No	Illegal street football and bicycle riding
Events/ activities	Flower markets in Lunar New year, exhibition	No	Books fair, bazaar	No	No	No	Flower markets in Lunar New year, exhibitions, city community activities	No	No	Private activities like wedding parties, funeral	Private activities like wedding parties, funeral
Food services	Restaurant, kiosk for drinks and snacks	Illegal restaurants, Drinking, and snacks	Drinking and snacks	Drinking and snacks	Street vendors	Drinking and snacks	Drinking and snacks, street vendors	Many street vendors	Vendors but not always	Vendors but not always	Vendors but not always
Toilet	Yes	Yes	Yes	Yes	Yes	Yes	Underground toilets	No	No	No	No

Table 4.3 Major features and amenities in selected POS

4.3 Determining the optimal methods for this study

Thirteen mentioned methods in part 4.1 were reviewed, then determine which could be applied to this study. After considering the collected data and objectives of this research, seven methods were chosen. The main applications, data and variables, drawbacks of these methods, and the decision on whether they can be utilized for this study are summarized in Table 4.4.

Methods	Application for	Data/ Variables	Drawbacks	Applied for this study?
Review	Predict, explain or guide a phenomenon	Research articles, books	Time-consuming	Yes
Mapping	Depict public spaces in urban morphology	Geography information system data	GIS Data Resources	Yes
Observation	Study participants' behaviors and activities	Photos, filming	Time-consuming	Yes
Interview	Understand the live experience of people	Interview transcript	Shy or unwilling interviewers	Yes
ANT	Analyze different influences of the objects	Observation	Time-consuming	Yes
Descriptive statistics	Provide answers to questions: Who, What, Where, When, How	Survey questionnaire	Not provide a solution to questions Why	Yes
Chi-square	Explore the associations between two categorical variables	Categorical variables/ survey questionnaire	Its sample size requirements, the difficulty of interpretation when there are large numbers of categories (20 or more) in the independent or dependent variables	Yes
ANOVA	Identify whether significant differences exist among multiple groups	Continuous dependent variables, multiple categorical independent variables/ survey questionnaire	The sample size is around 40 to 50 (UCLA, 2021) or 11 for each group to gain 80% power (SAS Institute Inc., 1999) Require normality distribution data	No
Correlation	Determine the associations between two numeric variables	Numeric variables/ survey questionnaire	Does not imply causation. A cause-effect relationship does not necessarily connect two or more associated events	No
T-tests	Detect whether differences between the means of two samples are statistically significant	Continuous dependent variables, two categorical independent variables/ survey questionnaire	Requirement of normally distributed data	No

Methods	Application for	Data/ Variables	Drawbacks	Applied for this study?
Linear Regression	Explore the details of relationships, evaluating two or more variables to understand how those variables are related or no relationship exists	Continuous dependent variables, continuous independent variables (through represent categorical)/ survey questionnaire	Requirement of normally distributed data	No
Logistic Regression	Predict the log odds of outcome, specify the relationships between the dependent variable and the independent variables	Continuous dependent variables (dichotomous), continuous independent variables (through representing categorical)/ survey questionnaire	Requirement of normally distributed data	No
CBC	Understand people's preferences	Different values in multiple attributes	Choosing concepts (products) from sets of concepts rather than by rating or ranking them	No

Table 4.4 Summary of possible methods to apply for the research

For data collection, a **desktop review** is a primary method to find the study gaps and the research direction. **Mapping** shows some of the distribution of green spaces. **A short observation with photos taken** can be conducted for a few days to get an overview of activities in POS. Other observation tools, such as filming, tracking, tracing, or diary notes, cannot be used because they are time-consuming. Frequently, statistics with survey questionnaires testing the associations between physical attributes and the elderly's use of POS do not imply causality. Therefore, **interviews** may provide a better understanding of why older people use POS, how POS is designed to fit the needs of the elderly, or even why they do not anticipate utilizing POS. Besides, **interviewing the** elderly as **the users and non-users** helps researchers elucidate the practical use of POS among this population. **Interviewing experts** promote a deeper understanding of the empirical application of POS design guidelines in Vietnam. **ANT** approach illuminates a network connection between the POS physical attributes and the elderly's activities. A survey questionnaire is designed with various open-ended questions for the respondents to express their opinions freely. Although CBC can be appropriate for multiple-choice questions, it does not explore or rank the attributes. Thus, this tool may not benefit the study's objectives while exploring the types of POS attributes used in real-life scenarios.

For data analysis, **descriptive statistics** are the primary method in presenting data without the requirement of data types. Parametric tests, such as t-tests, ANOVA, correlation, and regression, provide the assumptions of normally distributed population data, while non-parametric tests, including Chi-square, and contingency tables, do not. Besides, non-parametric tests are less powerful than parametric tests. When verifying whether there is a difference between groups, non-parametric tests require a larger sample size (n value) to gain the same power as parametric tests. Both test analyses result in almost the same significance or non-significance for inter-subgroup comparison when using a "large" (n>15) sample size. They both yield similar but not normal distributions from different subgroups, whereas only the parametric method is discriminant in the cases of non-similar conclusions (Mircioiu & Atkinson, 2017). Furthermore, although the normal distribution of data is frequently indicative, experts contend using non-parametric tests instead of parametric tests to analyze frequencies (as percentages of responses in each category) (Sullivan & Artino, 2013). When

determining a statistically significant difference between the expected and observed frequencies, the Chi-square test should be applied as a "model-fitting" technique in a non-parametric test, similar to ANOVA in a parametric test. It tests the hypothesis of random distribution between columns and rows of a contingency table in the same way that ANOVA tests the null hypothesis of random distribution between groups (Sapsford & Jupp, 2006). The Chi-square test's advantages include robustness concerning the data distribution, ease of computation, and the detailed information derived from the test. Therefore, it is often used in studies for which parametric assumptions could not be met, and its flexibility to handle data from two and multiple-group studies (McHugh, 2013).

The **regression method** is thought to be robust for data analysis; however, the data prediction results occasionally contrast the developed hypotheses when one or more independent variables have several dependent variables (Röder-Sorge, 2018; Sapsford & Jupp, 2006). Alternatively, "a balance of theoretical results, empirical rules, and subjective judgment" is required to get a successful application for parametric methods (K. Park et al., 2020). It is not ideal for conducting a self-reported survey questionnaire in a behavior study, especially with the elderly's behavior, due to the potential severe outliers, which may skew the data heavily, causing an increased risk of bias. Selection bias is likely to decrease the model performance with inherent flaws (K. Park et al., 2020); therefore, the regression method is not used to analyze the data in this study.

In conclusion, in this study, the Chi-square test is chosen to test the hypotheses using one or more categories of the contingency tables to induce the associations of the two variables. Suppose the statistical hypothesis tests do not show the connection between physical attributes and activities gained from observation. In that case, ANT is added simultaneously to identify the different influences among the actants in public spaces. All objects and participants are treated in the same fashion. Subjective results collected in questionnaires developed for users and non-users and objective results extracted from the author's observation of users' activities are combined. The details of applied methods for this study are described next in section 4.4.

4.4 Data Collection and technique

This research implores a case study approach to collect data using various methods. Data collected are tested by the Chi-square test to verify the hypotheses by analyzing 353 valid samples. There is no comparative method employed.

4.4.1 Methods of data and information collection

From 2017 to 2021, data collection was implemented in three stages. The first stage was the observational stage of selected sites between November and December 2017 to specify the potential study areas. The second stage entailed collecting primary data via observing and interviewing the elderly from December 2018 to February 2019 to design POS features for study areas. Due to the pandemic lockdown in HCMC between late 2020 to 2021, the research resumed with the third stage in September 2021, when the author interviewed the experts virtually regarding recommended design guidelines for age-friendly POS. Secondary data were reviewed and updated periodically during this Ph.D. dissertation between 2017 and 2022. The details are described in the following parts.

4.4.1.1 Primary data collection

Primary data were collected from:

- The observation of the elderly's activities in POS
- Questionnaires on activities, reasons to visit or not to visit POS, and evaluations of experience and expectation of the users and non-user elderly

- The in-depth interviews with users and non-users focused on the impact factors of the visitation
- The expert interviews on the design guidelines for age-friendly POS

Observation

The author observed and captured the activities of the elderly and POS physical attributes through photo-taking and note-taking. Sixteen parks and public spaces in HCMC were studied in 2017; six parks with similar functions were excluded resulting in ten study areas selected for final extraction. The details of the ten survey areas are described in part 4.2. POS activities and features design were observed periodically between 5:30 and 21:30 on a random day of the week. Each site was observed twice, each time on a particular day, with approximately four hours per day focusing on-peak hours. Photos and detailed notes were taken in every observation.

Survey and Questionnaires

The survey was designed to interview the elderly who lived in study areas to investigate their activities, needs, experiences, and expectations about POS in HCMC. The participants were the people who used and did not use POS called "user groups" and "non-user groups," respectively. The 15-minute questionnaire (detailed in Appendix A) was divided into three parts as follows:

- Part 1: Collecting general information of respondents as both users and non-users. This part contained ten questions assessing age range, state of health and mobility, caring responsibility, and financial conditions to determine if they were users or non-users. Questions included multiple-choice, single-choice, and yes/ no questions with an optional question asking for the address to conduct mapping and identify the respondent's proximity within green spaces using the ArcMap software program.
- Part 2: Focusing on the user group who visited POS often (at least once or twice per month). Twelve questions were developed to address these inquiries: why they made the visits, what activities they liked to do, how they experienced the design of POS and the surrounding areas, and what expectations they had to improve POS (if any).
- Part 3: Focusing on the non-user group who visited POS rarely (a few times per year) or had never visited. Nine questions were developed to identify why they did not use POS for outdoor activities, the acceptable distances for them to use POS, and what POS should be improved to attract the elderly.

The sample size (N) was calculated based on Cochran's formula (1977, pp. 75–76):

$$N = \frac{Z^2 \times p \times (1-p)}{c^2}$$

Where *Z* is the *Z* value (e.g., 1.96 for 95% confidence level),
p is the percentage picking *a* choice or response (use 0.5),
c is a confidence interval of 6%.

As a result, *N* = 267 indicates that 267 or more samples were needed to yield a 95% confidence that the real value was within ± 6% of the measured or surveyed value. Hence, 380 respondents were selected for this research, of which 268 were users, and 82 were non-users. The non-users made up 25% of the respondents to provide a general understanding of why people did not use POS.

A pilot survey was conducted with 16 random users (6% of expected total users) in November 2017 in ten selected areas. Two surveys per site were done at multifunctional parks, district parks, and greenery along the riverside. In contrast, one survey per site was done at a roundabout, walking boulevard, and neighborhood unit. In addition, two non-users were asked to test the questionnaire, one in the CBD and one in the non-CBD neighborhood unit. Any errors or unclear questions were revised afterward.

From December 2018 to February 2019, 308 elderly were interviewed directly on the site by a team of five Vietnamese students. To look for the non-users, the team visited random houses in the CBD and non-CBD neighborhood units and conducted the interviews at their homes or set up future interviews

(see Figure 4.11). 22 out of 82 seniors were interviewed remotely using the surveyact.com online tools under the author's supervision. Additionally, 50 print-out questionnaires were distributed and filled by the elderly without assistance from the author and the supporting team. Data from questionnaires collected directly on-site were imported into the excel files daily to update the sample size and identify missing data collected by the team for quality assurance.

A student interviewed a user

A student interviewed a user

A student interviewed a non-user

Figure 4.11 Interview users and non-users with the survey questionnaire
Source: Photos by author and supporting team

Moreover, the survey collection step appeared inefficient in the online method because, without guidance, the elderly were unfamiliar with the new technology and often misinterpreted the survey structure. Hence, there was a higher number of missing or invalid data collected through an online survey and group self-survey methods, with 27 questionnaires (7%) received with no feedback or adequate data. On the contrary, all data collected directly by the team achieved meaningful feedback. The elderly were willing to answer all questions and provide their phone numbers and home addresses for further follow-up if necessary. The responses with the acceptable value questionnaire were 353, making up 93% of the total responses. The questionnaire distribution in the study areas is presented in Table 4.5..

No.	**Types of POS**		**Missing data**	**Number of the survey questionnaire**	
				Users	Non-users
1	CBDs	Tao Dan Park		26	35
2		Le Van Tam Park		26	
3		Nhieu Loc riverside park		25	
4		Ward 5, District 3		25	
5	Other	Nguyen Hue Walking Boulevard		11	
6		Turtle Lake Roundabout		11	
Total of CBDs			15	**124**	
7	Non-CBDs	Binh Phu park		25	50
8		Phu Lam park		25	
9		Ton That Thuyet park		25	
10		Ward 1, District 6		69	
Total of Non-CBDs			12	**144**	
Total				**268**	**85**
			27	**353**	
				380	

Table 4.5 Distribution of conducted questionnaire

Data from print-out and online questionnaires were de-identified and coded before being entered into Microsoft Excel software version 2013 by Microsoft Corporation. The author screened data for the second time to remove duplicated cases or incomplete information. The yes/no questions and multiple-choice questionnaires with two or more answers were coded in a numerical order starting with number 1 (e.g., 1, 2, 3, and onward). The final data from Excel were imported into Statistical Package for Social Sciences (SPSS) software version 26 of IBM Corporation. The respondents' addresses mainly used for mapping were entered into the ArcMap of ArcGIS for Desktop version 10.2 by Environmental Systems Research Institute, Inc. (Esri) software to analyze GIS data.

The input of coding data used as various variables is presented in Table 4.5. The Likert five-point scale (1-5) from the survey questionnaires was combined into three-point nominal categories (1-3), of which "Very good" and "Good" values become "Good" while "Bad" and "Not good" value becomes "Not good." This conversion was necessary for the Chi-Square analysis to avoid the violation of the assumption that the expected value of the cell should be five or more in at least 80% of cells, and no cell should have an expected value of less than one (Duke et al., 2020). The differences among the scale formats in the Likert scale were minimal in terms of variation in the mean, skewness, or kurtosis (Dawes, 2008). The ordinal Likert data were transformed from a four-point scale to binary, making the graphical representation more straightforward to understand because of the accentuation effect. Moreover, ordinal Likert data with high response rates may steer the analysis to non-parametric methods, which can cause a loss of information. Hence, parametric methods, graphical analysis, subsets analysis, and data transformation were to add more in-depth analyses (Mircioiu & Atkinson, 2017).

Treating variables as categorical or continuous is challenging because many ambiguous areas exist in determining the suitable types. For instance, any continuous variable can be treated as categorical (or a set of categorical variables) by "discretizing" it. If categories can be defined, the continuous value can be used to determine the appropriate category for each measurement. Meanwhile, continuous variables estimate the linear component of the relationship, but categorical variables capture much more complicated relationships (Pasta, 2009). In this case study, the data were considered categorical in Table 4.6.

Groups	Variables	Type of data	Rank of value	Type of variable
Dependent Variables	Visit Frequency	Nominal	Rarely; Often	Categorical
	Time spent	Ordinal	< 30 minutes; 30-60 minutes; > 60 minutes	Categorical
	Independent Variables			
Proximity	Distance to POS	Nominal	>300; 300-600; 600-1000; <1000m	Categorical
	Travel time	Ordinal	<15; 15-30; 30-60; >60 minutes	Categorical
Neighborhood characteristics	Microclimate	Ordinal	1-5: Very good - Bad	Categorical
	Trip to POS	Ordinal	1-3: Good-Not good	Categorical
	POS distribution	Ordinal	1-3: Good-Not good	Categorical
	Resident location	Nominal	CBD; non-CBD	Categorical
Users' characteristics	Age	Ordinal	60-64; 65-69; 70-74; ≥75	Categorical
	Gender	Nominal	Male; Female	Categorical
	Health condition	Ordinal	1-5: Very bad-Very good	Categorical
	Income	Ordinal	<4 Mil; 4-10 Mil; >10 Mil VND	Categorical
	Caring responsibility	Nominal	Self-caring; Caring for others	Categorical

Groups	Variables	Type of data	Rank of value	Type of variable
	Household arrangement	Nominal	Alone; With family	Categorical
	Previous job	Nominal	Jobs related to the human; Jobs related to nature; jobs related to non-human (e.g., industries with a machine).	Categorical
	Current job	Nominal	Retirement; Continue working; New job	Categorical
Design of POS	Greenery	Ordinal	1-5: Very good-Not good	Categorical
	Relaxing equipment	Ordinal	1-3: Good-Not good	Categorical
	Sport Equipment	Ordinal	1-3: Good-Not good	Categorical
	Decoration	Ordinal	1-3: Good-Not good	Categorical
	Toilet	Ordinal	1-3: Good-Not good	Categorical
	Cleanliness	Ordinal	1-5: Very good-Not good	Categorical
	Safety	Ordinal	1-5: Very good-Not good	Categorical
	Lighting	Ordinal	1-3: Good-Not good	Categorical
	Food & Beverage	Ordinal	1-3: Good-Not good	Categorical
Social Interaction	Seniors' activities	Ordinal	1-3: Good-Not good	Categorical
	Non-seniors' activities	Ordinal	1-3: Good-Not good	Categorical

Table 4.6 List of variables that were conducted for testing the hypotheses

Lastly, the reliability of eleven variables for questions using a Likert five-point scale was tested by Cronbach's Alpha (see Appendix E.1). Besides, every two categorical variables, including dependent and independent variables, were tested by Pearson's Chi-square. These variables were re-examined before determining the associations and accepting the hypotheses. In detail, each of the two independent variables - "Visit Frequency" and "Time Spent" in POS, was tested in a sequence with every attribute variable from each of the five independent variables: proximity, neighborhood characteristics, user characteristics, design of POS, and social interaction. A comprehensive list of 25 variables used to identify any associations is also shown in Table 4.6.

Interview

Users and non-users interview

Structured interviews with ten guidance questions (Appendix B) were conducted in multifunctional parks, district parks, and greenery along rivers in CBD and non-CBD neighborhood units. Six users representing six types of POS and one non-users in a non-CBD neighborhood were interviewed. All the interviews were personally conducted in Vietnamese on-site by the author in December 2017. Each interview took approximately 30 minutes and was documented in writing.

The users in POS were asked why they used the POS, which factors influenced their selections of POS, and what recommendations they had to improve POS. Regarding the non-user, the questions focused on why she or he opted not to visit POS and if any changes should be made to attract the elderly or to increase their access to POS.

Expert interview

The new design guidelines for senior-friendly POS were created based on the synthesized guidance listed in chapter 3 and the findings extracted from the surveys. The author interviewed the experts for recommendations and experiences with designing a park in HCMC. In addition, the author asked for

their thoughts on comparing the synthesis design guidelines in chapter 3 and the new design guidelines (Appendix C). The questionnaire interview process was conducted via email due to the pandemic lockdown in HCMC in September 2021. The five participating experts were an architect with experience designing parks, a lecturer in landscape design, an officer working in the HCMC Department of Urban Planning and Architecture, a landscape architect, and an urban planner. Only the architect and landscape design lecturer provided feedback regarding the guideline comparison.

4.4.1.2 Secondary data collection

Secondary data came from previous studies, population census data from Official Vietnam authorities, geographic information system (GIS) data from the Department of Nature and Environment of Ho Chi Minh City (DONRE) in 2009, and statistics data of busy hours in different POS from Google statistics.

Desktop review

This systematic literature synthesized the characteristics of POS aimed at increasing the number of visitations from the elderly and promoting physical activities by combining with the design of age-friendly POS. Articles and books written between 1920 and 2022 were thoroughly reviewed following the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) guidelines under the four-phase flow - identification, screening, eligibility, and included **(Moher et al., 2009)**. The first identification stage was done through the search engines: Google.scholar.com, Taylor and Francis Online (www.tandfonline.com), Science Direct (www.ScienceDirect.com), Springer (link.springer.com), and Google.com. Searching keywords were “the elderly,” “senior,” “impact factors,” “the use,” “public open spaces,” and “scholarly article” added to generate more academic studies. All the documents were actively screened to remove duplicates.

All papers’ abstracts and book summaries were reviewed for topic relevance before being read for the second time to obtain the objectives. The notebook was used to record their findings and documentation. Two hundred thirty-four papers in Vietnamese, English, and German were cited, including articles, reports, dissertations, and books on urban spaces, particularly for the elderly. All relevant studies were imported into Mendeley Desktop Version 1.19.4 by Mendeley Ltd. Based on the findings of previous studies, the hypotheses were created to examine which factors affected the choice of using POS. The combination of age-friendly design guidelines was built as the framework to design POS that matched the elderly’s needs. The process of synthesizing global age-friendly design guidelines is described in sub-chapter 5.1.

Population census data were used to gain some perspectives on the current aging population in Vietnam, whereas GIS data was used to show the distribution of the elderly. GIS data consisted of the number of households and residents, demographics of residents, including age, and the size and location of POS in each ward and district in HCMC. Google statistics helped get a general estimate of park uses each day before visiting sites for distributing the questionnaires.

4.4.2 Data analysis methods

A deductive approach was used to analyze data. The grounded theories about impact factors on POS were reviewed to pick out hypotheses. Then the hypotheses were tested by observation and survey questionnaire methods to confirm or reject, as shown in Figure 4.12 below.

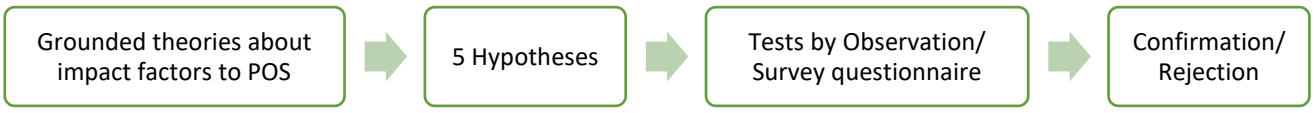


Figure 4.12 Deductive process

4.4.2.1 Qualitative data analysis

Two types of qualitative data used in this research for analysis were mapping and ANT. The mapping used GIS data to calculate the distance to POS, while ANT used photo and note taking to draw a network between physical attributes and the users' behaviors.

Mapping the distance

The questionnaire with self-reported answers asked for the subjective perception of distance to POS. The accurate distance was measured by ArcMap software using the respondents' addresses and their favorite POS. GIS data was also applied to draw the distribution of POS in HCMC, the distance between green spaces and residential areas, and any services within a 500-m radius of green spaces. Besides, Google data in 2018 provided the most updated information on land use.

ANT

The ANT analysis focused on the relationships between POS design features and the elderly's behaviors. The POS design features were generally specified but not in detail. For instance, all sidewalk attributes considered "actants" included pavement, grass, trees, lighting, vendors, and passengers.
The interactions between the elderly and "actants" created stability in the network. For example, the vendors provided interactions by observing, meeting, or performing sale transactions. The ANT for each type of POS was created based on observed data through photos and note-taking. Eight types of POS surveys contained many characteristics in the design, as each design attribute connected to commonly observed behaviors of the elderly.

4.4.2.2 Statistical analysis of the survey questionnaire

All the questionnaires collected were removed in Excel if duplicated or incomplete before being imported into SPSS software. The overviews of frequency, activities, time spent, date, and time of the day presented in stacked charts and tables elucidated the reasons for visiting or not visiting POS. Chi-square tests for independence in contingency tables were used to verify the hypotheses.

Chi-square tests for independence in contingency tables

The Chi-square tests for independence in contingency tables are used when the following assumptions were met:

- Both variables are categorical
- Mutually exclusive cells in the contingency table
- Independent observations
- The expected value of cells should be more significant in at least 80% of cells or five, and no cell should have an expected value of less than one (Duke et al., 2020).

When more than 20% of cells have expected frequencies of fewer than five, the analysis needs to implore Fisher's exact test because applying the approximation method is inadequate (H.-Y. Kim, 2017)

Fisher's exact test

Fisher's exact test is typically analyzed in small samples, but it still works for all sample sizes. While the Chi-squared test relies on estimation, Fisher's exact tests are exact. Fisher's exact test assesses the null hypothesis of independence by employing the hypergeometric distribution of the numbers in the table's cells (H.-Y. Kim, 2017). Fisher's exact tests are not only limited to computing with two-by-two tables utilizing the alignment and multiplication of appropriate binomial coefficients but also can be extended to larger tables, such as three-by-three tables, two-by-column, and row-by-column tables (Arthur W. Ghent, 1972).

Below is the formula of the one-tailed P-value for Fisher's exact test.

$$p = \frac{(a+b)!\,(c+d)!\,(a+c)!\,(b+d)!}{(a!\,b!\,c!\,d!\,N!)}$$

Where *a, b, c, and d* are the individual frequencies of the two-by-two contingency table, and *N* is the total frequency

In Fisher's exact tests, the two-tailed P-value is less unequivocal to calculate and cannot be found by simply multiplying the one-tailed P-value by two, but it can be computed using SPSS version 26 (Statistics Solutions, 2022).

The P-value and hypotheses tests

The *P-value* is "the probability of observing the given value of the statistical test, or greater, under the null hypothesis with its assumption of no effect or difference" (Dahiru, 2008; Ferreira & Patino, 2015). The *P* (probability) can take any value between 0 and 1. Values close to 0 indicate that the observed difference is unlikely due to chance, whereas value 1 suggests no differences between groups (Dahiru, 2008). Traditionally, the cut-off value to reject the null hypothesis is 0.05 (5% significance) (Ferreira & Patino, 2015). It has been used worldwide after the statement of R. A. Fisher in the 1930s: The value $P < 0.05$ is advocated as a standard level for concluding that there is evidence against the hypothesis tested, though not as an absolute rule'' (Dahiru, 2008).

Two hypotheses are identified. One is a null hypothesis (usually a statement of null effect), and the other is an alternative hypothesis (opposite the null hypothesis). The hypothesis test rejects or accepts one hypothesis based on a predetermined arbitrary benchmark, which the P-value designates. However, errors occur when the hypothesis is rejected even though it should be accepted and vice versa. Those errors are the type I error (i.e., there was no difference, but there was) and the type II error (i.e., when there was a difference when there was none) (Dahiru, 2008).

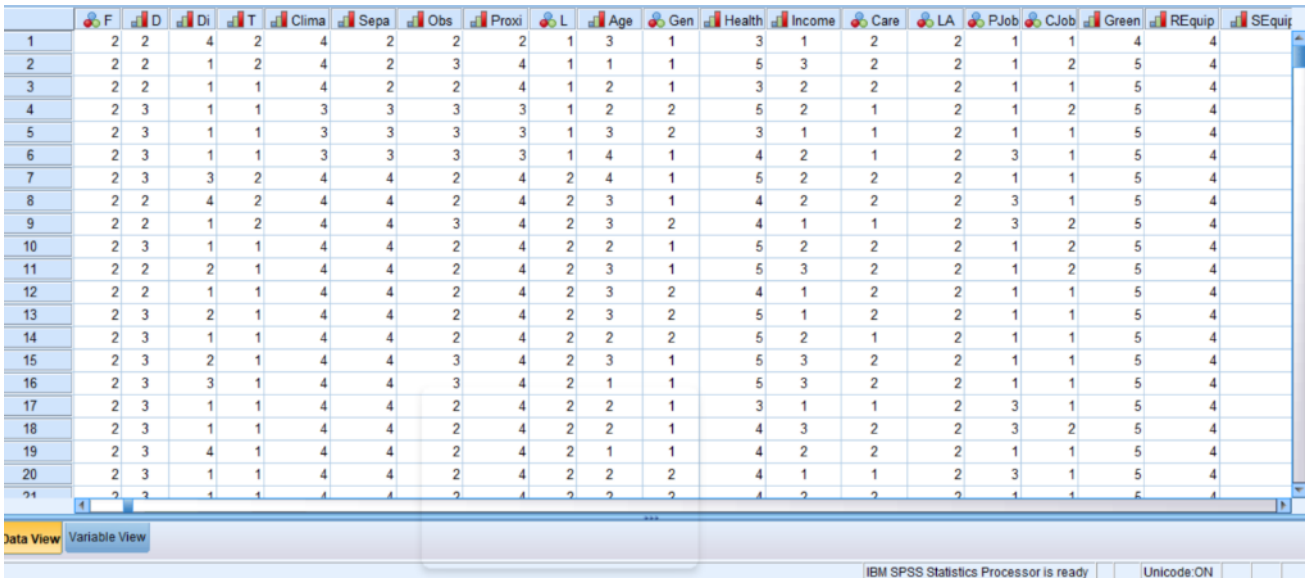
The *P-value* is influenced by three factors: (1) effect size, (2) size of the sample - a large sample detects a significant difference, and (3) spread of data - the spread of observations in a data set, measuring commonly with standard deviation. The bigger the standard deviation, the more observations spread and the lower the P-valu*e* (Dahiru, 2008). Therefore, the *P-value* should not be reported alone. Instead, the effect size should be considered, and the results should include the mean values for each group, the difference, and the 95% confidence interval in addition to the *P-value* (Ferreira & Patino, 2015).

Effect size

An effect is "a proportion of variance explained by a variable or error." It illustrates a relationship between one or more independent variable(s) and the dependent variable (Sapsford & Jupp, 2006). As the significance test does not tell us the degree of effect, displaying the effect size show the magnitude of the effect helpfully. Three different measures of effect size for the Chi-square test comprise Phi (φ), Cramer's V (V), and odds ratio (OR). φ and OR can be used as the effect size only in a two-by-two contingency table but not in a more extensive table (H.-Y. Kim, 2017). Limitations include sample size requirements, difficulty interpreting large numbers of categories (20 or more) variables, and the Cramer's V tendency to produce relatively low correlation measures, even for highly significant results (McHugh, 2013).

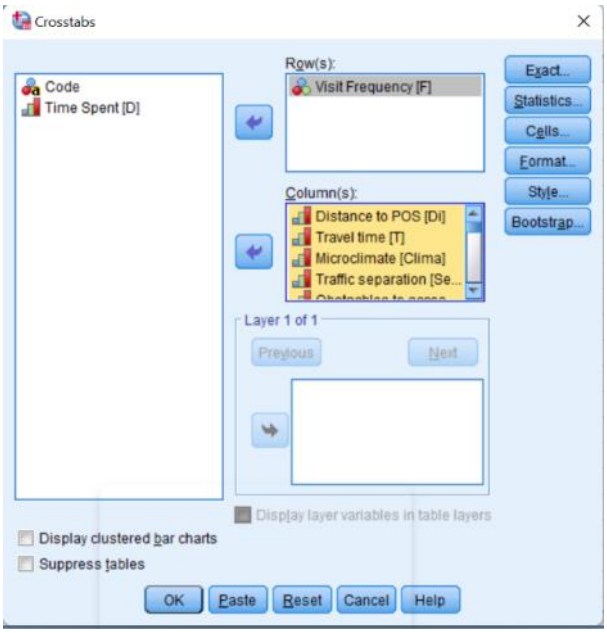
The procedure of the Chi-square test and Fisher's exact test using IBM SPSS Statistics for Windows Version 26.0 (IBM Corp., Armonk, NY, USA) is presented in the following example:

(a) Data (weight by F: Visit Frequency)

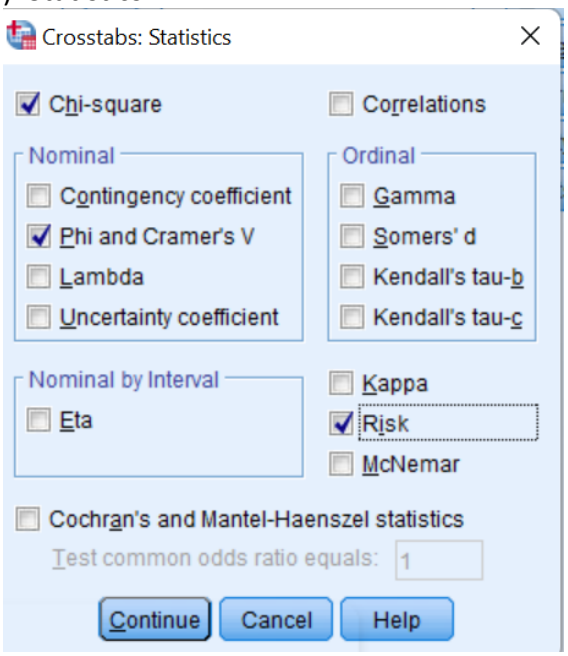


	F	D	Di	T	Clima	Sepa	Obs	Proxi	L	Age	Gen	Health	Income	Care	LA	PJob	CJob	Green	REquip	SEquip
1	2	2	4	2	4	2	2	2	1	3	1	3	1	2	2	1	1	4	4	
2	2	2	1	2	4	2	3	4	1	1	1	5	3	2	2	1	2	5	4	
3	2	2	1	1	4	2	2	4	1	2	1	3	2	2	2	1	1	5	4	
4	2	3	1	1	3	3	3	3	1	2	2	5	2	1	2	1	2	5	4	
5	2	3	1	1	3	3	3	3	1	3	2	3	1	1	2	1	1	5	4	
6	2	3	1	1	3	3	3	3	1	4	1	4	2	1	2	3	1	5	4	
7	2	3	3	2	4	4	2	4	2	4	1	5	2	2	2	1	1	5	4	
8	2	2	4	2	4	4	2	4	2	3	1	4	2	2	2	3	1	5	4	
9	2	2	1	2	4	4	3	4	2	3	2	4	1	1	2	3	2	5	4	
10	2	3	1	1	4	4	2	4	2	2	1	5	2	2	2	1	2	5	4	
11	2	2	2	1	4	4	2	4	2	3	1	5	3	2	2	1	2	5	4	
12	2	2	1	1	4	4	2	4	2	3	2	4	1	2	2	1	1	5	4	
13	2	3	2	1	4	4	2	4	2	3	2	5	1	2	2	1	1	5	4	
14	2	3	1	1	4	4	2	4	2	2	2	5	2	1	2	1	1	5	4	
15	2	3	2	1	4	4	3	4	2	3	1	5	3	2	2	1	1	5	4	
16	2	3	3	1	4	4	3	4	2	1	1	5	3	2	2	1	1	5	4	
17	2	3	1	1	4	4	2	4	2	2	1	3	1	1	2	3	1	5	4	
18	2	3	1	1	4	4	2	4	2	2	1	4	3	2	2	3	2	5	4	
19	2	3	4	1	4	4	2	4	2	1	1	4	2	2	2	1	1	5	4	
20	2	3	1	1	4	4	2	4	2	2	2	4	1	1	2	3	1	5	4	

(b) Analyze-Descriptive Statistics -Crosstabs

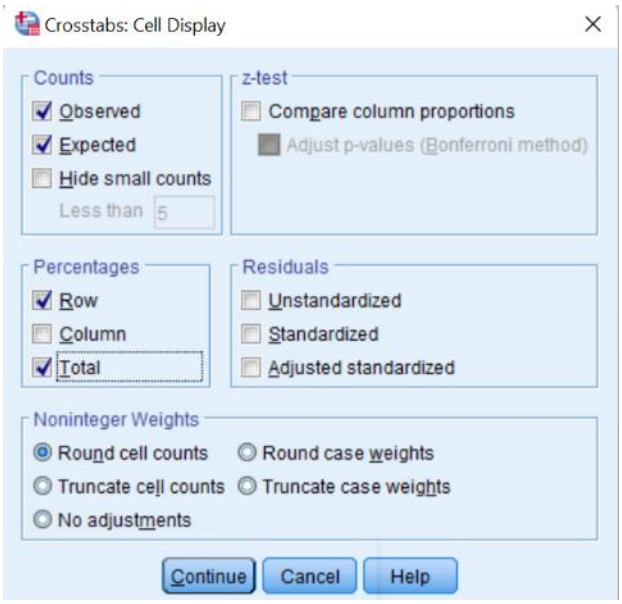


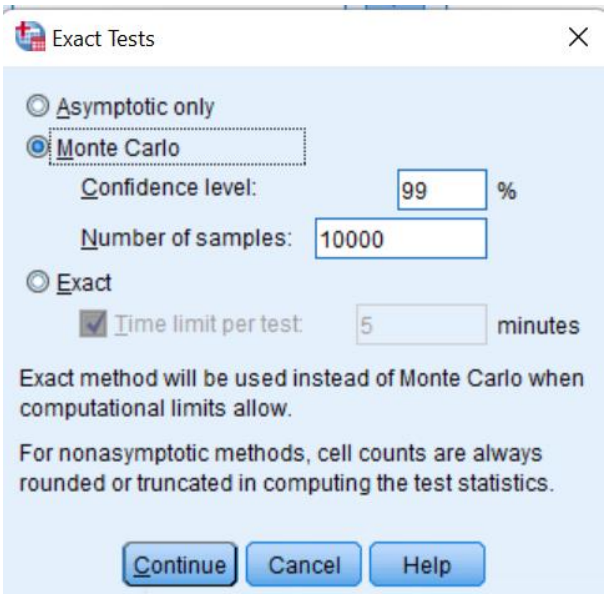
(c) Statistics



(d) Cells

(e) Exact tests





(f) Crosstables

Visit Frequency * Distance to POS Cross-tabulation

			Distance to POS				
			<300m	300-600m	600-1000m	>1000m	Total
Visit Frequency	Rarely	Count	72	9	2	3	86
		Expected Count	52.6	12.9	11.9	8.5	86.0
		% within Visit Frequency	83.7%	10.5%	2.3%	3.5%	100.0%
		% of Total	20.4%	2.5%	0.6%	0.8%	24.4%
	Often	Count	144	44	47	32	267
		Expected Count	163.4	40.1	37.1	26.5	267.0
		% within Visit Frequency	53.9%	16.5%	17.6%	12.0%	100.0%
		% of Total	40.8%	12.5%	13.3%	9.1%	75.6%
Total		Count	216	53	49	35	353
		Expected Count	216.0	53.0	49.0	35.0	353.0
		% within Visit Frequency	61.2%	15.0%	13.9%	9.9%	100.0%
		% of Total	61.2%	15.0%	13.9%	9.9%	100.0%

(g) Chi-square test

Chi-Square Tests

				Monte Carlo Sig. (2-sided)			Monte Carlo Sig. (1-sided)		
					99% Confidence Interval			99% Confidence Interval	
	Value	df	Asymptotic Significance (2-sided)	Significance	Lower Bound	Upper Bound	Significance	Lower Bound	Upper Bound
Pearson Chi-Square	26.674[a]	3	.000	.000[b]	.000	.000			
Likelihood Ratio	31.534	3	.000	.000[b]	.000	.000			
Fisher's Exact Test	29.208			.000[b]	.000	.000			
Linear-by-Linear Association	23.308[c]	1	.000	.000[b]	.000	.000	.000[b]	.000	.000
N of Valid Cases	353								

a. 0 cells (0.0%) have an expected count of less than 5. The minimum expected count is 8.53.

b. Based on 10000 sampled tables with starting seed 2000000.

c. The standardized statistic is 4.828.

(h) Effect size: Phi & Cramer's V

Symmetric Measures

				Monte Carlo Significance		
			Approximate		99% Confidence Interval	
		Value	Significance	Significance	Lower Bound	Upper Bound
Nominal by Nominal	Phi	.275	.000	.000[c]	.000	.000
	Cramer's V	.275	.000	.000[c]	.000	.000
N of Valid Cases		353				

c. Based on 10000 sampled tables with starting seed 2000000.

The applied tests according to types of data are summarized in Table 4.6

Hypotheses	**Variances**	**Type of Tests**	
		Visit frequency (Categorical variable)	Time spent (Categorical variable)
1.Proximity	Distance to POS	χ^2	χ^2
	Travel time	Fisher's exact test	Fisher's exact test
2.Neighborhood's characteristics	Microclimate	χ^2	χ^2
	Trip to POS	Fisher's exact test	χ^2
	POS distribution	χ^2	χ^2
	Resident location	χ^2	χ^2
3.Users' characteristics	Age	χ^2	χ^2
	Gender	χ^2	χ^2
	Health condition	χ^2	χ^2
	Income	χ^2	χ^2
	Caring responsibility	χ^2	χ^2
	Household arrangement	Fisher's exact test	χ^2
	Previous job	χ^2	χ^2
	Current job	χ^2	χ^2
4.Design of POS	Greenery	χ^2	χ^2
	Relaxing equipment	Fisher's exact test	$\chi 2$
	Sport Equipment	χ^2	χ^2
	Decoration	χ^2	χ^2
	Toilet	Fisher's exact test	Fisher's exact test
	Cleanliness	χ^2	χ^2
	Safety	χ^2	χ^2
	Lighting	Fisher's exact test	χ^2
	Food & Beverage	Fisher's exact test	Fisher's exact test
5.Social Interaction	Seniors' activities	χ^2	χ^2
	Non-seniors' activities	χ^2	χ^2

Table 4.7 Summary of Hypotheses tests and type of variables

4.5 Summary

This chapter considers different methods to answer six research questions in chapter 1. Regarding question 1 on a worldwide synthesis of age-friendly design guidelines, the desktop review with a systematic review of applicable standards and articles is applied to create the grounded design guidelines. This method is a framework for developing new design guidelines that match the needs of the elderly in HCMC. The next part, sub-chapter 5.1, will discuss the results in detail.

Questions 2, 3, 4, and 5 investigate the impact factors and associated effects on the use of POS, the preferences of the elderly, and the network between POS design elements and users' activities. These factors and preferences can be found through the questionnaire and observations. The observations provide data on activities, design features in POS, and their surroundings. At the same time, the questionnaire collects information about the reasons for visits, expectations, and experiences from the users and non-users in POS. The reasons for visits and activities in POS are also identified through in-depth interviews with users and non-users. As for data inquiry, two statistical tests are applied to explore the associated degree of impact factors, including Chi-square tests and Fisher's exact tests due to most categorical variables. Observation data using the ANT method conveys the network between design objects and the elderly's activities.

Lastly, the tailored design guidelines are created based on the review of framework guidelines to address the final research question on which models of age-friendly POS should be designed to match the elderly's needs in POS. Expert interviews are conducted to evaluate this new model. The next chapter will present the collected data findings and the statistical analysis process results.

5 CHAPTER 5: RESULTS

This chapter presents the results from various analyses in seven sub-chapters in the order of six research questions. Sub-chapter 5.1 provides the global design guidelines for the elderly synthesizing relevant guidelines. Sub-chapter 5.2 details the demographics of the respondents as the impact factors in series of user characteristics, including age, gender, and socio-economic status. Sub-chapter 5.3 describes the survey results on the use of POS, comprising of the frequency of visiting POS of the elderly, types of activities, duration of stay, time of visit, and commute method. Essentially, this part explains the reasons to visit or not to visit by the elderly, in addition to the evaluations and expectations for POS. In order to investigate the association levels of impact factors and the use, sub-chapter 5.4 analyses five hypotheses listed in chapter 2 using Chi-square tests and Fisher's exact tests. Because the models created from testing hypotheses cannot establish the relations between objects and human activities, only networks between objects in POS and elderly activities are drawn visually through ANT methods in sub-chapter 5.5. The network finding is used to develop new design guidelines later in sub-chapter 5.6, attributing the experts 'opinions to current guidelines and how to design a park in Vietnam. Lastly, sub-chapter 5.7 ends this chapter summarizing the facts' main features.

5.1 Synthesis of design standard for POS towards the elderly

In this section, the design guidelines of public spaces, particularly parks, for the elderly are the focus in synthesizing age-friendly design standards for POS by applying desktop review following the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) method (Moher et al., 2009). In March 2018, materials for global design guidelines for the elderly were collected in digital form. The search engines for relevant publications on age-friendly design guidelines for public spaces follow four stages of PRISMA, as shown in Figure 5.1.

1. Identification: The identification process was conducted when keywords for urban planning and architecture were entered into popular search engines such as scholar.google.com, Taylor and Francis Online (www.tandfonline.com), Science Direct (www.ScienceDirect.com), and Springer (www.link.springer.com). "Design guidelines" and "elderly" keywords were used in scholar.google.com, while "Design guidelines," "elderly," and "park" keywords were used in other search engines. Google.com provided a larger search with more keywords such as "public spaces design guidelines for the elderly," "seniors," "age-friendly design guidelines for parks," "age-friendly design guidelines," "parks for the seniors," "parks for the elderly," and "older people." For Google, the use of the format term "scholarly article" added in search queries directed the author to Google Scholar to generate more academic studies and accredited scientific journals. Another valuable source came from relevant articles and guidelines reference lists collected from academic resources.
2. Screening: The research titles were screened to exclude papers that were irrelevant to the intended research topic.
3. Eligibility: Documents written in non-English or non-Vietnamese language were excluded. The papers that were not available in full text were also removed. Design guidelines were considered ineligible if their methods did not focus on the elderly, or did not follow Vietnam standards. All materials collected for this research were downloaded freely or retrieved from the institute library at no cost. However, there was a small number of pertinent articles or relevant policies that were inaccessible. The downloaded articles were categorized into a folder named "Relevant References" after the first screening. Articles containing intended research content were then moved to a second folder named "Selected References" after the second review before being cited correctly using Mendeley Software.

4. Inclusion: To further reduce the list of research documents, a third review was conducted, and 14 papers were selected (Table 5.1). This final selection covering the most relevant literatures worldwide were sufficient data to use to synthesize a new guideline. In June 2018, the first draft of the global design guidelines was generated, and the synthesis of the design guidelines was updated and finalized in June 2021 (Table 5.2).

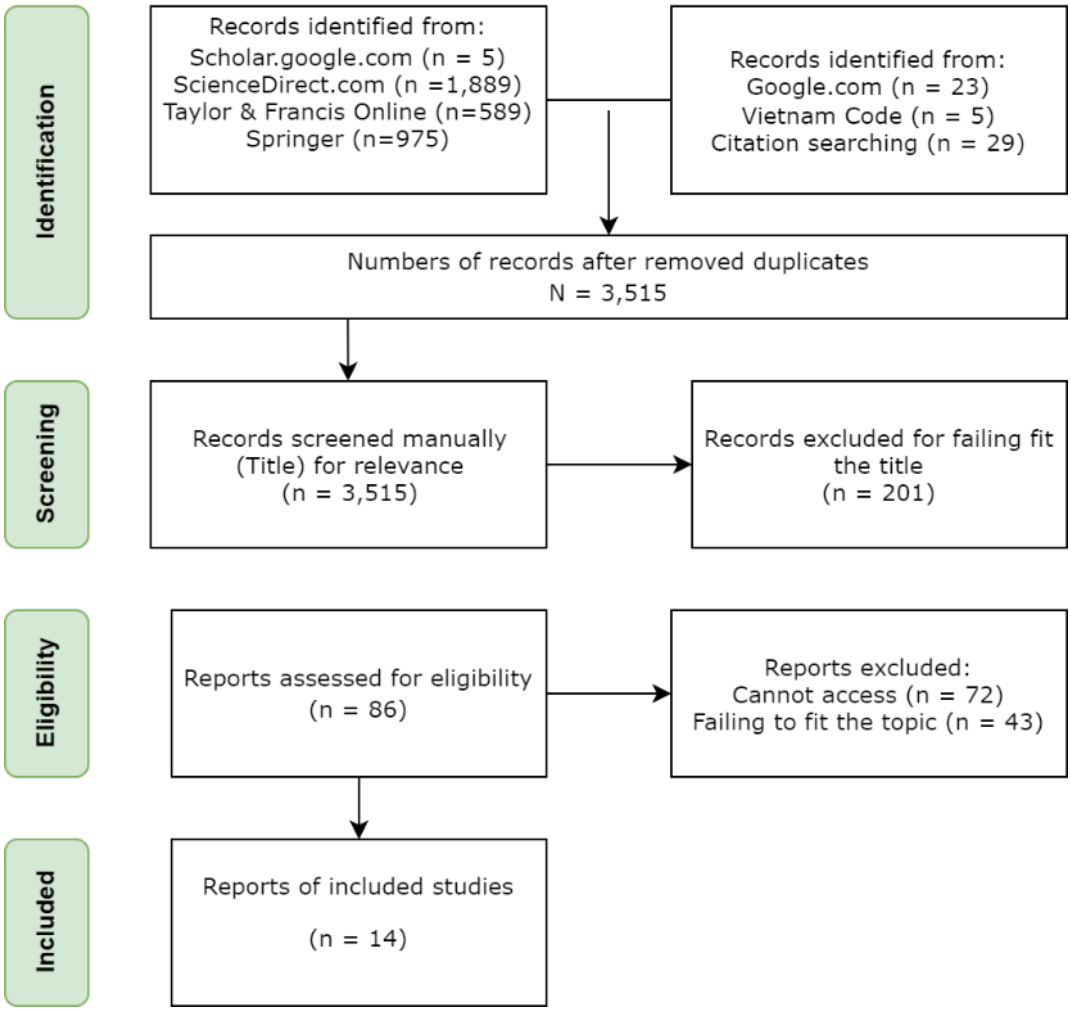


Figure 5.1 PRISMA for records of design guidelines

List of publications for synthesizing

Publication Title	Country, Author, and year of publishing
1. Placemaking for an aging population. Guidelines for Senior-Friendly Parks	The US, A. Loukaitou-Sideris, L. Levy-Storms, and M. Brozen. 2014
2. Parks for an Aging Population: Needs and Preferences of Low-Income Seniors in Los Angeles	The US, A. Loukaitou-Sideris, L. Levy-Storms, L. Chen, and M. Brozen, 2016
3. National technical regulation on construction planning	Vietnam, Ministry of Construction, 2021
4. Greenery planning for public utilities in urban areas - Design standards	Vietnam, Ministry of Construction, 2012
5. Global Age-friendly Cities: A Guide	World Health Organization, 2007
6. Urbaging: Designing urban space for an aging society	Switzerland, A. Josep, 2009
7. Guidelines for Planning for Older People in Public Open Space	Australia, Sarkissian and B. Stenberg, 2013

8.	Elderly-friendly Design Guideline	Hong Kong Architectural Services Department, 2018
9.	Designing Urban Public Spaces for Pedestrian Mobility of Elderly Citizens A Case of Bengaluru City.	India, D. R. Patil and M. P. Raj, 2015
10.	Urban Open Spaces	The US, M. Francis, 1991
11.	Needs in public space	The US, S. Carr, M. Francis, Leanne G. Rivlin, and Andrew M. Stone, 1992
12.	The Architecture of Community	The US, L. Krier, 2009
13.	Multi-Criteria Assessment of Public Space from the Social Perspective	Poland, S. Palicki, 2015
14.	How far is the park?	Vietnam, T. T. H. Phan, D. Labbé, and É. P. Pelletier, 2015

Table 5.1 List of synthesized publications for design guidelines

Table 5.1 demonstrates the synthesis of global age-friendly design guidelines based on the seniors-friendly design guidelines of Loukaitou-Sideris et al. (2014, 2016), following five groups of impact factors on using POS (listed in chapter 2). The design guidelines of Loukaitou-Sideris study are selected for their explicit configuration of applicable instructions for planners to develop senior-friendly parks in inner cities narrowing the gap between an academic study and the application of the results for planners, architects, and landscapers (Loukaitou-Sideris et al., 2016). Meanwhile, other guidelines, such as "Elderly-friendly design guidelines" from the Hong Kong Architectural Services Department, are based on the policies, case study projects, and non-academic guidelines with a workshop survey of the representative users and stakeholders. The users in academic articles play an important role as stakeholders, while guidelines controlled by the investors are more practical and less beneficial to the users. Besides, other scholarly studies lack the application of their models in the form of design guidelines compared to Loukaitou-Sideris.

In this study, the synthesized design guidelines were used as a ground framework, and adjusted accordingly using other studies' guidelines to fit the needs of the elderly in a specific location such as HCMC (shown in sub-chapter 5.6.1.) Even though this synthesis did not address all impact factors listed in sub-chapter 2.2 because of the practicality and applicability employed by planners, landscape designers, and architects, all the elements were considered and included.

	Objectives	**Principles**
Proximity	Accessibility: Quick, safe, and easy to access	▪ Barrier-free ▪ Ample handicapped parking ▪ Walkable distance (National Technical Regulation on Construction Planning, 2021) Increase the number of public spaces (recommend: inner the radius of 900m of existing downtowns in lacking POS cities such as HCMC and Hanoi, Vietnam) (Phan et al., 2015)
	Control: have a good sense of orientation and understanding of the park's layout with different offerings	▪ Provide a visible sign at the entrance, way-finding signage to the parks and inside the parks, layout information/ map/ programs by flyers in many languages (including graphic and Braille) at the entrance and other areas inside the parks ▪ Design a park layout that is legible and comprehended from the main entry ▪ Provide oriental features in large parks (e.g., a kiosk, a clock tower, a fountain, some boulders) ▪ Simple looped walking path to avoid confusion and frustration at change of direction and dead-ends situation for the elderly (Architectural Services Department, 2018)

	Objectives	Principles
		▪ Provide educational and informational signs/ other sensory cues (sound patterns, flower fragrances) inside the parks
Neighborhood characteristics	Economic: Contribute economic benefits to the surrounding community (Francis, 1991)	▪ Space as a place of work, Creates economic, property market price and functional custom, Dynamics of property price fluctuation, Perception of business attraction & stability (Palicki, 2015); ▪ A false economy with too little public space, a false luxury with too much public space (recommended from 25 to 35% total area of the quarter (Krier, 2009, p. 163) or 7-9 m^2 per capita for a neighborhood unit (National Code, 2012)
	Connectivity (Josep, 2009)	▪ Good connectivity between public spaces: attractive, continuous, and intervenes footpaths (Josep, 2009). ▪ Park placement near the transit stops and the facilities that the seniors often use (e.g., senior centers, churches); ▪ Create pleasant places to rest along pathways or a little oasis (including one or more of these elements: benches, water features, vegetation, sufficient lighting, trash bins, shelters against unpleasant climates, and toilets) (Josep, 2009). ▪ Locate shared/ joint open spaces (or patios) for parties and barbecues next to interior community areas (Sarkissian & Stenberg, 2013); ▪ Connect to the larger community physically and programmatically through events and activities that engage older people (e.g., outdoor health clinic; senior yoga, and farmers markets) ▪ Limited grade changes and flat or gently sloped ramps and pathways ▪ Connect to the presence of people through consumption and trading activities. Bars, restaurants, shops, and public services make the squares attractive and frequently visited (Josep, 2009)
	Safe pedestrian crossings (World Health Organization, 2007)	▪ Non-slip strips on pedestrian crossings, bridges, and tunnels to assist pedestrians at crossroads, auditory as well as visual cues at crossings (World Health Organization, 2007) ▪ Safe crossings: signalized intersections with adequate times to cross the street (Josep, 2009)
	Age-friendly pavements (World Health Organization, 2007)	▪ Smooth, flat, non-slip surface; wide enough to accommodate wheelchairs; remove the curb to make it level with the road surface; clear of obstacles such as street vendors, parked cars, and trees; and prioritize pedestrians (World Health Organization, 2007).
Users' characteristics	Functionality (need for a tranquil environment at the park)	▪ Reduce street noise: locate the park in a quiet location, use buffer planting for seating areas in parks, and use natural sounds (e.g., water, the breeze moving through tree leaves) ▪ Offer some sub-areas that visitors can sit alone
	Democratic (Francis, 1991)	▪ Governance: the age-friendly city is a city for all. Participation: the age-friendly city is built for the elderly (Josep, 2009). ▪ Mainstreaming: There are many ways to meet the elderly's needs and cover various areas of public authority: town planning, housing, social, and health services. Creating a city for seniors requires a holistic approach (Josep, 2009). ▪ State what each outdoor community space is primarily used for (Sarkissian & Stenberg, 2013) ▪ Over time should evaluate, redesign, and improve the public spaces (Francis, 1991) ▪ Friendly and beloved by the users and the neighborhood (Francis, 1991)

	Objectives	Principles
Design of POS	Safety/security	▪ Crime: Clear lines of sight paths; avoid foliage blocking the views; Aquadate lighting; no dark or concealed areas ▪ Emergency phone boxes and security technology (e.g., CCTV, emergency report systems) ▪ Community volunteers overseeing safety ▪ Falls: Non-slippery, flat, or gently sloped paving surfaces; Handrails on ramps and paths; Avoid stairs; No skateboarding or cycling in the park, or only in designated areas
	Contact with nature	▪ The predominance of "soft-scapes" (plants, greenery) over "hard-scapes" (concrete) (recommended ratio of 30% hardscape and 70% vegetation) ▪ Adequate shadows by trees ▪ Diverse plants, flowers, and vegetables (e.g., various colors, fragrances); Arrange flowers in multi-tiered flower beds to save space in small parks ▪ Slowly moving water elements (e.g., small ponds, creeks, and waterfalls) ▪ Soothing and natural sounds (water, birds, breezes, wind chimes) ▪ Urban spaces as a setting for unthreatening wildlife (e.g., birds, butterflies, squirrels, ducks) ▪ Provide opportunities for environmental learning (Francis, 1991) ▪ Better maintenance (World Health Organization, 2007)
	Age-friendly, ergonomic design	▪ Seats with ergonomic design, backs, and arms made from natural materials (resistant to high temperatures) ▪ Benches, preferably wooden paint, allow rapid drying. Avoiding too cold or too hot metal benches (Josep, 2009) ▪ Light, easily movable seats and tables under shade (e.g., trees, kiosks, pavilion, and umbrellas) ▪ Using contrast colors in seating and pavement for compromised depth of field perception ▪ Design for helper/companion (Architectural Services Department, 2018)
	Various physical activities	▪ Walking loops and paths with destination points ▪ Different length paths for different levels of walking difficulty ▪ Sports equipment for different capacity levels ▪ Locate low-impact exercise equipment away from heavy-traffic park areas ▪ Grassy, flat area for group exercise classes and Tai-chi group ▪ Organized physical activity classes for seniors ▪ Gardening activities for seniors
	Flexibility in park design and offering different choices	▪ Offer opportunities for both passive recreation (people, performance, and scenery-watch) and active recreation (e.g., direct contact with people, groups game, promenade) (Carr et al., 1992) ▪ Provide seating options and spaces for small and more significant groups for a person alone, in the shadow, or under the sun.
	An aesthetic and sensory delight	▪ Place exciting sensory at shorter intervals ▪ Using vegetation or art placement to screen and transform unpleasant views (e.g., a blank wall or an asphalt parking lot) ▪ Identify and use cultural meaning plants for particular cultural or ethnic groups in the neighborhood ▪ Consider outdoor installation ▪ Includes opportunities for discovery (e.g., crafts fairs, concerts, flea markets), delight, and challenge (Carr et al., 1992; Francis, 1991)
	Comfort	▪ Protection from sun, wind, rain, and glare: Using trees and vegetation to protect from direct sunlight and minimize glare; Providing elements that can protect from the sun, such as umbrellas and kiosks.; Provide settings that offer

	Objectives	Principles
		overhead protection, such as umbrellas and kiosks, for sun and rain protection; In windy areas, orient parks and parks' features to avoid prevailing winds; In hot climates, orient the park in a way that allows cool breezes ▪ Encourage food stands in the park ▪ Prevent from being disturbed by noise and odor (World Health Organization, 2007)
	Adequate public toilets (World Health Organization, 2007)	▪ Availability of clean, conveniently located (near the walkways), well-signed, handicap-accessible toilets (World Health Organization, 2007). Information on the location of public restrooms (Josep, 2009) ▪ Favor self-cleaning models or made with washable materials quickly (Josep, 2009); ▪ Avoid the toilets underground that are difficult to access and insecurity (Josep, 2009)
Social Interaction	Social Support: wanting to be connected with other human beings and be cared for and supported by them	▪ Seating that facilitates interaction BBQ pits, chess tables, board games ▪ Neighborhood events or events that bring youth and seniors together (e.g., youth orchestra performances) ▪ Outdoor reading room ("little free library" to donate and read books) ▪ Provide architectural, natural, or landscape elements that encourage a conversation (e.g., kiosks, water fountains, flowers, pigeons) that bring people together around a common focus ▪ Facilitate community exchanges, e.g., food banks, community-supported agriculture, and exhibits of neighborhood photos taken by the elders ▪ Using bulletin board and newsstand as a node for local information exchange
	Park Operation: Towards an Intergenerational Playground?	▪ Prioritize the use of specific equipment and facilities for the elderly ▪ Provide senior facilities in parallel with non-seniors facilities ▪ Exclude certain dangerous activities for older adults ▪ Provide an area in the park where elders can feel their own ▪ Locate a carefully designed children's playground where residents can watch without having their privacy invaded (Sarkissian & Stenberg, 2013); ▪ Locate shared areas that can be accessible and visible from a maximum number of points while still maintaining visual and acoustic privacy (Sarkissian & Stenberg, 2013);

Table 5.2 Briefly synthesis of global design guidelines
Source: The author mainly bases the guidelines for senior-friendly parks on Loukaitou-Sideris et al. (2014, 2016).

5.2 Participants' information

The survey comprised 380 responses from senior individuals, including 268 identified as users (70%), 85 as non-users (22%), and 27 incomplete responses (8%). Of 353 valid respondents, the highest percentage of response (30%) was among the group aged 65 to 69, while the lowest percentage of response (16%) was among the group aged 75 and older. The participant correspondence from the survey did not align with the age group distribution in Vietnam's urban areas, which reported to have 35% of the population aged between 60 and 64, 24% between 65 and 69, 14% between 70 and 74, and 27% of 75 and older. The sample size of groups over 75 was an outliner and excluded because the average life expectancy of Vietnamese people was 73.3 years, according to GSO (2015). Hence, an equal sample size was chosen for each of the three leading groups aged 75 or younger in this study. The duration of using favorite POS ranged from one to 20 years, of which one-third of the respondents claimed to have used the studied POS over five years, another third reported to have visited it less than five years, and the remaining third did not provide the time. The sample size was equal in gender, with 52% of male and 48% of female respondents (Table 5.3).

Gender	N	Percentage	Range of age	N	Percentage
Male	182	51,6%	60-64	96	27.2%
Female	171	48,4%	65-69	108	30.6%
Total	353	100,0%	70-74	92	26.1%
			75 and above	57	16.1%
			Total	353	100.0%

Table 5.3 Basic information of respondents

Table 5.4 shows the respondents' socio-economic status, including their self-rated health status, occupation, income, and household size with the household arrangement. Regarding health conditions, eighty percent rated themselves as average to good health. They had acceptable movement and conscious awareness. Nearly 70% used to work related to the human environment, such as teachers, administration, human resources, and office workers. Fewer respondents (less than 5%) had worked in the natural environment as agricultural engineers, farmers, or gardeners. Thirty percent had worked in a firm or lab with fewer people and mostly with machines or tools. At the time of the questionnaire interview, 60% had retired. The remaining either were at the same jobs or had started their new positions recently after being retired from companies at 60 for men and 55 for women. Ninety-five percent lived with their immediate family, including their spouse, grown-up children, or their children's family. Among them, 60% were caring for their grown-up children, grandchildren, or spouse. Their income was low in comparison to the average income of HCMC as of 2018. Forty percent earned their wages less than the minimum living cost[11] in HCMC, while 30% had higher than average[12].

Respondent's socio-economic status		N	Percent
Self-rated health status	Very bad	20	5.7%
	Bad	59	16.7%
	Normal	129	36.5%
	Good	64	18.1%
	Very good	81	22.9%
Previous Occupation	Jobs related to humans (e.g., teachers, administration)	237	67.1%
	Jobs related to nature (e.g., farmers, gardeners)	17	4.8%
	Jobs related to non-humans (e.g., industry, labs)	99	28.0%
Current work	Retirement	212	60.1%
	Continue working	102	28.9%
	Start new jobs	39	11.0%
Caring responsibility	Self-caring	138	39.1%
	Caring for other people (spouse, children, relatives, grandchildren)	215	60.9%
Household arrangement	Alone	18	5.1%
	With family	335	94.9%
Monthly income[13]	< 4 million VND	143	40.5%
	4 million – 10 million VND	163	46.2%
	>10 million VND	47	13.3%

Table 5.4 Socio-economic states of the respondents

[11] Minimum living cost in HCMC was 4.2 million VND per month since 2017, based on the standard of Vietnam General Confederation of Labor

[12] Average salary in HCMC in 2018 was 10.3 million VND per month, as a survey of Navigos Group – the biggest career website in Vietnam.

[13] 1 USD = 23,240 VND as of 25th June 2019

5.3 The use of POS for the elderly

This part shows the results of Geographic Information System software (ArcGIS) computation on the distance to POS from the respondents' locations. Additionally, it also mentions the descriptive analysis of the survey questionnaire about the frequency of the visit to POS, time spent, means of transport to POS, reasons to visit, usual activities, and the evaluations and expectations of the elderly about POS.

5.3.1 Distance to green spaces

Figure 5.2 shows the POS distribution in HCMC survey areas using the ArcGIS software to define 500-m buffers and the location of the respondents taken from the questionnaires. This map presents an insufficient green-space distribution and a gap between CBD and non-CBD. Remarkably, 17% percent of Ward 5 and District 3 (W5, D3) representing CBD, and 3% percent of Ward 1 and District 6 (W1, D6) representing non-CBD were not covered in the 500-m buffer zone (Table 5.5). Moreover, the trip to POS in CBD was three times shorter than in non-CBD, 170 m and 618 m, respectively (measured by a median number). The average distance calculated for the whole study area to their favorite parks was 615 m. The survey results also showed a big gap between the median and average length due to the variation between the minimum and maximum distances (Table 5.6).

Regarding the median distance to each type of POS, most elderly residing in non-CBD traveled from 700 to 900 m to visit communal parks such as multifunctional, district parks, and greenery along rivers. In contrast, the elderly living in the CBD commuted less than 200 m. The distribution of pocket parks was also disproportional. The elderly in non-CBD traveled nearly twice the distance compared to the elderly in the CBD area (490 m and 300 m, respectively).

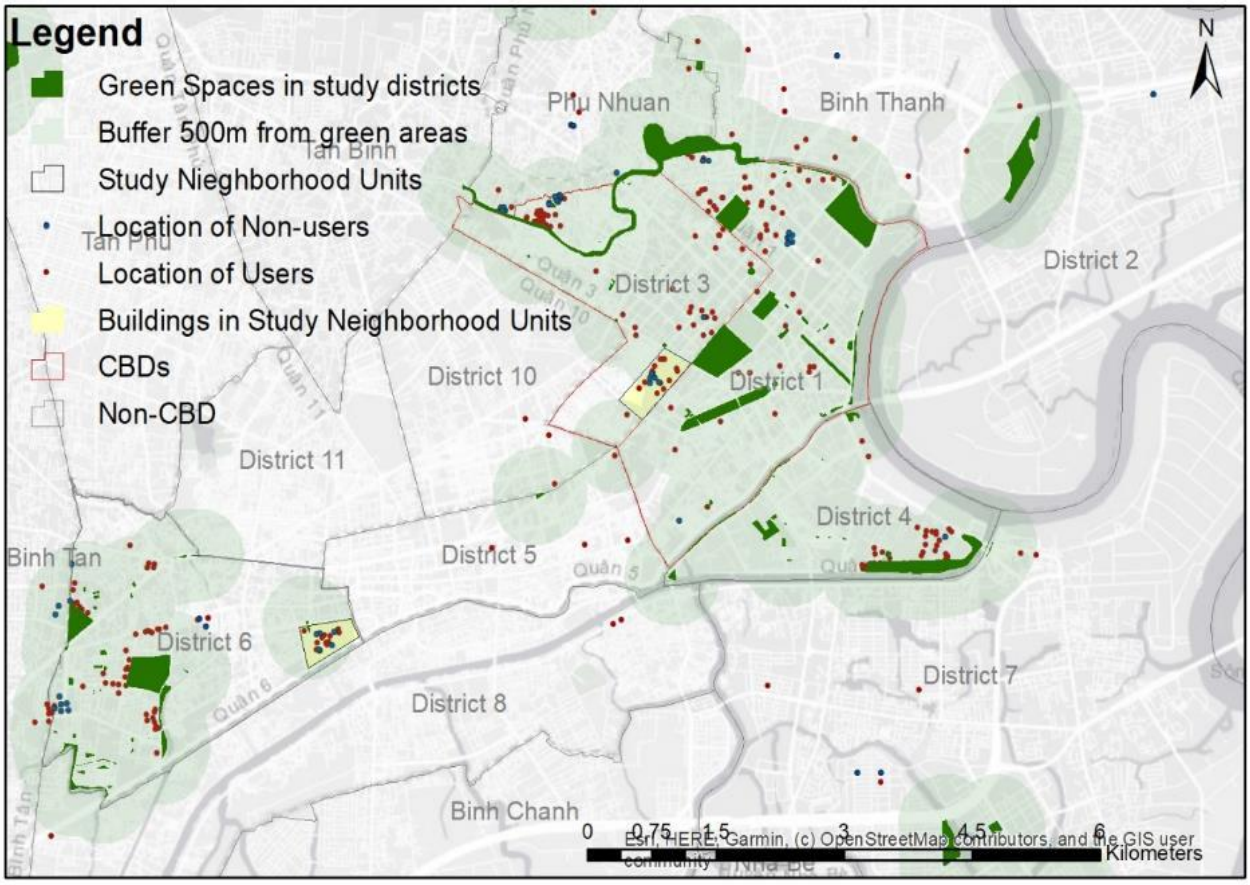


Figure 5.2 The coverage of buffer 500m of green spaces to neighborhood units

There was an insufficiency in green space distribution and a gap between CBD and non-CBD. Seventeen percent of Ward 5, District 3 (W5, D3), representing CBD, and 3% of Ward 1, District 6 (W1, D6), meaning non-CBD, were not covered in the 500m buffer zone (Table 5.5). The trip to POS in CBD was three times shorter than in non-CBD: 170 m and 618 m, respectively (measured by a median number). The average distance calculated for the whole study area to their favorite parks was 615 m. The survey results also showed a big gap between the median and average length due to the variation between the minimum and maximum distances (Table 5.6). Regarding median distance to each type of POS, to visiting communal parks, such as multifunctional district parks, and greenery along rivers, most elderly residing in non-CBD traveled from 700 to 900 m. In contrast, the CBD elderly commuted less than 200m. The distribution of pocket parks was also different. The non-CBD elderly traveled nearly twice more than the CBD elderly (490 m and 300 m, respectively).

	Area		**Proportion**	
	m^2		%	
	W5, D3	W1, D6	W5, D3	W1, D6
Areas inside a radius of 500m from green spaces	184,937	247,365	83%	97%
Areas outside the radius of 500m of green spaces	37,574	7,071	17%	3%
Total	221,511	254,436	100%	100%

Table 5.5 The percentage of coverage green spaces within a 500m radius

Distance to POS (meters)	**Total**	**Multifunctional parks**		**District parks**		**Greenery along rivers**		**Pocket parks**		**Walking boulevard**
		CBD	Non-CBD	CBD	Non-CBD	CBD	Non-CBD	CBD	Non-CBD	CBD
Mean	615	758	807	144	1,047	271	727	231	644	509
Median		**182**	**275**	**81**	**946**	**195**	**669**	**272**	**490**	**316**
Minimum		17	119	17	126	12	37	31	16	36
Maximum		6,955	3,072	592	4,305	2,538	3,353	661	2,176	1,532

Table 5.6 Distance to favorite parks of the users

When the non-users were asked how far the park should be from their homes, 48% responded between 200 m and 500 m, while 42% wished it should be less than 200 m. However, 10% reported using POS that required over 500 m of walking. As a result, ArcGIS calculated the mean distances from the non-users' houses to the nearest POS to be between 146 m and 166 m (Table 5.7).

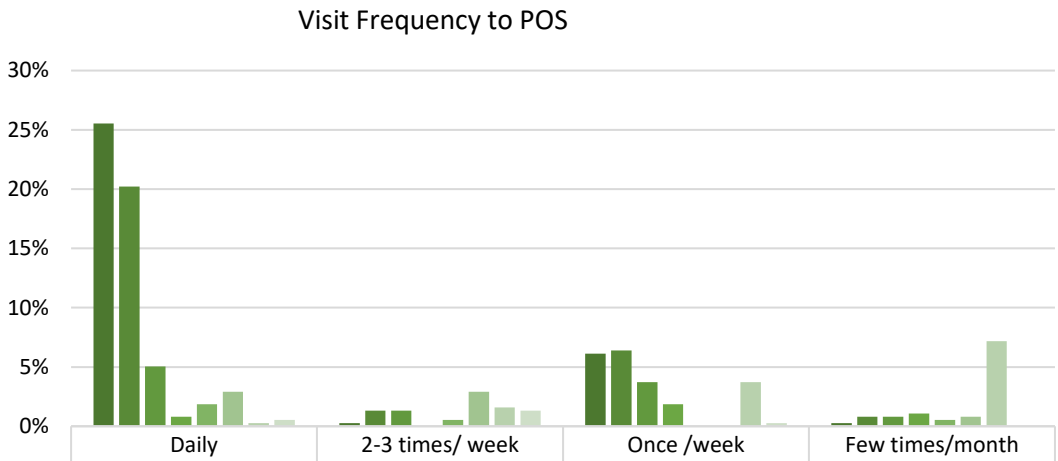
Distance to the nearest green spaces (meters)	**Nearest green spaces**	
	CBD	**Non-CBD**
Mean	**166**	**146**
Median	*78*	*69*
Minimum	*21*	*10*
Maximum	*523*	*802*

Table 5.7 Distance to nearest green spaces of the non-users

5.3.2 The frequencies of visiting POS

Figure 5.3 shows the relative results of a multiple-choice question (more than one answer can be selected) asking how frequently an elderly visited POS and the type of POS they would choose (collected from 376 complete responses). It can be inferred from the results that the elderly saw POS quite often; however, the visit frequency varied depending on the type of POS. The most daily visits (58%) happened in parks and greenery along the rivers. Sidewalks and alleys used for everyday walking

were not popular, with 4% of visits for both types. Visiting religious public buildings was considered a favorable exercise for the elderly, with 11% visiting once per week or once per month.

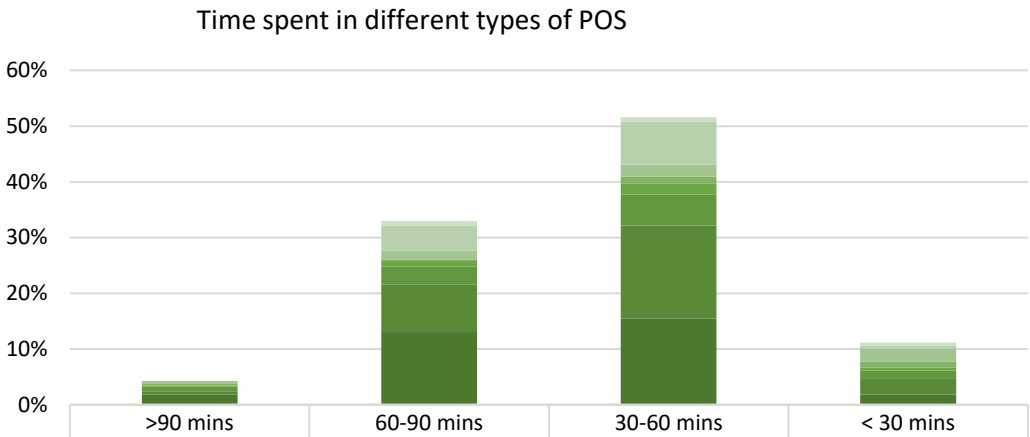


	Daily	2-3 times/ week	Once /week	Few times/month
Parks	26%	0%	6%	0%
Greenery along rivers	20%	1%	6%	1%
Pocket Park	5%	1%	4%	1%
Walking Boulevard	1%	0%	2%	1%
Roundabout	2%	1%	0%	1%
Sidewalk	3%	3%	0%	1%
Religion yard	0%	2%	4%	7%
Alley	1%	1%	0%	0%

Figure 5.3 Visit Frequency to POS by types of POS

5.3.3 Time spent in POS

A multiple-choice question was designed to track the time spent in POS and received 376 responses. 85% of the respondents reported spending between 30 to 90 minutes in the POS (Figure 5.4). Some of the particular POS, such as parks and greenery along the river, were most attractive to the user as they intended to stay longer compared to other POS types due to various activities (Figure 5.4). Only a small number of the elderly (3%) remained in the alleys for no more than 90 minutes to socialize or to do housework and food preparation. The preferred time concentrated on the early morning (5-7 am) and early evening (5-7 pm) hours, 28% and 25% of the respondents, respectively. The elderly who did not visit POS every day of the week would come more frequently on Sundays (Figure 5.5).



	>90 mins	60-90 mins	30-60 mins	< 30 mins
Alley	0%	1%	1%	1%
Religious yard	0%	5%	8%	1%
Sidewalk	1%	2%	2%	2%
Roundabout	0%	0%	1%	1%
Walking boulevard	0%	1%	2%	1%
Pocket park	1%	3%	6%	1%
Greenlines along rivers	1%	9%	17%	3%
Park	2%	13%	15%	2%

Figure 5.4 Time spent in different types of POS

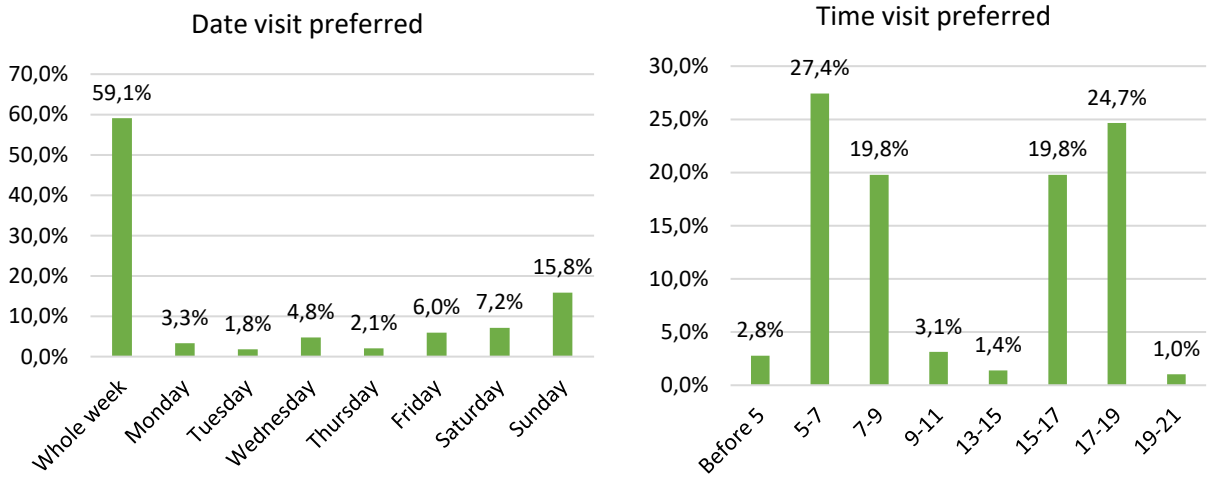


Figure 5.5 Date and time visit preferred

5.3.4 Travel time and means of transport to POS

Almost 70% of the questionnaire respondents spent less than 15 minutes traveling to the POS nearby. In contrast, the remaining respondents would spend between 15 to 60 minutes traveling, except 0.2% of respondents who would commute by bus to their selected POS, which required more than 60 minutes (Table 5.8). However, public transport such as buses was the least favorable (2% of respondents) amongst the means of transportation due to delayed time or many inconvenient bus stops. Walking was the most profitable means to POS (50% of respondents), followed by motorbikes and bicycles (20% and 15% of respondents, respectively).

Time to POS			Means of Transportation		
	N	Percent (%)		N	Percent (%)
<15 mins	305	68.7	Walking	224	49.6
15 - 30 mins	113	25.4	Bicycle	68	15
30 - 60 mins	25	5.7	Motorbike	90	19.9
> 60 mins	1	0.2	Bus	7	1.6
Total	265	100	Being lifted	56	12.4
			Other	5	1.1
			No answer	2	0.4
			Total	268	100

Table 5.8 Travel time and means of transport to visit POS of the elderly

5.3.5 Reasons to visit POS

Figure 5.6 illustrates the 14 famous and most important reasons to visit different types of POS reported by the elderly, with the exclusion of the "Others" column presented with a null percent. As a user could see POS for more than one reason, there were 1,655 complete responses to this multiple-choice question. The "Nearby" reason was chosen by most respondents (30%), followed by the "Greenery" and the "Senior's activities" reasons, 17% and 12% of respondents, respectively. Senior's activities often took place in group exercises such as Tai chi, a series of gentle physical movements and stretches, or presented with dance performance, or playing racket sports such as shuttlecock kicking and badminton. Social interaction reasons, including "Meeting new people" (7%) and "Acquaintances" (4%), were important reasons for the visit. Factors of surrounding environments such as "Quietness" and "Safety" were also crucial for visiting POS, 7% and 6% of respondents, respectively.

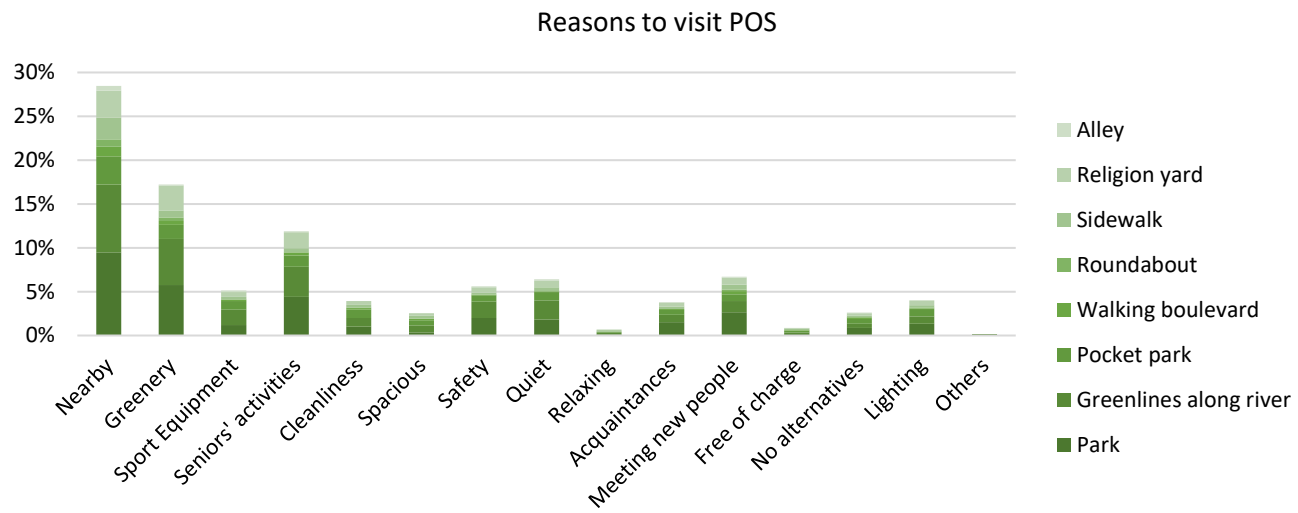
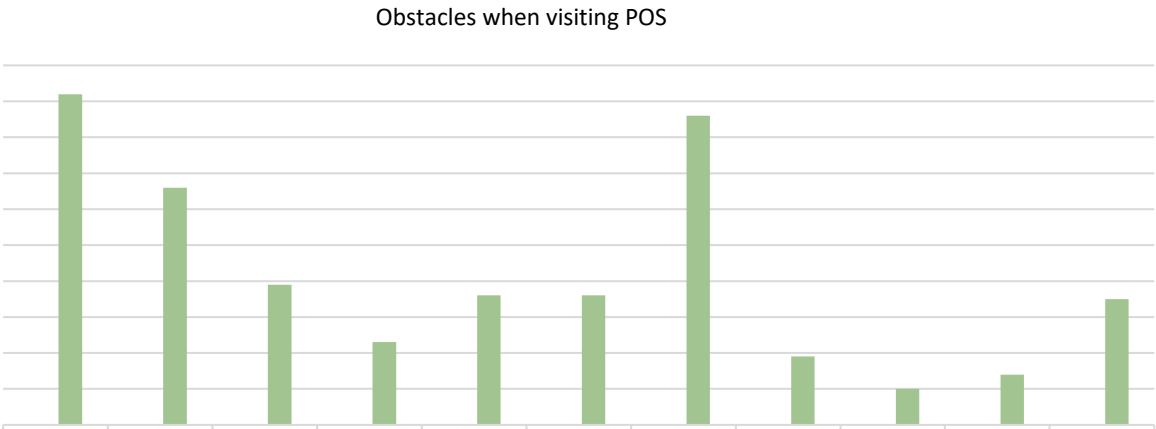


Figure 5.6 Reasons to visit POS of the elderly

The biggest challenges for older people when using POS stem from environmental concerns. Figure 5.7 demonstrates the ten most common obstacles the elderly faced when visiting POS, along with the "Others" column consisting of pollution and cleanliness issues. The uncomfortable climate (20% of 456 complete responses) appeared to be the most significant challenge as the temperature could rise to over 27°C in the early morning, or well over 30°C with a natural feel, due to the heat of the urban city. The next problem was the risk of being pickpocketed and disturbed by vendors, provided by 19% and 14% of respondents, respectively. It was unpleasantly familiar for the elderly to fear that their bags containing money and important documents would be snatched when walking down the sidewalks or

alleys. Besides, the busy sidewalk occupied by vendors and their customers unruly pushed the elderly to walk on the crowded streets with motorbikes and cars. Sidewalks with poor quality containing potholes (9%) caused difficulties walking, leading to an increased risk of falling. "No sidewalk" and "Risk of traffic accidents" (8% for each) were also considered critical obstacles for the elderly to access POS. Five percent of respondents were worried about the safety of "crossing streets" to POS. At the same time, other issues such as entrance or parking fees, distance, and public transportation to POS were not significant concerns.



	Climate	Vendors	Sidewalk's quality	Unfriendly crossing	No sidewalk	Risk of traffic accident	Risk of pickpocket	Fee for parking/ entrance	Public transportation	Distance	Others
Percent	20%	14%	9%	5%	8%	8%	19%	4%	2%	3%	8%
N	92	66	39	23	36	36	86	19	10	14	35

Figure 5.7 Obstacles to visiting POS from the point of view of the elderly

The reasons preventing people from visiting POS were ranked as the mean for evaluation on a five-point Likert scale from 1 to 5, equivalence to "total disagree" to "total agree" in Figure 5.8 below. Lacking "vegetation" in POS seemed to be the most impactful factor preventing the elderly from visiting POS. At the same time, "climate" and uncomfortable temperatures in the middle of the day reduced the willingness to go outdoors. "Pollution" and "Cleanliness" problems, as well as "Poor design," lack of organized and attractive "Activities," and limited self-choice of "religious activities," decreased the use of POS for the elderly as daily physical outdoor activities.

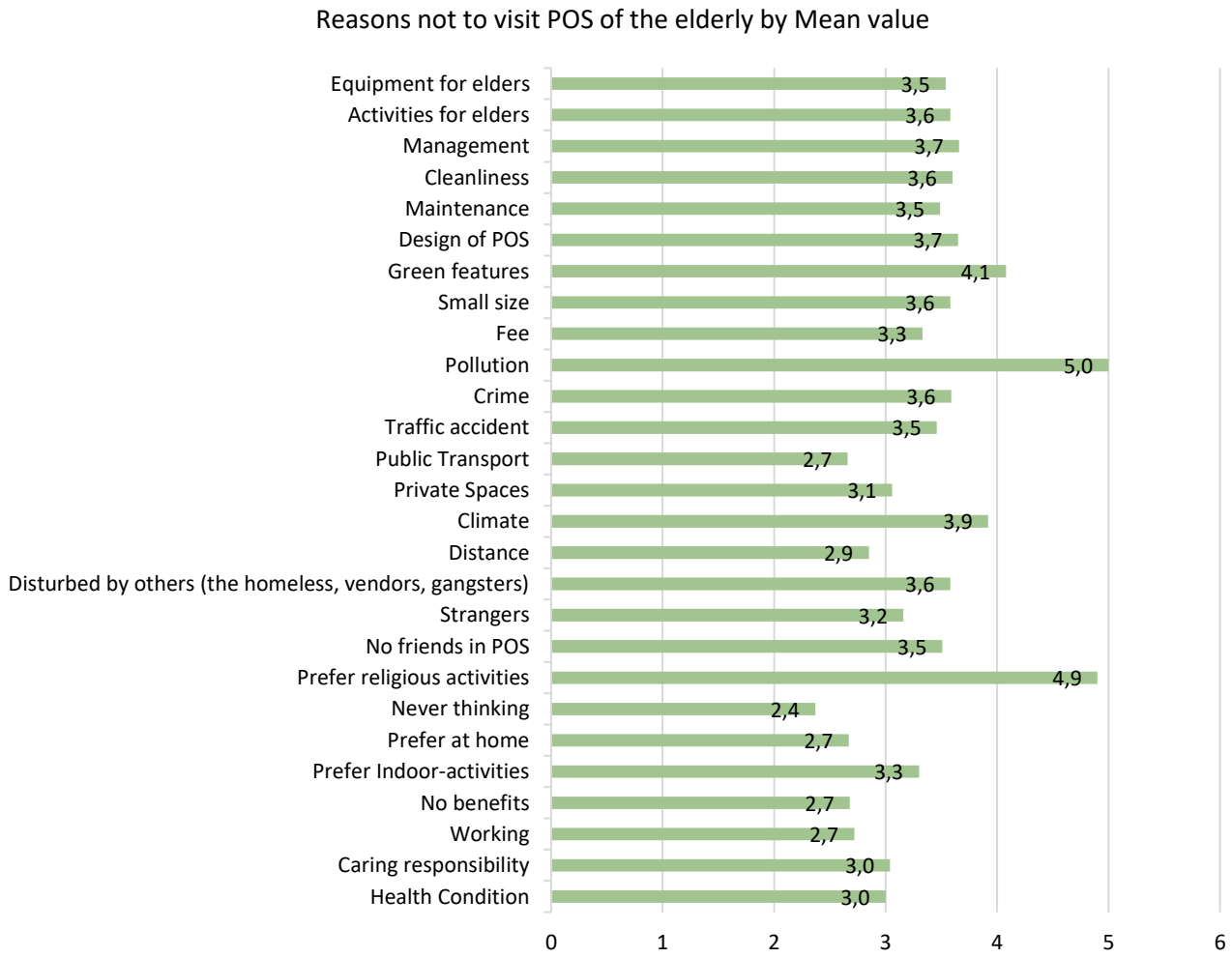
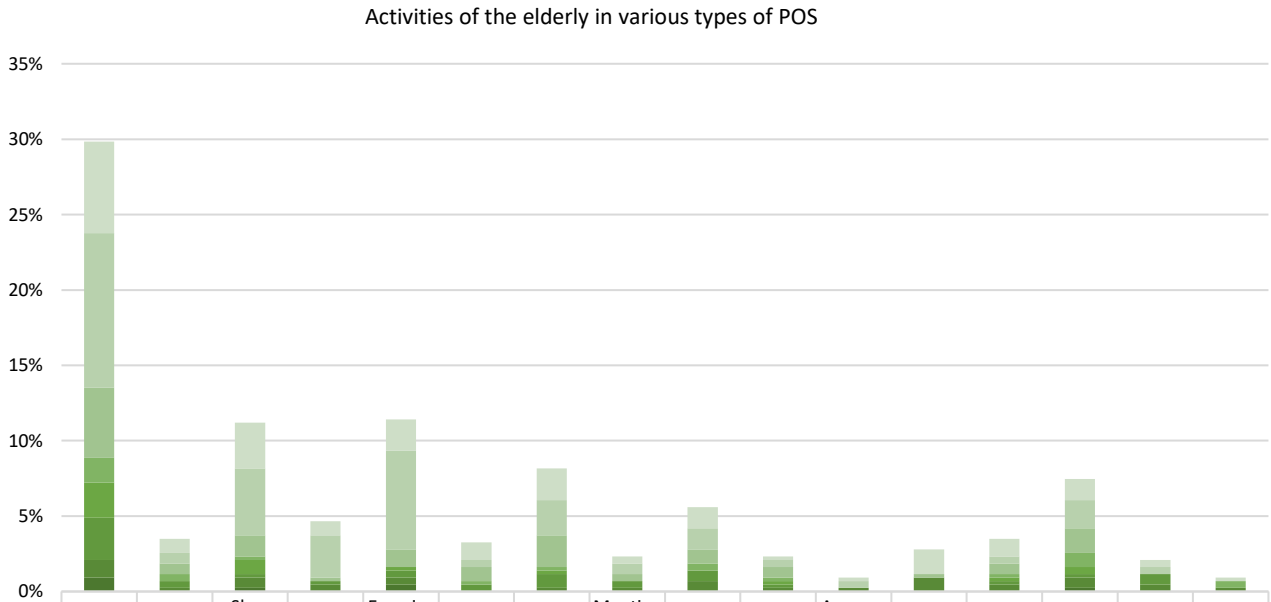


Figure 5.8 Reasons preventing the elderly not to visiting POS

5.3.6 Activities of the elderly in POS

The survey result in Figure 5.9 demonstrates the types of activities the elderly enjoyed while staying in POS. Four hundred twenty-nine participants responded to multiple-choice questions as one person could do more than one activity simultaneously. Approximately 30% of the elderly came to the POS for a walk. Eleven percent visited POS to practice a series of gentle moving meditations and stretches called Tai-chi, while 12% used equipment to exercise. Social activities such as enjoying nature were reported at 8%, while activities requiring a regular schedule (e.g., group exercises) and sedentary activities presented with lower anticipation.



	Walking	Jogging	Slow move exercise	Group exercise	Exercise with tools	Playing sports	Meeting people	Meeting new people	Watch	Taking kids	Accompany others	Reading	Sitting & thinking	Enjoy nature	For food	Others
Park	6%	1%	3%	1%	2%	1%	2%	0%	1%	0%	0%	2%	1%	1%	0%	0%
Greenery along rivers	10%	1%	4%	3%	7%	0%	2%	1%	1%	0%	0%	0%	0%	2%	0%	0%
Pocket park	5%	1%	1%	0%	1%	1%	2%	0%	1%	1%	0%	0%	1%	2%	0%	0%
Walking boulevard	2%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	1%	0%	0%
Roundabout	2%	0%	1%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
Sidewalk	3%	0%	0%	0%	0%	0%	1%	0%	1%	0%	0%	0%	0%	0%	1%	0%
Religion yard	1%	0%	1%	0%	0%	0%	0%	0%	1%	0%	0%	1%	0%	1%	0%	0%
Alley	1%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%

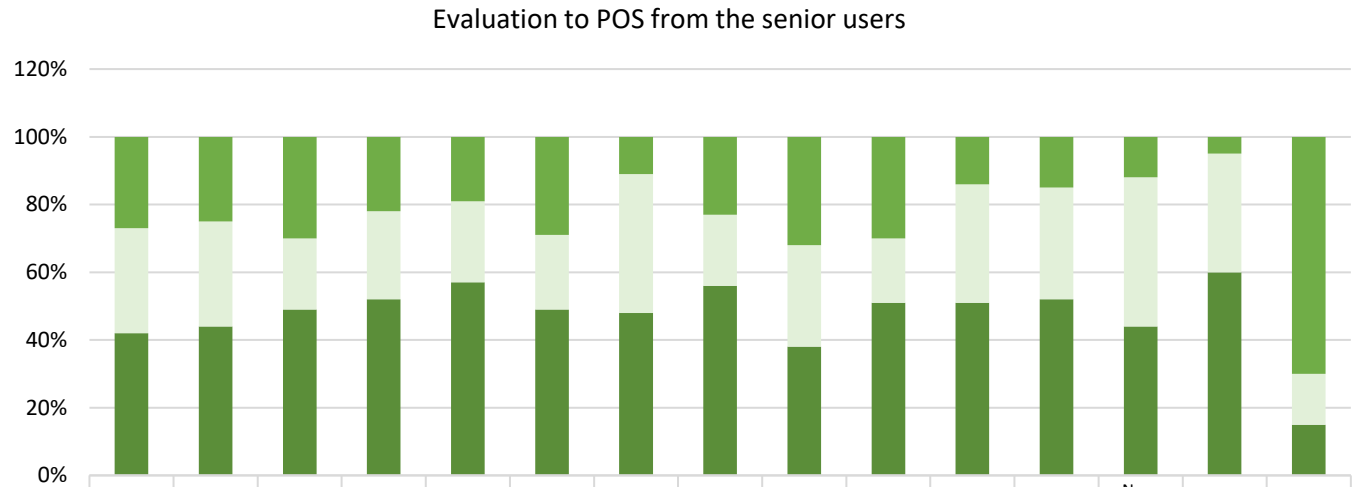
Figure 5.9 Activities of the elderly in each type of POS

Some photos of the elderly's activities are presented in Figure 5.10.

Figure 5.10 Activities of the elders in POS
Photos 'source: the author

5.3.7 Evaluation & expectation of the elderly about POS that they visit often

Despite facing many challenges using POS, the elderly provided positive feedback on the quality of their most frequently visited POS in the survey. Figure 5.11 shows the survey result of relevant factors that received the most positive feedback, including "food and beverage," "elements for resting," and "toilet" (60%, 57%, and 56% of respondents, respectively). "Food and beverage" services were offered in the coffee shops inside the parks or from the street vendors in POS. Public toilets were primarily located in the gardens and not on the outside streets. Great stone benches readily for use for resting also received high appraisal from POS users. Meanwhile, the elderly rated the "cleanliness," "safety and security," "microclimate," and "equipment for doing exercise" poorly, evaluated by 32%, 30%, 30%, and 29% of respondents, respectively. Other unlisted factors of POS were inadequate maintenance of sports equipment, lack of organization in cleaning the park and caring for greenery, reduction of POS, and privatization of POS for eatery and commercial purposes (marked up to 70% total).



	Proximity	Traffic seperat.	Climate	Green	Equip. for relaxing	Sport equip.	Décor	Toilet	Clealiness	Safety/ security	Lighting	Seniors' activities	Non-seniors 'activities	F&B	Others
Bad	27%	25%	30%	22%	19%	29%	11%	23%	32%	30%	14%	15%	12%	5%	70%
Neutral	31%	31%	21%	26%	24%	22%	41%	21%	30%	19%	35%	33%	44%	35%	15%
Good	42%	44%	49%	52%	57%	49%	48%	56%	38%	51%	51%	52%	44%	60%	15%

Figure 5.11 Evaluation of POS from the point of view of the elderly

Therefore, based on the elderly's feedback, the most crucial aspects to improve were "cleanliness" (19%), "more green spaces" (18%), "more facilities" (15%), "better security" (14%), "more extensive areas" (12%), and "better sidewalk" to POS (8%). Sports equipment provision and maintenance were

also important (7%) (Figure 5.12). Other expectations (2%) were “more exciting programs” and “better maintenance.”

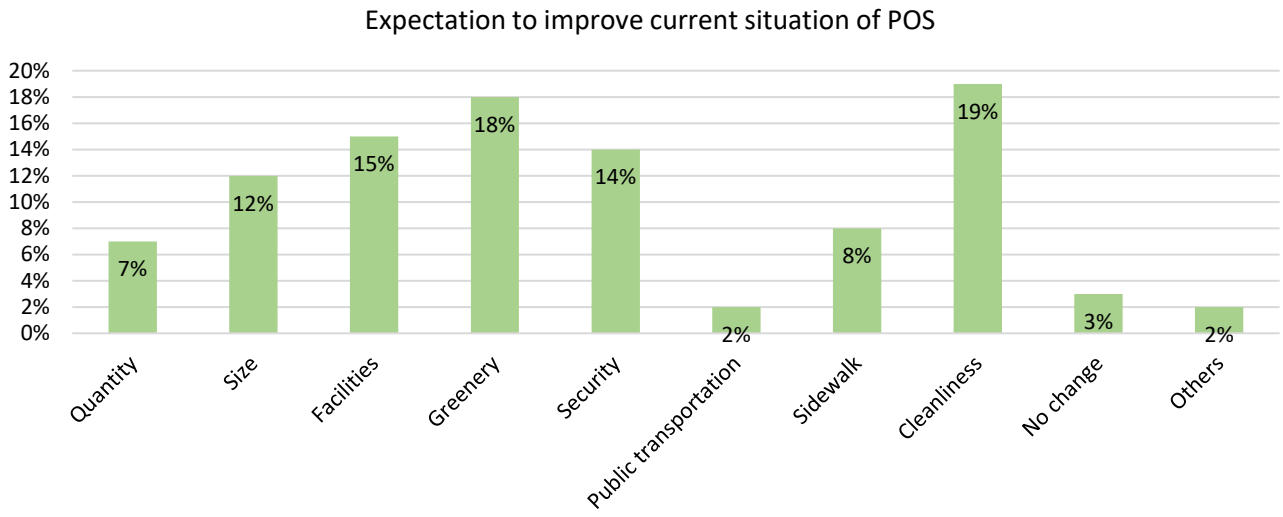


Figure 5.12 Improvement for POS from the point of view of the elderly

5.4 Hypotheses tests

Statistical Package for the Social Sciences (SPSS) software analyzed all collected data through questionnaires. Before performing scientific testing, it was necessary to evaluate the reliability and validity of the scale used in the survey. Cronbach’s Alpha method was used to assess the scale's reliability for the Likert scale questionnaire. The result showed that 11 variables had Cronbach’s Alpha average value of .770, ranging from .730 to .805 (see Appendix E.1). It can be interpreted that multiple question Likert scale survey was reliable.

Table 5.9 summarizes the association between all impact factors and visit frequency of the elderly, and duration of the visit. Each hypothesis test's details were described starting from part 5.4.1 to part 5.4.5. The cross-tabulation generated by SPSS Chi-square tests is displayed in Appendix E.2.

Hypotheses	Factors	Effect strength	
		Visit Frequency	Time spent
1.Proximity	Distance to POS	.275	-
	Travel time	-	-
2.Neighborhood characteristics	Microclimate	.205	-
	Trip to POS	-	.148
	POS distribution	-	.187
	Resident location	-	-
3.Users’ characteristics	Age	.152	.155
	Gender	-	-
	Health condition	-	.183
	Income	-	-
	Caring responsibility	.117	-
	Household arrangement	-	-
	Previous job	-	-
	Current job	.214	.143
4.Design of POS	Greenery	-	.245
	Relaxing equipment	-	.201

Hypotheses	Factors	Effect strength	
		Visit Frequency	Time spent
	Sport Equipment	-	-
	Decoration	.176	-
	Toilet	.196	.176
	Cleanliness	.277	.268
	Safety	-	.223
	Lighting	.163	.168
	Food & Beverage	-	-
5.Social Interaction	Seniors' activities	.162	-
	Non-seniors' activities	.270	.201

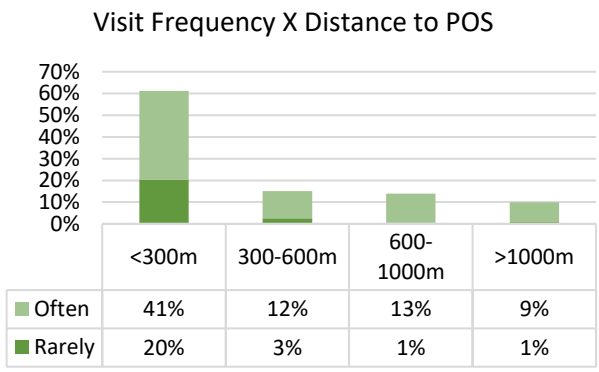
Table 5.9 Summary of impact factors on Visit frequency and Time spent in POS of the elderly

5.4.1 Testing Hypothesis 1: Proximity

H1: Proximity, including distance to POS and travel time, will significantly impact the visit frequency and time spent by the elderly in POS.

5.4.1.1 Factor(s) impacting "Visit Frequency"

Two variables impacting the "Visit Frequency" variable are "Distance to POS" and "Travel time." The frequencies cross-tabulated are shown in Figure 5.13. The elderly who travels 300 m or less appears to visit POS twice among the "Often" visiting group compared to the "Rarely" visiting group (40% and 20%, respectively). When that traveling distance was between 600 m to 1000 m or greater than 1000 m, the visit frequency of the "Rarely" visiting group was equally less than 1%. More than 80% of older adults traveled to POS for no more than 15 minutes. Approximately less than 2% of respondents traveled to POS between 30 to 60 minutes. As travel time increased, the gap between the "Often" visiting group and the "Rarely" visiting group reduced.



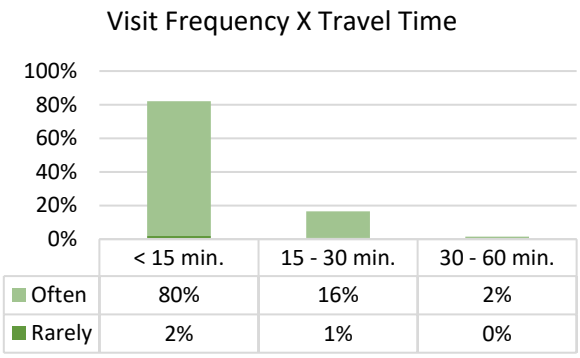


Figure 5.13 Cross-tabulations between Visit Frequency and Proximity impact factors

A Pearson's Chi-square was conducted to identify any discrepancies in "Visit Frequency" among the visiting groups, "Often" versus "Rarely." Chi-square was best used in this statistical analysis because frequency data of "Visit Frequency" and "Distance to POS" were categorical variables in addition to the available sample sizes per cell greater than five values, given the large sample size. The result showed a significant relationship between "Distance to POS" and "Visit frequency," $\chi^2(3, N= 353) =26.67$, $p < .05$. The effect size for this finding, Cramer's V, was moderate with $V = .275$.

Due to the sample size value per cell, with more than 20% of cells having greater than five values, Fisher's exact test was used to determine if there was a significant association between two variables,

"Visit frequency" and "Travel time." The result showed no statistically significant association between the two variables (two-tailed test, p= .406 > 0.05). The effects of "Visit Frequency" and two independent variables, "Distance to POS" and "Travel time," are summarized in Table 5.10 below.

Factors	Tests	*P-value*	Relation	Effect strength
Distance to POS	χ^2 (3, N= 353) =26.67	< .05	Significant association	V= .275
Travel time	Fisher's exact test	.406	No association	-

Table 5.10 Test results of Visit Frequency and Proximity impact factors

5.4.1.2 Factor(s) impacting "Time spent"

"Time spent" in POS of the elderly was impacted by "Distance to POS" and "Travel time." Figure 5.14 presents the cross-tabulations between the variable "Time spent" in POS and two other variables in the percentage of responses, "Distance to POS" and "Travel time," respectively.

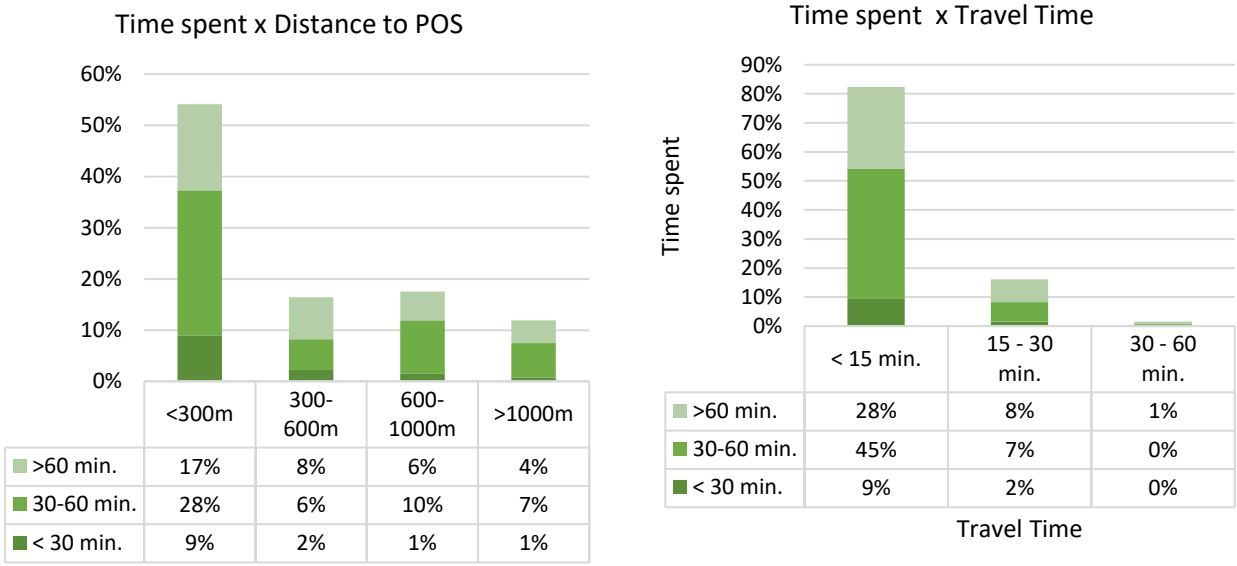


Figure 5.14 Cross-tabulations between Time spent in POS of the elderly and Proximity impact factors

A Chi-Square test of Independence was performed to assess the relationship between "Time spent" and "Distance to POS." Fisher's exact test was used to test whether "Time spent" in POS was associated with "Travel time." The results showed there were no statistical associations in either "Time spent" and "Distance to POS" (χ^2(6, N= 268) =9.50, p= .147) or "Time spent" and "Travel time" (Fisher's exact test, p= .243), summarized in Table 5.11.

Factors	Tests	*P-value*	Relation	Effect strength
Distance to POS	χ^2 (6, N= 268) =9.50	.147	No association	-
Travel time	Fisher's exact test	.243	No association	-

Table 5.11 Test results of Time spent in POS of the elderly and Proximity impact factors

5.4.2 Testing Hypothesis 2: Neighborhood characteristics

H2: Neighborhood characteristics, including street layout, resident location, microclimate, trip to the park with traffic safety and security, and the availability of public transport, will significantly impact the visit frequency and time spent by the elderly in POS.

5.4.2.1 Factor(s) impacting "Visit Frequency"

Figure 5.15 displays neighborhood characteristics factors impacting "Visit frequency": "Microclimate," "Trip to POS," "POS distribution," and "Resident location." "Microclimate" is the suite of climatic conditions with environmental variables of temperature (heat versus coolness), light (sun versus shade), wind (breeze versus absence of wind), and humidity (dry versus moist air). "Trip to POS" consists of traffic safety during the traveling, street layout, and public transportation. "POS distribution" is the number of POS distributed and estimated proximity to users' neighborhoods. The "Resident location" is where the users live, called CBD or non-CBD.

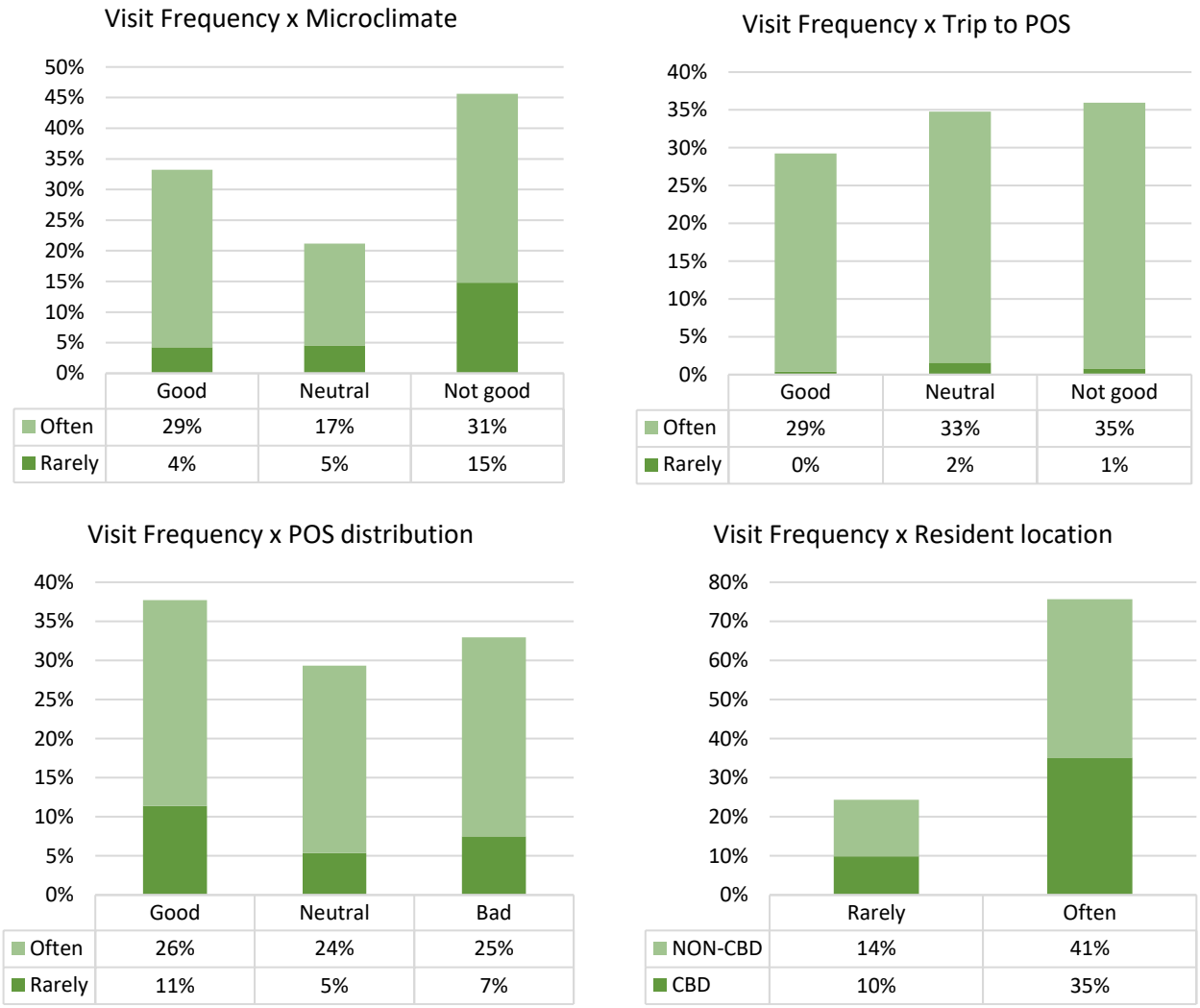


Figure 5.15 Cross-tabulations between Visit Frequency and Neighborhood characteristics impact factors

Chi-square tests were used to check the association between the dependent variable "Visit Frequency" and independent variables "Microclimate," "POS distribution," and "Resident location." Because 33% of cells presented with expected frequencies, Fisher's exact test was performed to assess the association between "Visit Frequency" and "Trip to POS." The results showed that there was a statistically significant association between "Climate" and "Visit frequency" (χ^2 (2, N= 331) =13.97, p= .001, Cramer's V = .205). "Trip to POS," "POS distribution," and "Resident location" had no significant association with "Visit frequency" (Table 5.12). It can be interpreted that the elderly visited POS more frequently when the climate was in a favorable setting with minimal effects of POS and residential logistics.

Factors	Tests	*P-value*	Relation	Effect strength
Microclimate	χ^2 (2, N= 331) =13.97	.001	Significant association	*V* = .205
Trip to POS	Fisher's exact test	.561	No association	-
POS distribution	χ^2 (2, N= 334) =4.38	.112	No association	-
Resident location	χ^2 (1, N= 353) =.867	.384	No association	-

Table 5.12 Test results for Visit Frequency and Neighborhood characteristics impact factors

5.4.2.2 Factor(s) impacting "Time spent"

The dependent variable "Time spent" was tested with "Neighborhood characteristics" impact factors in a similar approach. The cross-tabulations in percentage values with stacked column charts are shown in Figure 5.16.

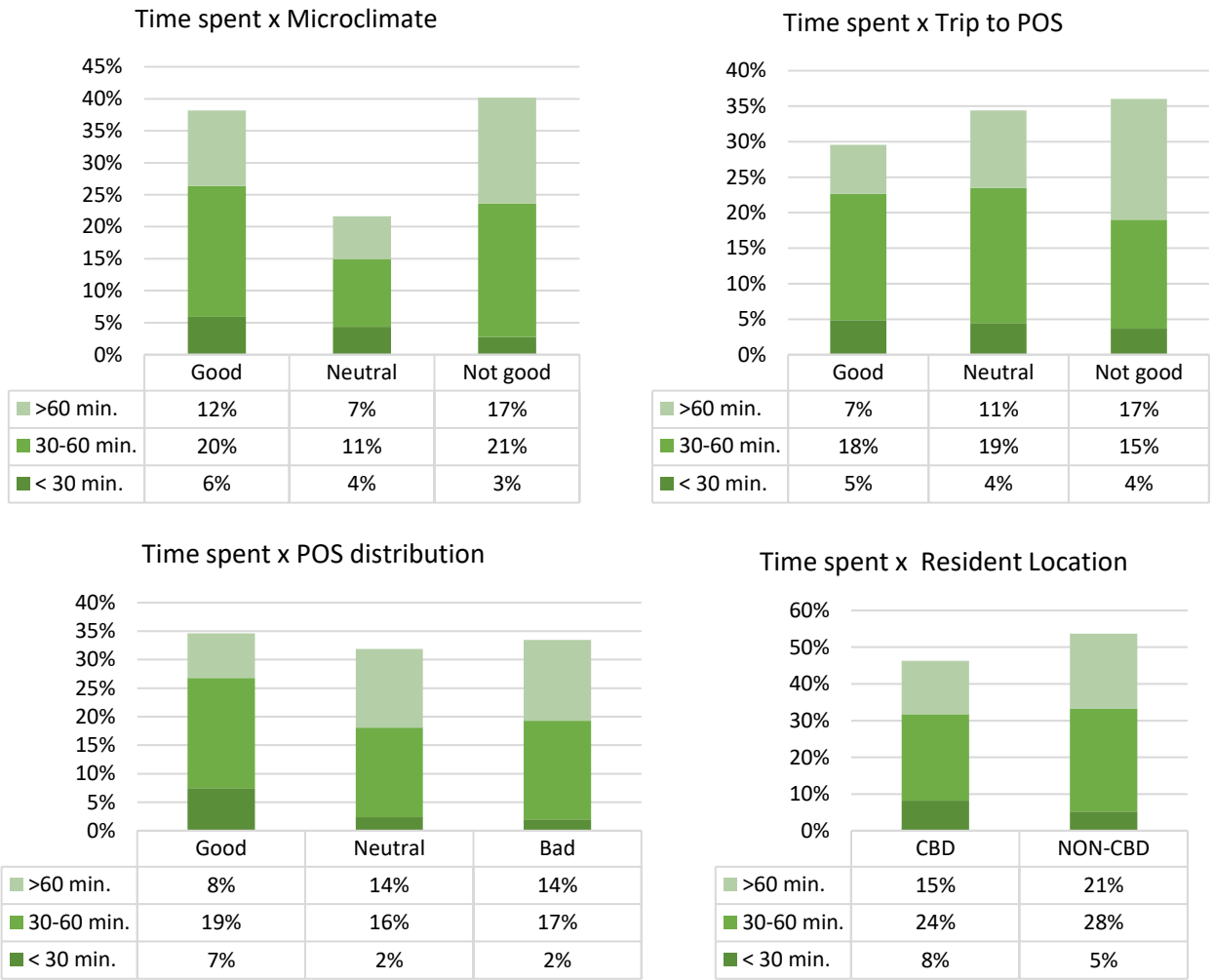


Figure 5.16 Cross-tabulations between Time spent and Neighborhood characteristics impact factors

Four impact factors met the assumptions of Chi-square tests and were cross-checked. "Time spent" in POS had a statistically significant relationship with "Trip to POS" (χ^2 (4, *N*= 247) =10.77, *p* = .026, Cramer's *V* = .148) and "POS distribution" (χ^2(4, *N*= 254) =17.77, *p* = .001, Cramer's *V* = .187). There was no significant association between "Time spent" in POS and "Microclimate" (*P-values* = 0.114) or "Resident location" (*P-values* = 0.13). It can be interpreted that the elderly will likely stay longer in POS if they have a good trip or travel route to POS and the POS distribution is sufficient. However, unfavored

temperature or weather and the CBC or non-CBD locations do not impact the visit duration at the park. The statistical results are shown in Table 5.13.

Factors	Tests	*P-value*	Relation	Effect strength
Microclimate	χ^2 (4, N= 254) =7.46	.114	No association	-
Trip to POS	χ^2 (4, N= 247) =10.77	.026	Significant association	*V* = .148
POS distribution	χ^2 (4, N= 254) =17.77	.001	Significant association	*V* = .187
Resident location	χ^2 (4, N= 254) =17.77	.130	No association	-

Table 5.13 Test results for Time spent and Neighborhood characteristics impact factors

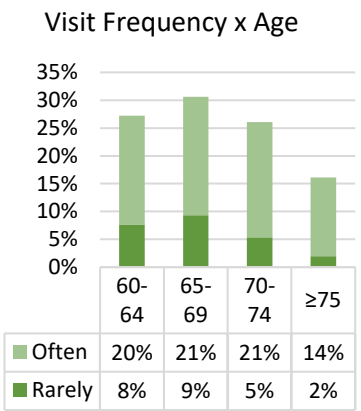
5.4.3 Testing Hypothesis 3: Users' characteristics

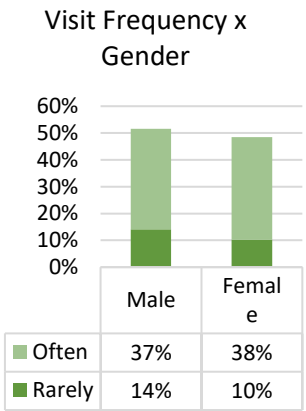
H3: Users' characteristics, including age, health status, household arrangement, income, and socio-cultural aspects, will significantly impact the visit frequency and time spent by the elderly in POS.

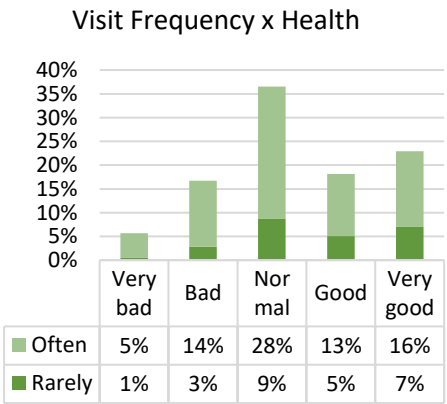
5.4.3.1 Factor(s) impacting "Visit Frequency"

Figure 5.17 presents the cross-tabulations of the dependent variable "Visit frequency" and eight independent variables "Age," "Gender," "Health," "Income," "Caring responsibility," "Household arrangement," "Previous job," and "Current job."

Four "age" groups were identified with the following ranges: "60 to 64," "65 to 69," "70 to 74," and "75 and older." "Gender" had two values: "male" and "female." Health was self-rated by the respondents, with a scale from 1 to 5 corresponding from "very bad" to "very good." "Income" was divided into three ranges, from "lower than average income," "average income," and "higher than average income," reported by HCMC citizens in 2018. "Caring responsibility" was categorized into two values: "self-caring" and "caring for others," such as spouses, children, grandchildren, or relatives. "Household arrangement" were listed as two variables: "alone" and "living with others." "Previous job" was assigned to three types of occupational environments: "human relation", "nature relation," and "non-human relation." People working in a human relation environment were referred to as administration staff, human resources, teachers, and sellers. Those who worked close to nature were viewed as gardeners, farmers, or agriculture workers. The remaining respondents mainly worked in industrial factories or laboratories with machinery and mechanical devices. "Current job" refers to whether they were working or not working at the time of the survey and is categorized into three groups: "retired," "continued working," or had a "new position."







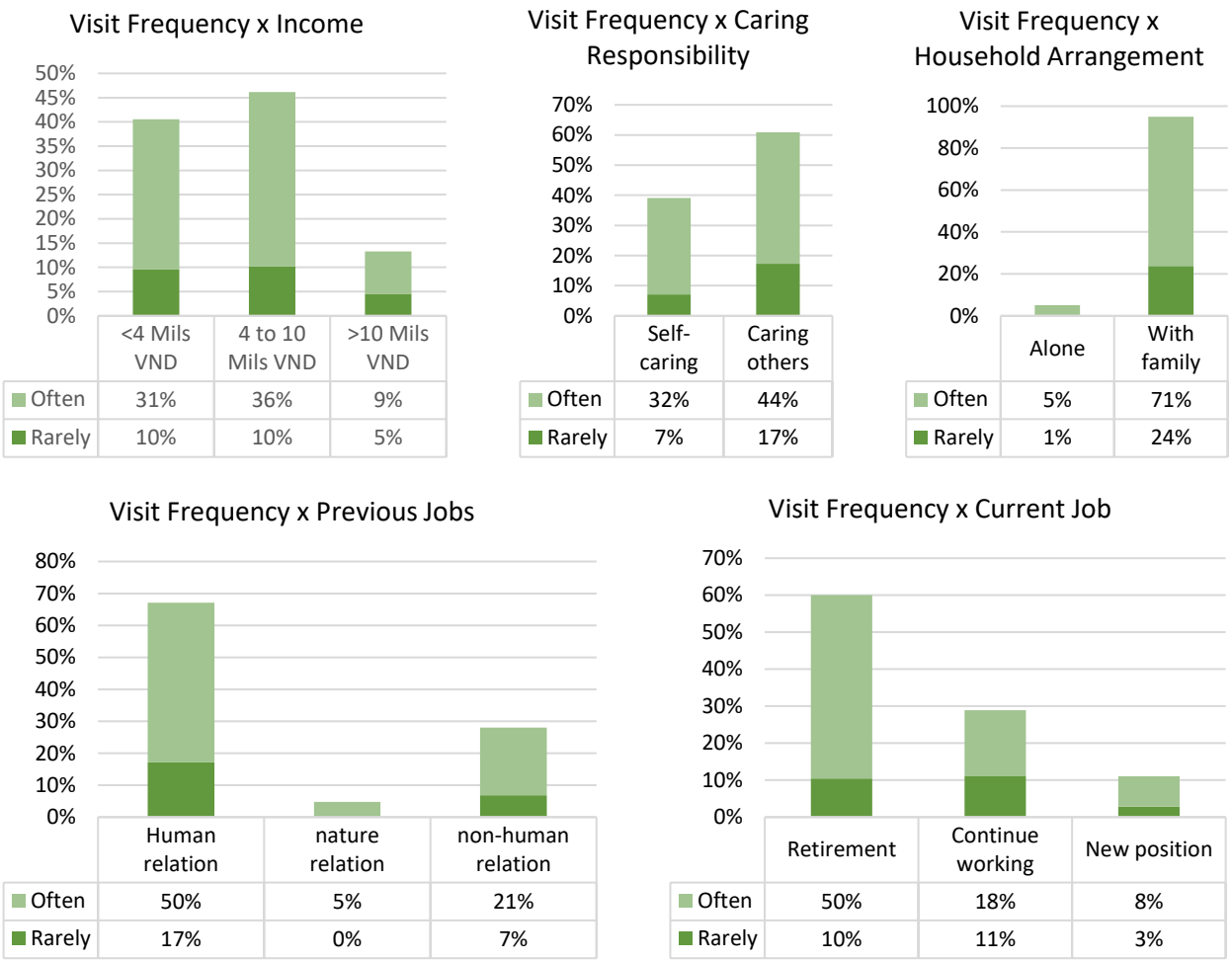


Figure 5.17 Cross-tabulations between Visit frequency and Users' characteristics impact factors

Eight factors of users' characteristics groups were tested to identify relations with the variable "Visit Frequency." The results showed that the frequency of visiting POS was influenced by three variables, "Age," "Caring responsibility," and "Current jobs." Their effect sizes were weak to moderate, with Cramer's V = .152, .117, and .214, respectively (Table 5.14). The visit frequency decreased as the age of the people increased by 15% of the sample size. The elderly who cared for others appeared to visit POS more often. The retired elderly taking 50% of all visits from responses, came to POS thrice a week. The current job's impact (working or retired) was moderate, indicating that 21% of the respondents were likely to visit POS more often after retirement.

Factors	Tests	*P-value*	Relation	Effect strength
Age	χ^2 (3, N= 353) =8.18	.042	Significant association	V = .152
Gender	χ^2 (1, N= 353) =1.97	.160	No association	-
Health condition	χ^2 (4, N= 353) =6.36	.174	No association	-
Income	χ^2 (2, N= 353) =2.88	.238	No association	-
Caring responsibility	χ^2 (1, N= 353) =4.79	.028	Significant association	V = .117
Household arrangement	Fisher's exact test	.461	No association	-
Previous job	χ^2 (2, N= 353) =2.43	.296	No association	-
Current job	χ^2 (2, N= 353) =16.18	< .05	Significant association	V = .214

Table 5.14 Test results for Visit frequency and Users' characteristics impact factors

5.4.3.2 Factor(s) impacting "Time spent"

The listed eight independent variables on users' characteristics (age, gender, health, income, caring responsibility, household arrangement, previous job, and current job) were crossed with "Time spent" shown in Figure 5.18.

Figure 5.18 Cross-tabulations between Time spent and Users' characteristics impact factors

The assumptions of Chi-square tests were met, and eight independent variables were tested with the dependent variable "Time spent." The statistical results showed that "Age," "Health condition," and

"Current jobs" provided a significant impact on "Time spent" in POS with a weak effect size. "Gender," "Income," "Caring responsibility," "Household arrangement," and "Previous job" had no association with the length of stay in POS (Table 5.15). All age groups spent a similar amount of time in POS, primarily for 30 minutes or longer. There was a trend of having a longer duration of visit among older people, but only 15% of the sample size was affected (Cramer's *V* = .155). The 18% of all surveyed elderly self-evaluated themselves as usual or with good health and often stayed longer in POS (Cramer's *V*= .183). Fourteen percent of the elderly had their visit duration impacted by "Current job" (Cramer's V= .143) as they were retired and could spend more time in POS than those who currently work.

Factors	Tests	*P-value*	Relation	Effect strength
Age	χ^2 (6, N= 268) =12.79	.046	Significant association	V = .155
Gender	χ^2 (2, N= 268) =4.57	.102	No association	-
Health condition	χ^2 (8, N= 268) =17.88	.022	Significant association	V = .183
Income	χ^2 (4, N= 268) =1.07	.898	No association	-
Caring responsibility	χ^2 (2, N= 268) =4.46	.107	No association	-
Household arrangement	χ^2 (2, N= 268) = .925	.630	No association	-
Previous job	χ^2 (4, N= 268) = 4.338	.362	No association	-
Current job	χ^2 (4, N= 268) =10.98	.027	Significant association	V = .143

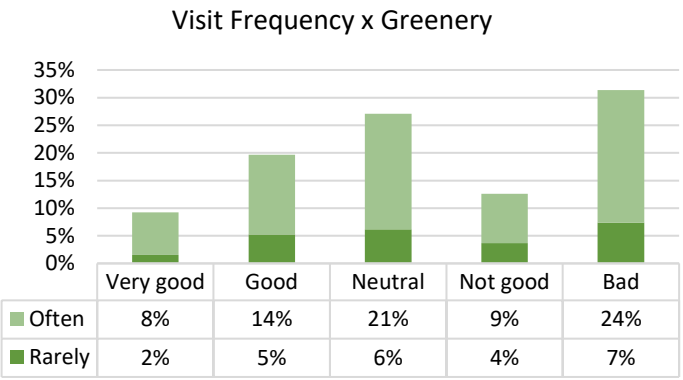
Table 5.15 Test results for Time spent in POS and Users' characteristics impact factors

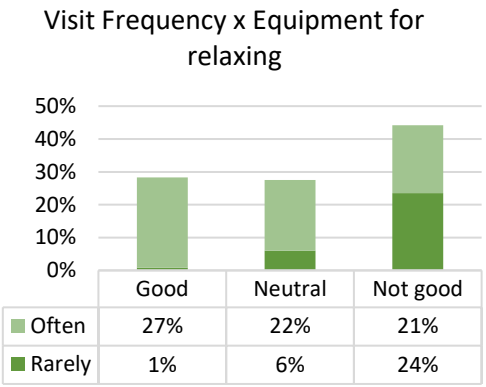
5.4.4 Testing Hypothesis 4: Design of POS

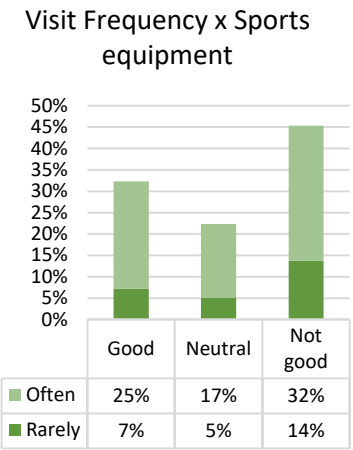
H4: The design of POS, comprising size, design features, programs, management of public space, comfort, safety, pollution, and aesthetics of POS, will significantly impact the visit frequency and time spent by the elderly in POS.

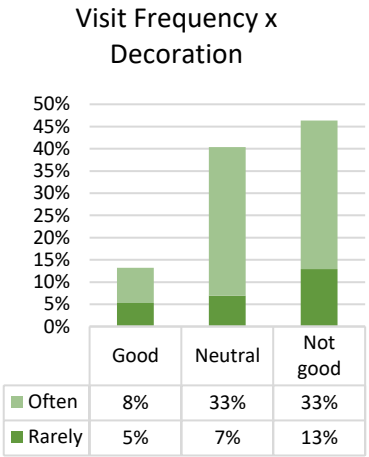
5.4.4.1 Factor(s) impacting "Visit Frequency"

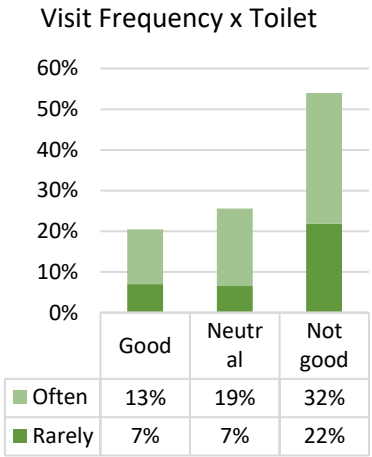
The design of POS included nine impact factors: "Greenery," "Equipment for relaxing" such as benches, "Sports equipment," "Decoration" like a statue and fountain, "Toilet," "Cleanliness" with good management and maintenance, "Safety and security" with security guards or surveillance, "Lighting," and "Food and beverage." The associations between nine factors and "Visit Frequency" are presented in contingency tables in Figure 5.19.

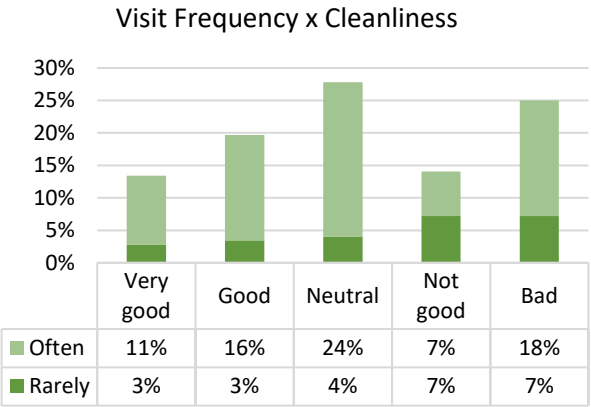


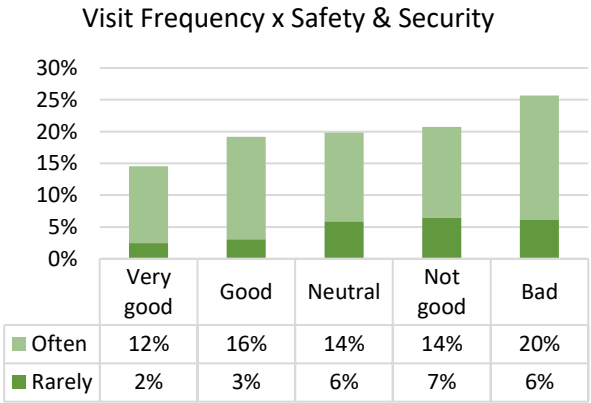


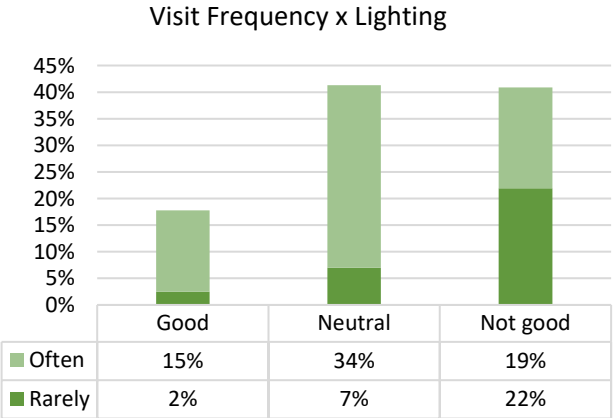












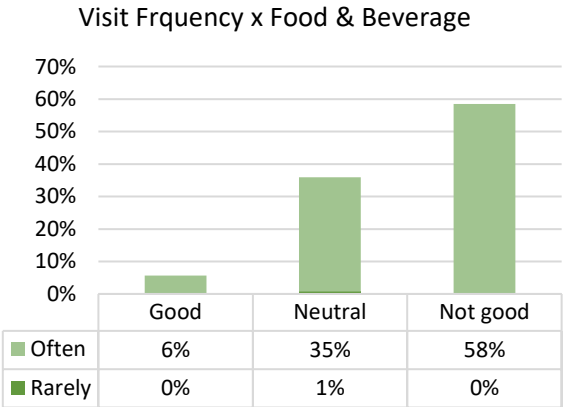


Figure 5.19 Cross-tabulations between Visit frequency and POS design impact factors

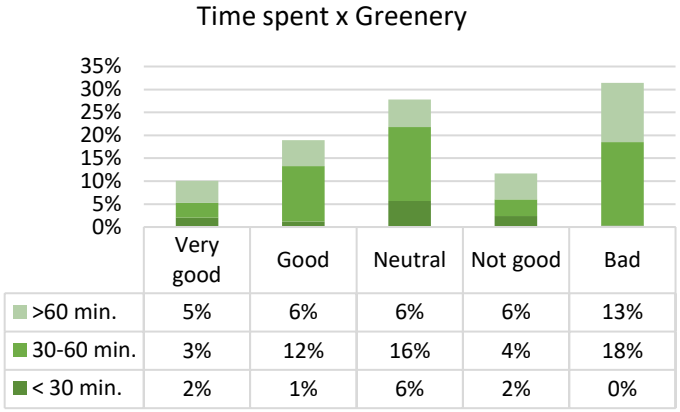
The Chi-square independence test showed that "Visit Frequency" differed significantly between the "Decoration," "Toilet," "Cleanliness," and "Lighting" aspects. It can be interpreted that the elderly would visit POS that had beautiful decorations, clean public restrooms, well-maintained POS, and an excellent park lighting system at night. The effect sizes of significant associations were weak and moderate. The details of the result are listed in Table 5.16.

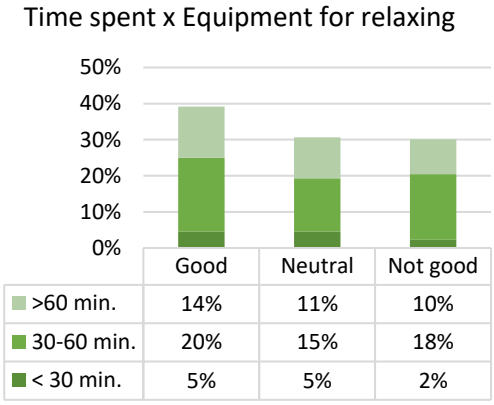
Factors	Tests	*P-value*	Relation	Effect strength
Greenery	$\chi^2(4, N= 325) =1.83$	.767	No association	-
Relaxing equipment	Fisher's exact test	.095	No association	-
Sport Equipment	χ^2 (2, N= 291) =2.21	.332	No association	-
Decoration	χ^2 (2, N= 302) =9.31	.010	Significant association	V = .176
Toilet	Fisher's exact test	.019	Significant association	V = .196
Cleanliness	χ^2 (4, N= 320) =24.57	< .05	Significant association	V = .277
Safety & Security	χ^2 (4, N= 323) =6.45	.168	No association	-
Lighting	Fisher's exact test	.034	Significant association	V = .163
Food & Beverage	Fisher's exact test	.406	No association	-

Table 5.16 Test results for Visit frequency and POS design impact factors

5.4.4.2 Factor(s) impacting "Time spent"

The relationships between nine POS design factors and "Time spent" are presented in Figure 5.20





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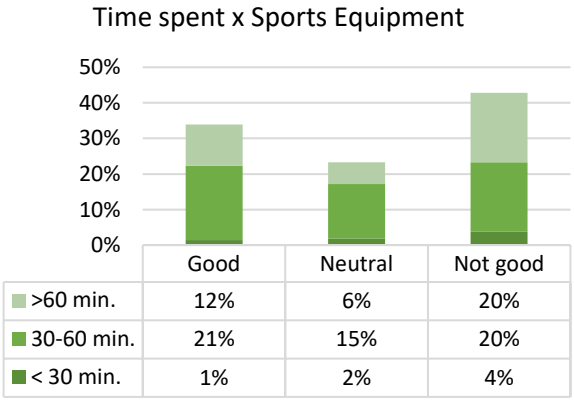
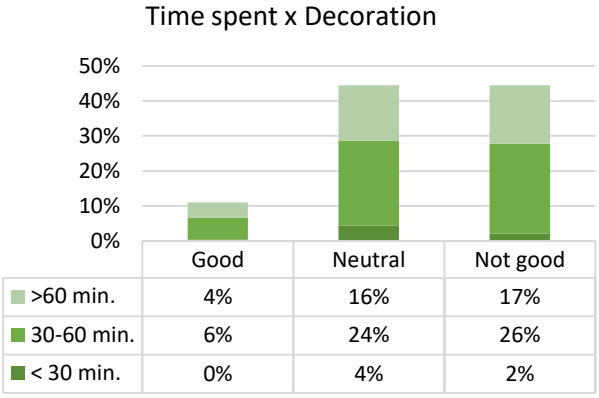
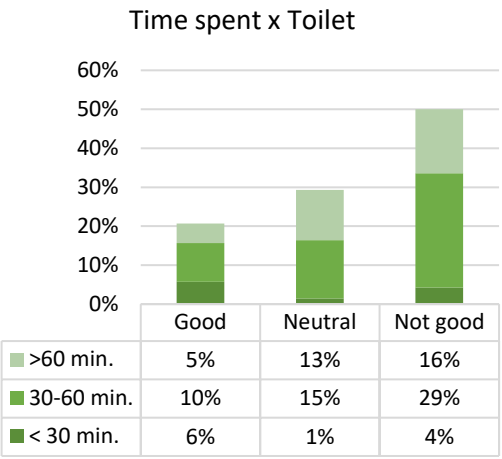
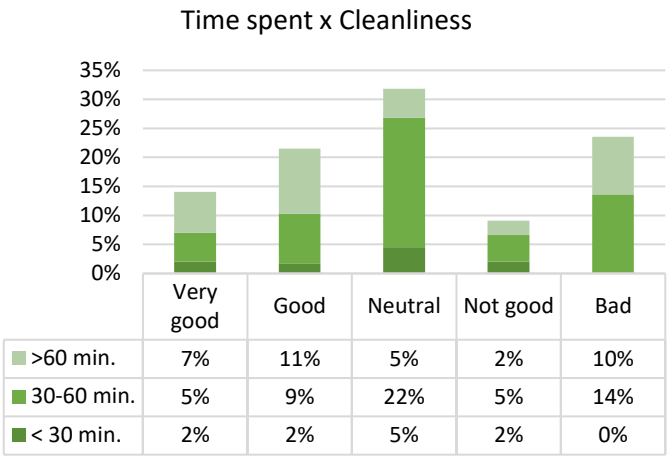
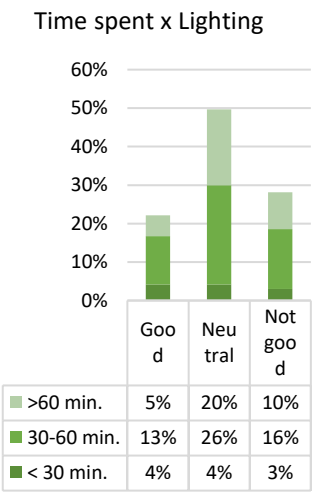










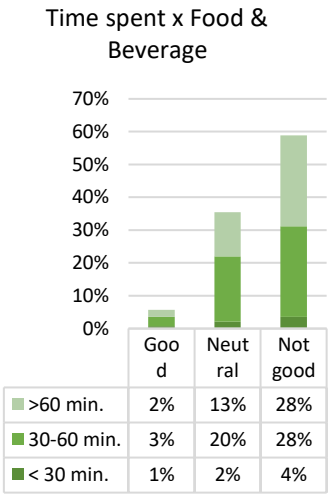


Figure 5.20 Cross-tabulations between Time spent and Design of POS impact factors

Chi-square tests found no significant association between the duration of staying in POS of the elderly and the availability of sports equipment, quality of decoration, or food and beverage services. On the contrary, the length of retaining in POS was significantly associated with six other aspects: quality and volume of tree and grass coverage, availability of benches or open spaces to sit and relax, clean public restrooms, feeling safe while enjoying the park, and sufficient lighting at night. The details of the tests are shown in Table 5.17.

Factors	**Tests**	***P-value***	**Relation**	**Effect strength**
Greenery	χ^2 (8, N= 248) =29.87	< .05	Significant association	*V* = .245
Relaxing equipment	χ^2 (4, N= 243) =29.87	.001	Significant association	*V* = .201
Sport Equipment	χ^2 (4, N= 215) =8.02	.091	No association	-
Decoration	χ^2 (4, N= 227) =2.33	.676	No association	-
Toilet	Fisher's exact test	.006	Significant association	*V* = .176
Cleanliness	χ^2 (8, N= 242) =34.88	< .05	Significant association	*V* = .268
Safety & Security	χ^2 (8, N= 246) =24.56	.002	Significant association	*V* = .223
Lighting	χ^2 (4, N= 236) =13.27	.009	Significant association	*V* = .168
Food & Beverage	Fisher's exact test	.667	No association	-

Table 5.17 Test results for Time spent and Design of POS impact factors

5.4.5 Testing Hypothesis 5: Social Interaction

H5: Social interaction will significantly impact the visit frequency and time spent by the elderly in POS.

5.4.5.1 Factor(s) impacting "Visit Frequency"

Figure 5.21 shows that well-organized and enjoyable activities in POS (Tai-chi groups or paper-fan performances) attracted the elderly to visit POS more frequently (33%). Similarly, activities designed for adolescents, children, and middle-aged groups, such as dancing, also increased the likelihood of the elderly visiting POS as they enjoyed watching and socializing (29%).

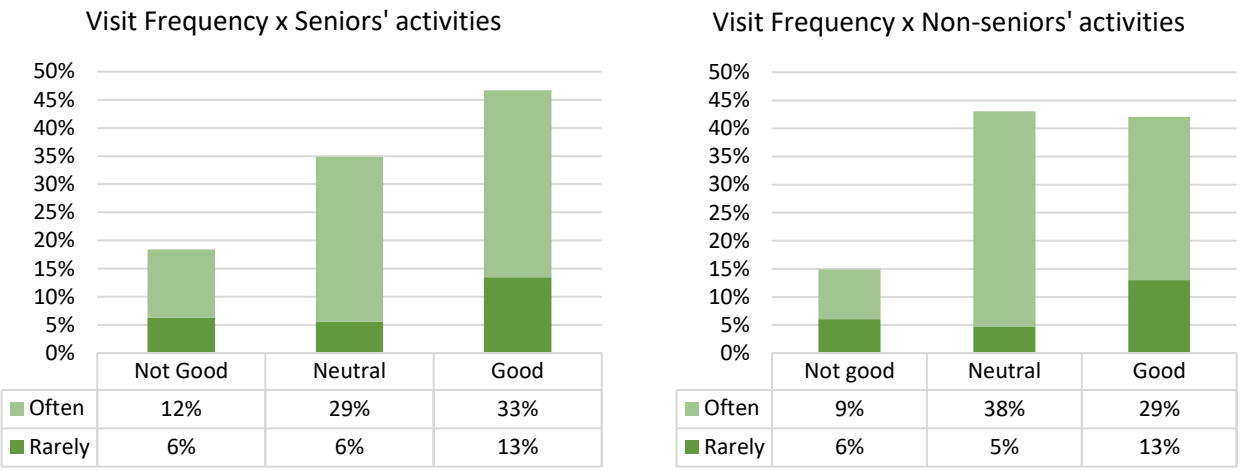


Figure 5.21 Cross-tabulations between Visit frequency and Social interaction impact factors

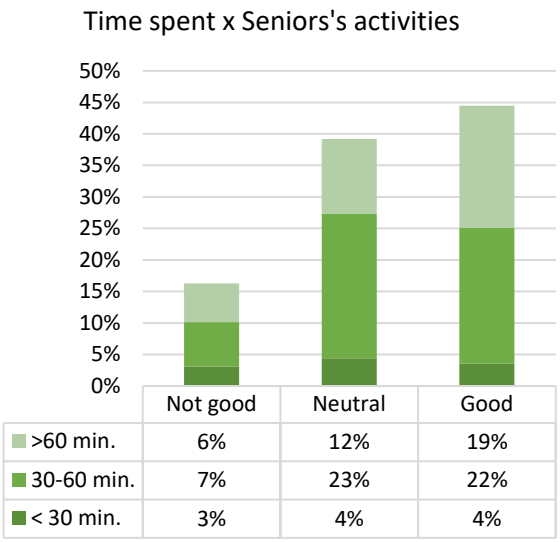
Pearson's chi-square tests of independence were calculated for variables "Seniors' activities" and "Non-seniors' activities" using the variable "Visit Frequency" as an outcome, resulting in statistics of 7.97, $df = 2$, $p = .019 < 0.05$ and 23.06, $df = 2$, $p < .05$, respectively. The analysis concluded that visit frequency and well-organized activities in POS were associated.

Factors	Tests	*P-value*	Relation	Effect strength
Seniors' activities	χ^2 (2, N= 304) =7.97	.019	Significant association	$V = .162$
Non-seniors' activities	χ^2 (2, N= 316) =23.06	< .05	Significant association	$V = .270$

Table 5.18 Test results for Visit frequency and Social interaction impact factors

5.4.5.2 Factor(s) impacting "Time spent"

Well-organized activities in POS also encouraged the elderly to stay in POS longer than unorganized ones, regardless if the targeted participants were seniors or non-seniors (Figure 5.22).



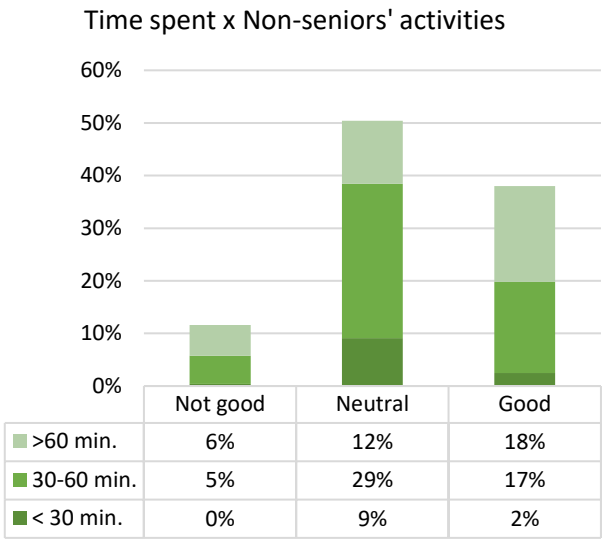


Figure 5.22 Cross-tabulations between Time spent and Social interaction impact factors

However, Chi-square tests suggested that only non-senior activities were significantly associated with the length of stay in POS of the elderly (statistic of 19.62, *df* = 4, *p*= .001). The fields were moderately associated with effect size, Cramer's *V* = .201. Activities for the seniors had no association with the "Time spent" in POS (*p* = .153) (Table 5. 19). It can be interpreted that the elderly would stay in POS longer for the excellent quality of activities performed by children, adolescents, and middle-aged groups.

Factors	Tests	*P-value*	Relation	Effect strength
Seniors' activities	χ^2 (4, N= 227) =6.68	.153	No association	-
Non-seniors' activities	χ^2 (4, N= 242) =19.62	.001	Significant association	*V* = .201

Table 5.19 Test results for Time spent and Social interaction impact factors

5.4.6 Summary of statistical evaluation

The results of impact factors on the use can be summarized in Figure 5.23

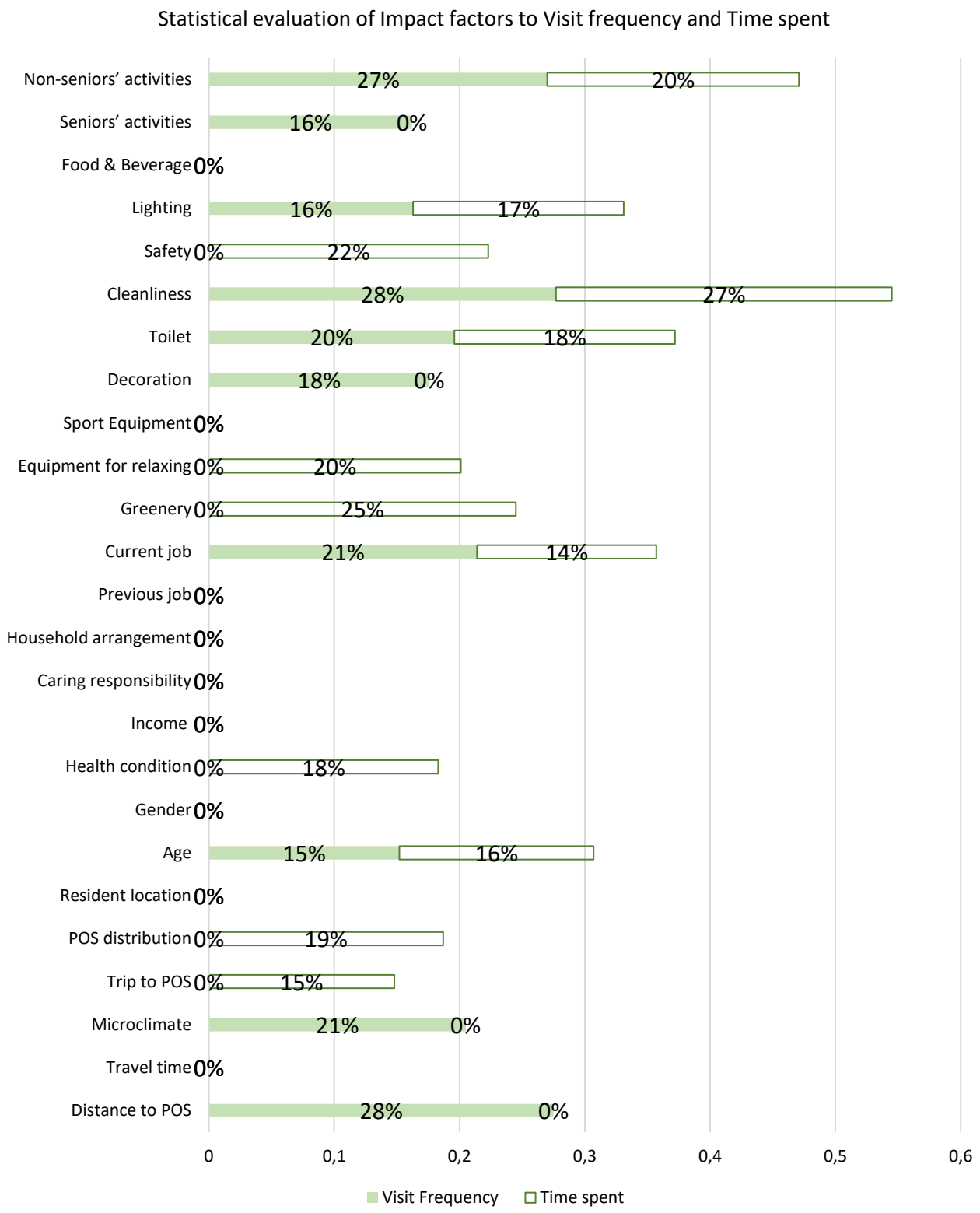


Figure 5.23 Summary of statistical evaluation

Table 5.20 compares the results of this research to the findings of previous studies, which are summarized in Table 2.3 in chapter 2. The two columns on the right are this research's statistical results.

Factors	Previous study		This research's findings	
	Significant impact on the use	Not significantly impact the use	Visit frequency	Time spent
Hypothesis 1: Proximity				
Distance	Thailand, Srichuae et al. (2016)	The US, Kaczynski et al. (2008) The UK, Alves et al. (2008)	Moderate	-
Travel time	Thailand, Srichuae et al. (2016)		-	-
Hypothesis 2: Neighborhood characteristics				
Resident location	Colombia, Gómez et al. (2010)		-	-
Age composition	Canada, Moore et al. (2010)		-	Weak
Trip to POS	Britain, Sugiyama et al. (2008) Turkey, Turel et al. (2007) Malaysia, Mahmoudi et al. (2015) Malaysia, Sakip et al. (2015) Colombia, Gómez et al. (2010)	The UK, Alves et al. (2008)	-	Weak
Microclimate/ Climate	Worldwide, King & King (2011) Denmark, Gehl (2011)		Moderate	-
Hypothesis 3: Users' characteristics				
Age	Austria, Wanka (2018)		Weak	Weak
Gender		The UK, Alves et al. (2008)	-	-
Ethnicity	Hungary, Boros et al. (2016) Malaysia, Ujang et al. (2018)			
Previous job			-	-
Current job			Moderate	Weak
Living conditions	The UK, Alves et al. (2008)		-	-
Household arrangement	The UK, Alves et al. (2008)		-	-
Caring responsibility			Weak	-
Health status	The US, Carr et al. (1992)	Britain, Sugiyama et al. (2008)	-	Weak
Income	Iran, Daneshpour & Mahmoodpour (2009) The US, Carr et al. (1992)		-	-
Hypothesis 4: Design of POS				
Safety	England, Holland et al. (2007) Iran, Fallahi & Momtaz (2018) Turkey, Turel et al. (2007)		-	Moderate
Comfort/relaxed equipment	The US, Carr et al. (1992) England, Holland et al. (2007)		-	Moderate
Nature enjoyment	China, Zhu et al. (2017) Australia, Sugiyama et al. (2015) The UK, Alves et al. (2008)		-	Moderate
POS size		Australia, Sugiyama et al. (2015) The US, Kaczynski et al. (2008)		
Park facilities	The US, Kaczynski et al. (2008) The UK, Alves et al. (2008)	Britain, Sugiyama et al. (2008)		
Lighting			Weak	Weak
Sport Equipment			-	-
Toilet			Weak	Weak
Park amenities/ Design features	Iran, Hajmirsadegh et al. (2013) Vietnam, T.-H. Nguyen (2015)	The US, Kaczynski et al. (2008)	Weak	-

Factors	Previous study		This research's findings	
	Significant impact on the use	Not significantly impact the use	Visit frequency	Time spent
Quiet	Vietnam, T.-H. Nguyen (2015)			
Pollution	Turkey, Turel et al. (2007)			
Maintenance	Malaysia, Mahmoudi et al. (2015) Saudi Arabia, Mandeli (2019)			
Cleanliness			Moderate	Moderate
Paid services	The US, More & Stevens (2000)		-	-
Hypothesis 5: Social Interaction				
Social interaction	Hong Kong, Yung et al. (2017)	China, Zhu et al. (2017)		
Non-senior group	England, Holland et al. (2007)		Moderate	Moderate
Friends and acquaintances	The US, Kweon et al. (1998) Isreal, Noon et al. (2018)		Weak	

Table 5.20 Comparison of research findings and previous studies

5.5 The network among POS objects and the elderly's activities

Each type of POS has its characteristics, which lead to various activities for the elderly. Actor-Network Theory (ANT) describes a stable network between the attributes of the built environment and the actions of the elderly. It assesses the relations between objects and activities in terms of design. Besides, it determines which things in the POS are fitted for the responding activities. Based on the observation of the elderly's activities related to the characteristics of POS, the network is generated between attributes and frequent actions in different types of POS. The photos in Figure 5.24 represent the typical features of six kinds of POS (park and pocket park are included). The specific networks of seven types of POS are listed in parts 5.5.1 to 5.5.7.

	Parks	Greenery along the river	Walking boulevard
Pathway			
Open field			
Benches			

Figure 5.24 Common types of architectural elements in POS
Photos' source: the author

Figure 5.25 shows types of daily activities in seven different kinds of POS (including parks, greenery along rivers, pocket parks, walking boulevard, roundabouts, sidewalks, and alleys). These activities are walking, slow-movement exercise, group exercise, meeting to talk, watching other people, sitting for rest, and simply enjoying natural elements.

Walking

Exercise with slow movement

Group exercise

Meeting

Watching

Sitting

Enjoy the nature

Figure 5.25 Common types of activities in POS

Photos' source: the author

5.5.1 Park

Multifunctional parks and district parks had similar actants displayed in ANT. Parks had the most actants and activities among all types of surveyed POS. The photos in Figure 5.26 illustrate some examples of actants in different parks. A total of 18 actants were affiliated with 17 common activities of the elderly (Figure 5.27). Typically, parks were designed with path lanes, open fields, children's playgrounds, food and beverage services, restrooms, decorations like statues and fountains, greenery, fixed equipment for exercise, and badminton yards. However, many activities mainly happened in open fields, such as walking, jogging, sports with loose equipment, Tai-chi, dancing groups, or simply meeting people. Five actants interrupted activities, of which lousy weather had the most effect.

Benches

Open space

Small lake

Figure 5.26 Some elements of parks in HCMC
Photos' source: the author

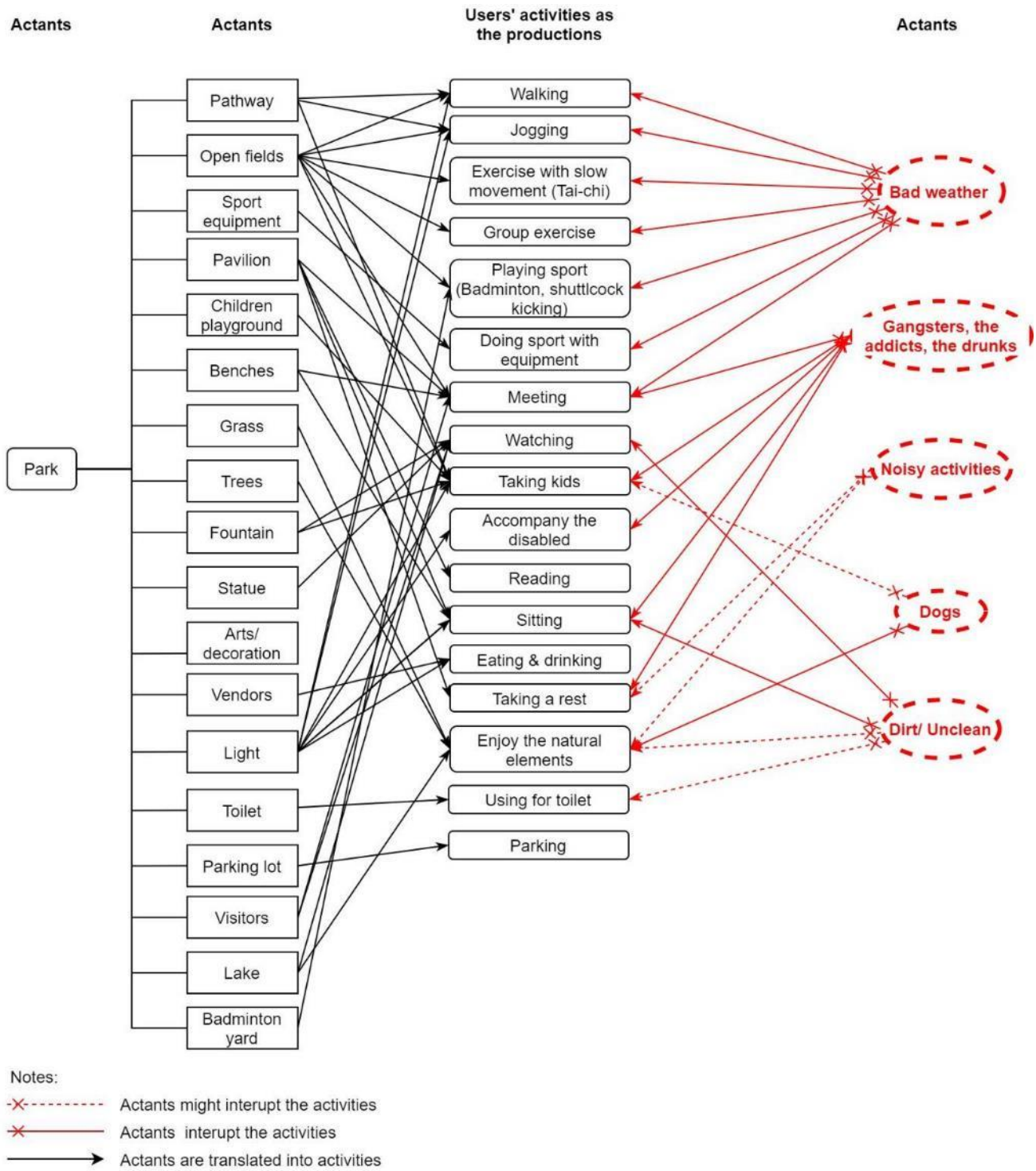


Figure 5.27 Actor-Network of parks in HCMC

5.5.2 Greenery along the river

A green lane was renovated along the rivers or under the bridge with shade trees and grass and fixed sports equipment installed (Figure 5.28). There were 12 actants for this type: a pathway, sports equipment, benches, grass, trees, vendors, light, toilet, parking lot, visitors, badminton yard, and pavilion. These actants were connected to 17 activities, in which light and pathway played the most vital role in connecting with various activities. Uncomfortable weather and the appearance of bad people providing unsafe feelings for the elderly were critical factors in reducing activities in POS (Figure 5.29).

With kids & parking on the motor lane Pavilion Greenery

Figure 5.28 Some elements of riverside parks in HCMC

Photos' source: the author

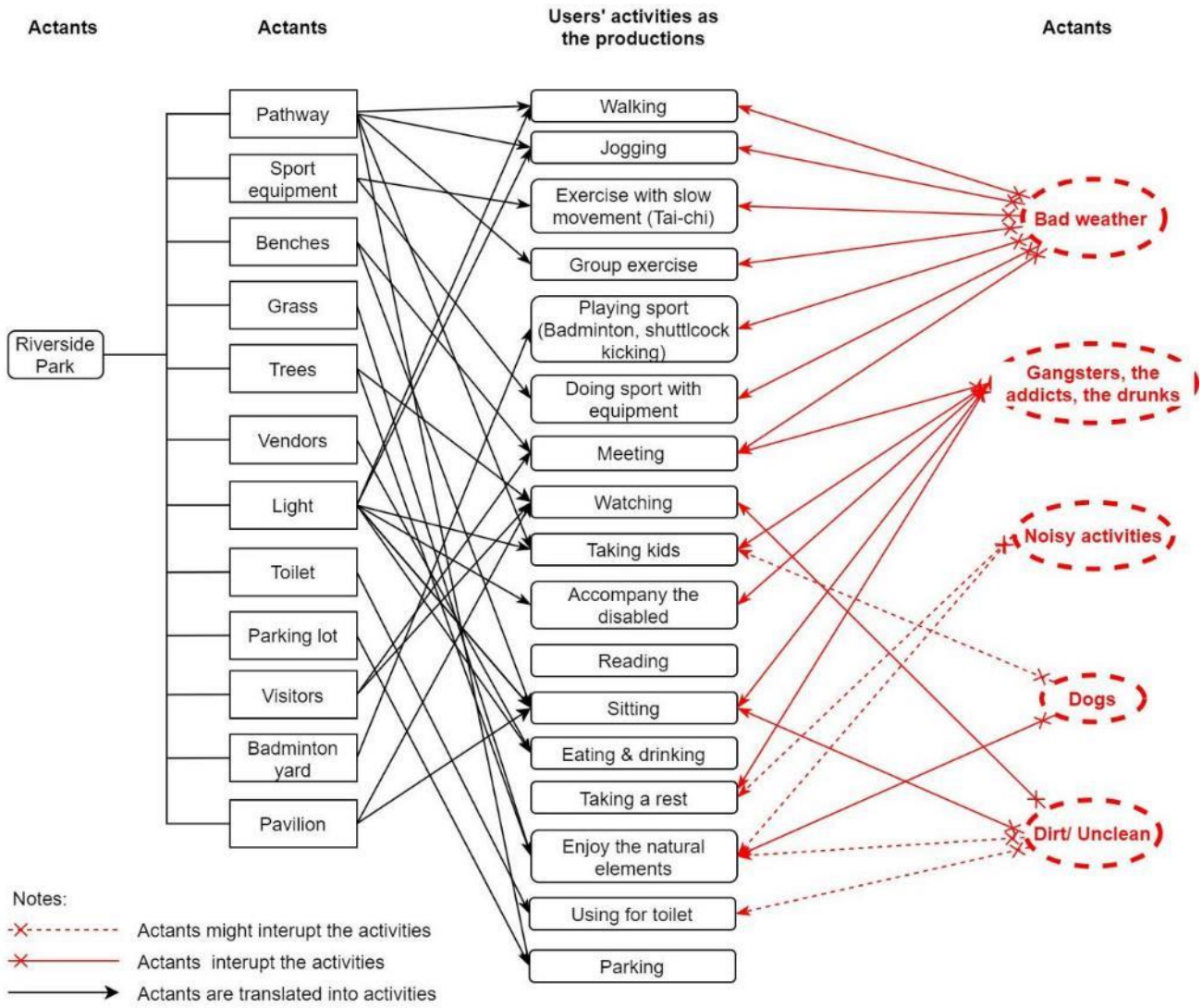


Figure 5.29 Actor-Network of riverside parks in HCMC

5.5.3 Pocket park

The small sizes of pocket parks resulted in fewer functions and activities. The ANT had nine actants: a pathway, sports equipment, benches, grass, trees, vendors, light, visitors, and a badminton yard. However, the number of activities was still diverse, with 15 activities connecting to nine actants. Five actants interrupted activities, of which inclement weather was critical (Figure 5.30 and Figure 5.31).

Sport equipment Sport equipment Pathway

Figure 5.30 Some elements of pocket parks in HCMC

Photos' source: the author

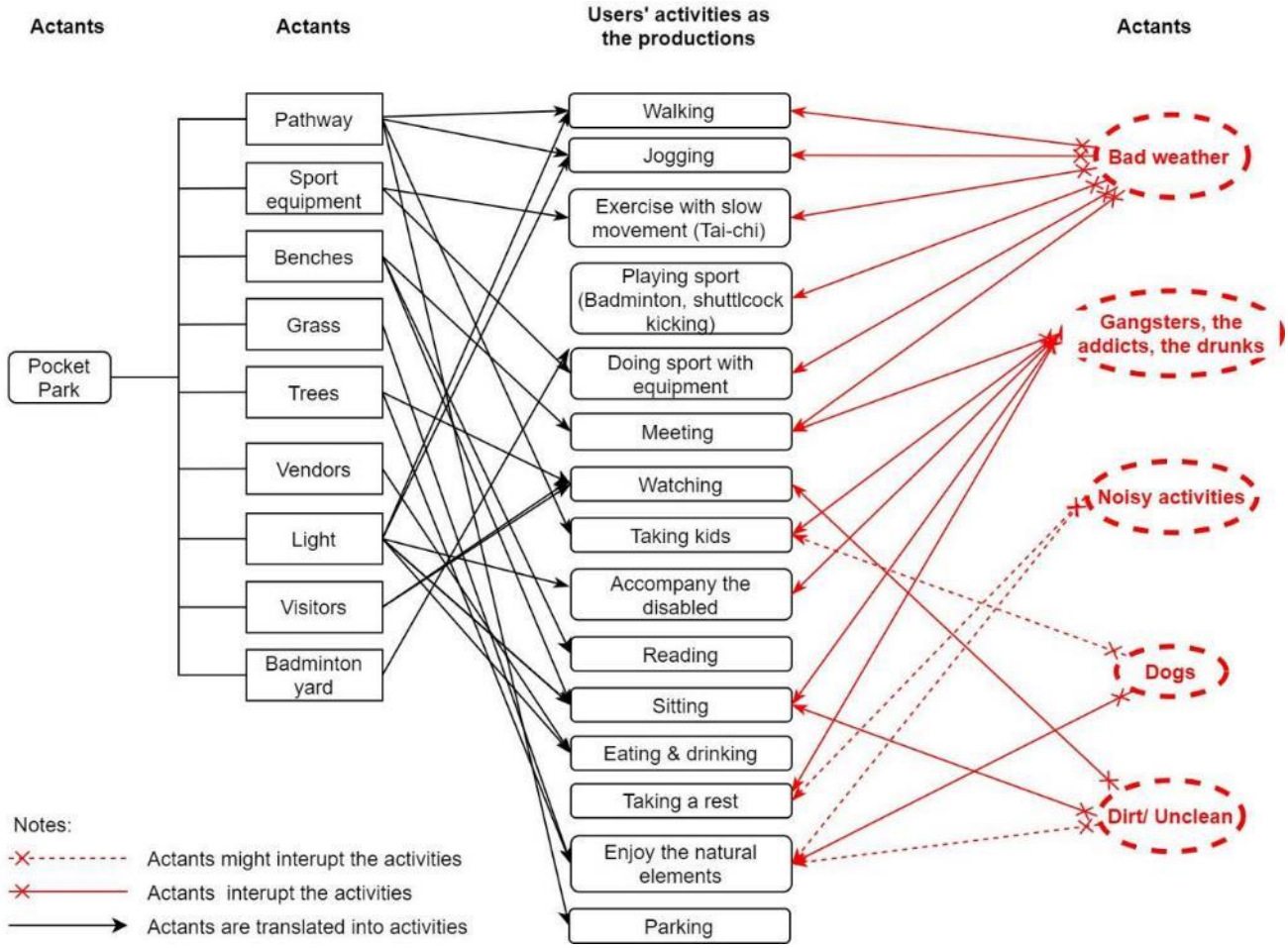


Figure 5.31 Actor-Network of pocket parks in HCMC

5.5.4 Walking Boulevard (Nguyen Hue boulevard)

The design of the walking boulevard was different from the parks. On this street, there was no children's playground or grass except for several attractive vendors offering various food and beverage services. The bollards placed to prevent vehicles from entering the walking areas were used for other purposes, such as sitting (Figure 5.32). Twelve actants connected to 12 activities where benches and fountains contributed the most network connections (Figure 5.33).

Open space

Bench

Bollard

Figure 5.32 Some elements of Nguyen Hue Walking boulevard in HCMC
Photos' source: the author

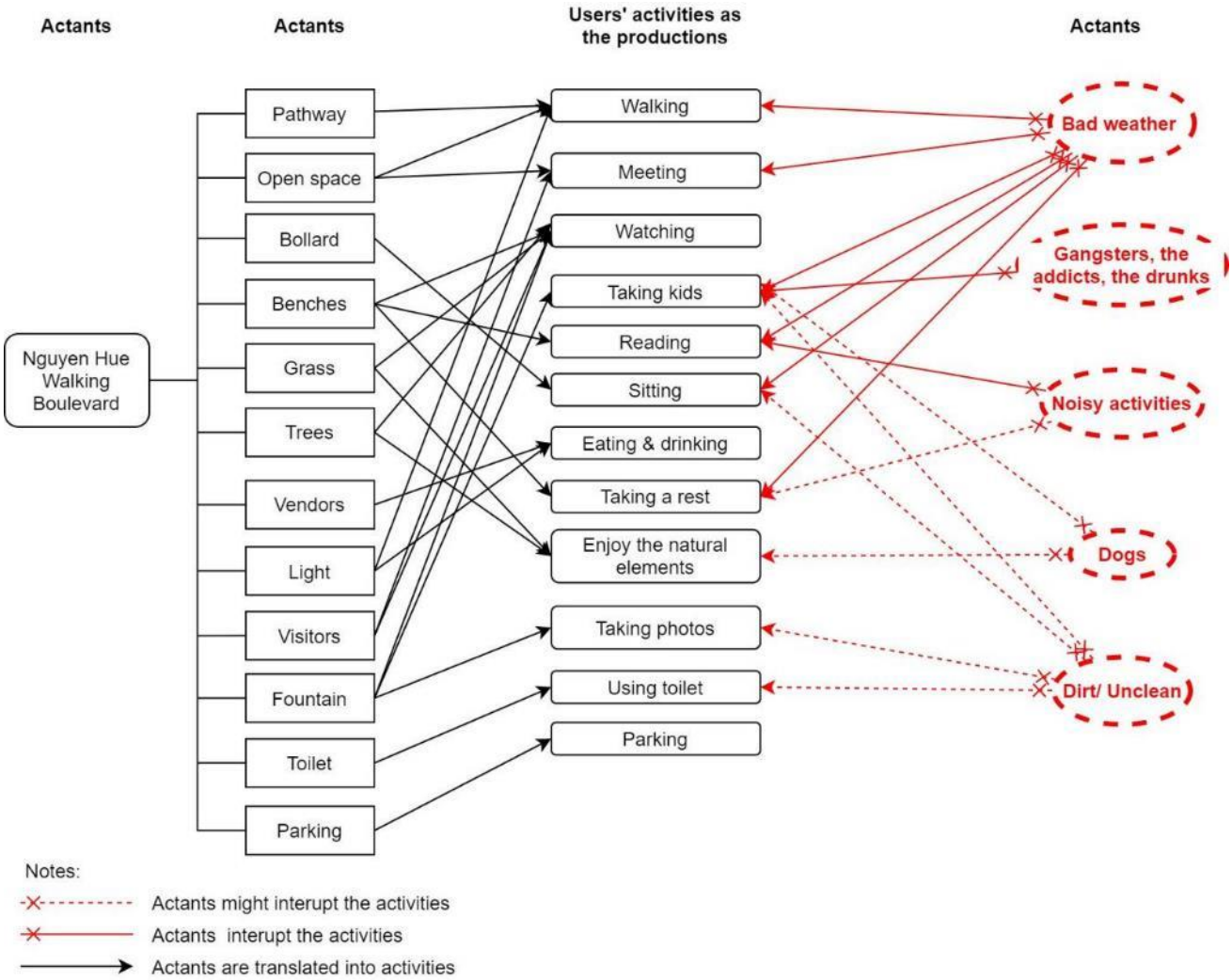


Figure 5.33 Actor-Network of Nguyen Hue Walking Boulevard in HCMC

5.5.5 Roundabout (Cong Truong Quoc Te)

Cong Truong Quoc Te roundabout symbolized HCMC, famous for its well-designed and historical aspects. It had eight actants connecting to 12 activities. Benches are attributed to most activities in this place, including meeting, sitting, watching, reading, and resting. The following favorite actant was a fountain attractive for taking photos and pleasant surroundings (Figures 5.34 and 5.35).

Overview Pathway Fountain

Figure 5.34 Some elements of Turtle Lake Roundabout in HCMC

Photos' source: the author

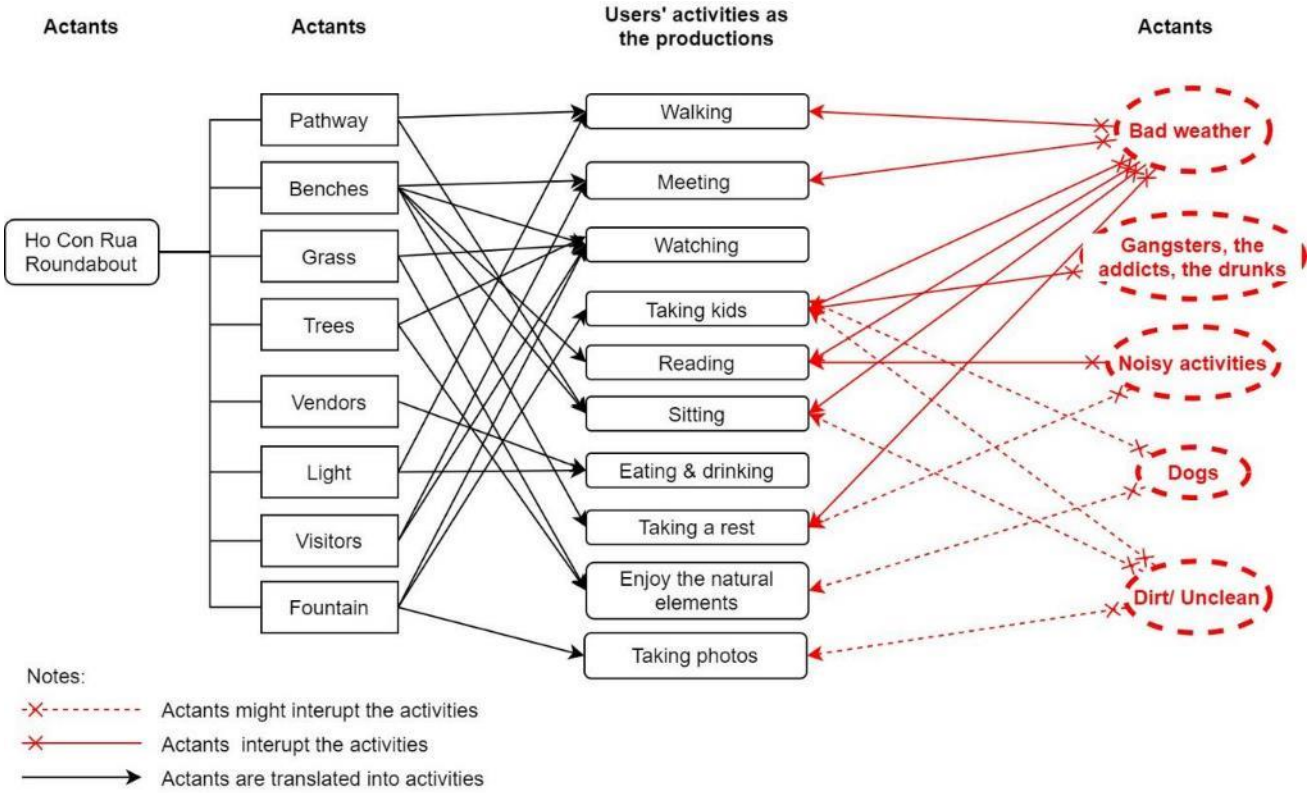


Figure 5.35 Actor-Network of Turtle Lake Roundabout in HCMC

5.5.6 Sidewalk

Sidewalks, a simple design with the primary function of walking, had seven activities from six actants. The elderly used pavement not only for walking but also for performing slow movement exercises called Tai-chi. Actant "passengers" played an essential role in the network as objects for watching, meeting, and doing group activities like walking in groups or food preparation. The number of interrupted actants was higher than other types of POS, with heavy traffic and poor pavement quality (Figures 5.36 for examples and 5.37 for the network).

Fence
Photo: the author (2017)

Sidewalk under the bridge
Photo: Thanh Tung/ Dan Tri Online magazine

Grass & Trees
Photo: Vinhomes/Ann Homes

Figure 5.36 Some elements of sidewalks in HCMC

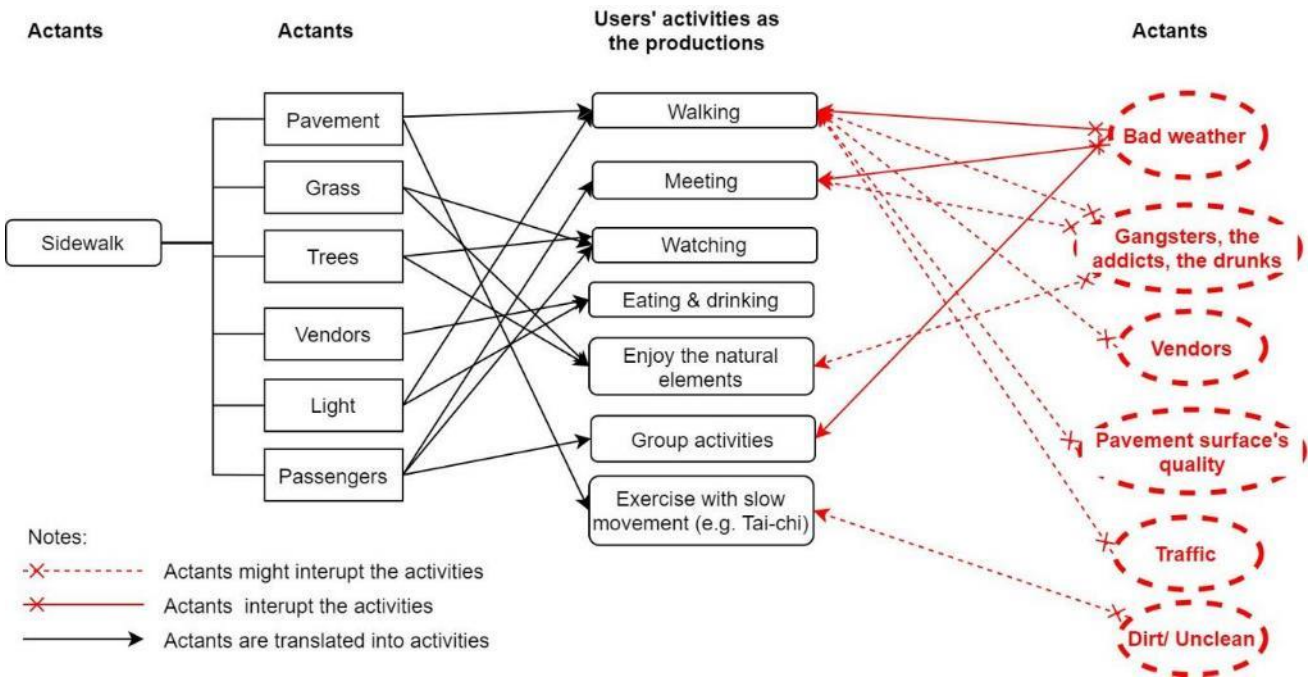


Figure 5.37 Actor-Network of Sidewalks in HCMC

5.5.7 Alley

Alley was a place with a mixture of passengers and vehicles together without any separation by design, for example, a sidewalk for passengers only. There were six actants in this type of POS: roadway, vendors with various foods carried in a stall-box with tables and chairs, passengers, neighbors exchanging small talks, lighting systems at night for security reasons, and illegal plant boxes occupying the narrow roadway (Figure 5.38).

Plant boxes in the alley
Photo: the author (2019)

Shadow from the opposite house
Photo: Nguyen Son

Group activities
Photo: Vietnamnet. vn

Figure 5.38 Some elements of the alleys in HCMC

These six actants were linked to six activities. Eating activities require the most prolonged time compared to other activities such as meeting, walking, watching, group activities, or enjoying natural elements from plant boxes. Furthermore, neighbors played a vital role in three movements: meeting for small talk, watching each other, and sometimes doing exercises like walking together. Four actants interrupted these six activities: uncomfortable temperatures, heavy traffic, illegal vendors, and poor roadway surface with potholes causing accidents and injuries (Figure 5.39).

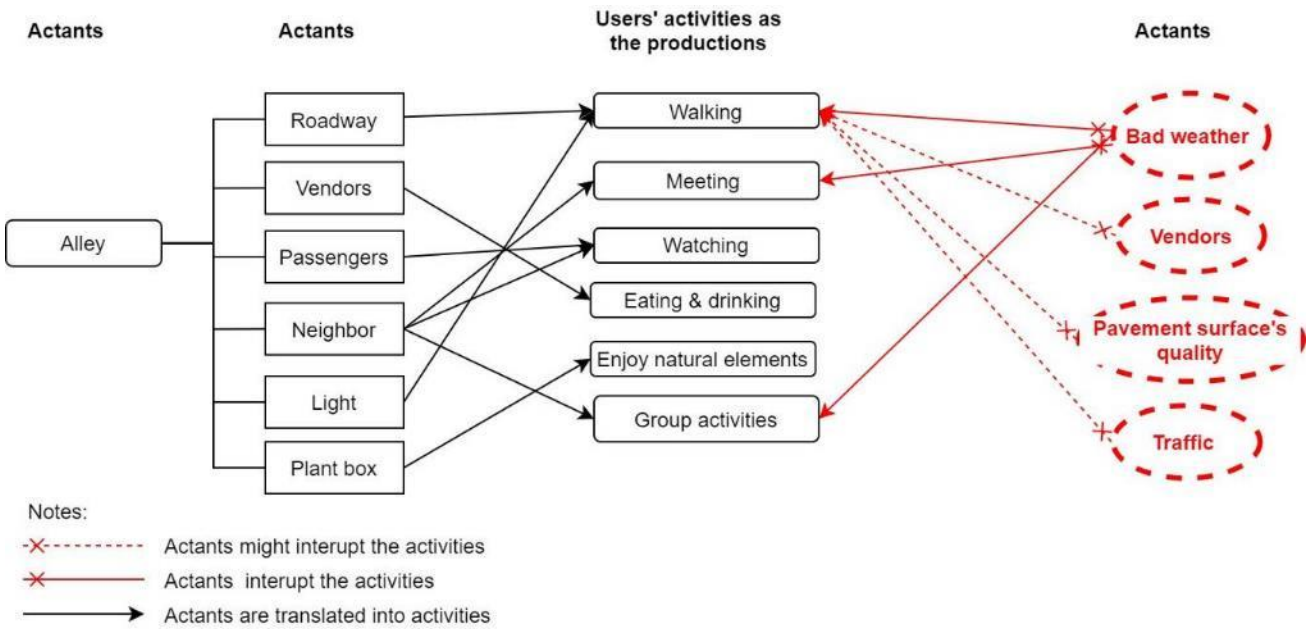


Figure 5.39 Actor-Network of Alleys in HCMC

5.5.8 Summary of ANT

Seven surveyed types of POS, comprising of “parks,” “greenery along rivers,” “pocket parks,” “walking boulevards,” “roundabouts,” “sidewalks,” and “alleys,” were designed differently. However, the activities of specific objects performed by the elderly had something in common. Six general objects called “actants” appeared in seven types of surveyed POS, including “pathways,” “open fields,” “benches,” “trees,” “lights,” and “people.” “Actants” were linked to seven general activities named “walking,” “exercise with slow movement,” “group exercise,” “meeting,” “sitting,” “watching,” and “enjoying the natural elements.” One “actant” led to one or more activities. For instance, a pathway was the place for walking and jogging - an essential function in design but also used for meeting people for small talk or observing others. These activities would be interrupted, distracted, or halted in the occurrence of activities such as bad weather, addicts or drunks, commercial activities, and unhygienic scenes. Bad weather, like high temperatures or rain, slowed down or prevented people from walking, jogging, and performing other exercises. Street gangs, drunks, or drug addicts posed the most significant threat and unsafety to the elderly, which deferred their walking or meeting friends. Some elderly were active, while others relaxed on the benches while sitting, reading, watching, talking, or simply resting. Some liked to stay in the open fields with shades where they felt comfortable and safe. Figure 5.40 shows the network between general objects of seven types of studied POS and the responding activities. This network focuses on the most common elements of available POS in HCMC that helps to orient the guidelines in designing features for POS in the next sub-chapter.

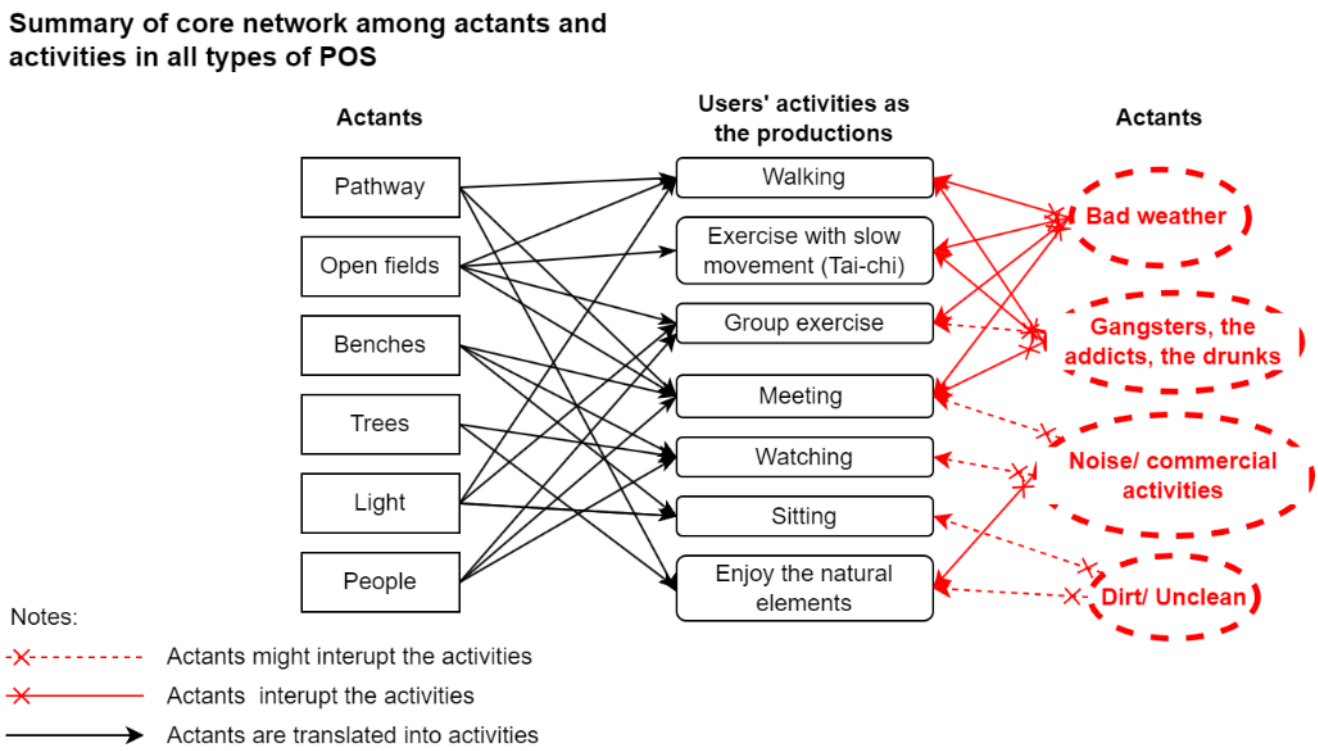


Figure 5.40 Summary of ANT for all kinds of POS

5.6 Design guidelines that match the needs of the elderly in HCMC, Vietnam

Based on the synthesis of global design guidelines for seniors (Table 5.2 in Section 5.1) and the needs of the elderly in HCMC (sections 5.3 to 5.5), a detailed design guideline was created to match the requirements described in Table 5.21.

5.6.1 Detailed design guidelines matching the needs of the elderly in HCMC, Vietnam

This guideline gives an overview of different indicators for age-friendly POS among various types of existing POS regardless of location. It can be used as a strategic reference for urban planners, landscape architects, authorities, and investors in the development of public spaces.

The design guidelines used age-friendly design guidelines as the framework to modify to match the findings above. The order of impact factor series had been re-ordered in the list of priorities from Social interaction, proximity, design of POS, neighborhood characteristics, and user characteristics. Common features of seven types of POS found in sub-chapter 5.7 received more attention than other features to respond to the needs of the elderly in HCMC. Table 5.21 presents the tailored design guidelines that match the needs of the elderly in HCMC, Vietnam.

Note: The italic and underlined words are added to match the HCMC content. The strikethrough words are deemed to be unnecessary considering the HCMC context. The order of the series of factors is modified to fit the most impact factors from the findings in sub-chapter 5.3.

	Principles	Criteria
Social Interaction	Towards an Intergenerational Playground	• *<u>Locate a carefully designed children's play area next to the activities developed for the elderly and increase the number of benches so that the elderly can sit and watch the children playing</u>* • Locate common areas accessible and visible to visitors from a maximum number of points while ensuring individual units maintain their visual and acoustic privacy

	Principles	Criteria
	Social Support: wanting to be connected with other human beings and be cared for and supported by them	• Provide facilities to use in parallel with facilities used by non-seniors, *especially the children*, but still privilege the elderly in the use of particular equipment and facilities • Create an amicable community in the neighborhood- compact, walkable, self-sustained zones • ~~Exclude certain activities that are deemed dangerous by older adults~~ • ~~Provide a "haven" within the park – an area that elders can call their own.~~ • Seating arrangement to facilitate interactions ~~BBQ pits,~~ *Chinese/ chess* tables, board games • Neighborhood events at the park; or events that bring youth and seniors together (e.g., youth orchestra performances) • Facilitate community exchanges such as food banks, community-supported agriculture, and exhibits of neighborhood photos taken by elderly • Create a node for local information exchange with a bulletin board and a newsstand • ~~Outdoor reading room ("little free library" to donate and read books)~~ • ~~Provide "foils for conversation"—architectural, natural, or landscape elements (e.g., kiosks, water fountains, flowers, pigeons) that bring people together around a common focus~~
Proximity	Accessibility: Quickly, safely, and easily access	• *Natural barriers such as small shrubs* • Ample handicapped parking *with a discount for the seniors* • Walkable distance (recommended around *300m to an oasis or semi-public spaces in the walkway (e.g., using the outdoor lobby of public buildings with benches) so that the elderly can take a rest* • Increase the number of public spaces and *semi-public spaces (outdoor or entrance of commercial buildings, schools, and religious buildings* within a 900m radius of existing downtowns) ~~in lacking POS cities such as HCMC and Hanoi, Vietnam)~~
	Control: have a good sense of orientation and understanding of the park's layout and its different offerings	• Provide visible signs such as way-finding, park signage, layout information/ map/ programs with flyers in many languages (including graphic and Braille) at the entrance and other areas inside the *multifunctional and district* parks *(whose areas are greater than 10 ha)* • Provide oriental features in large parks *(> 10 ha)* (e.g., a kiosk, a clock tower, a fountain, some boulders) • Avoid creating dead-end paths • Provide educational and informational posters ~~/other sensory cues (sound patterns, flower fragrances)~~ inside the parks
Design of POS	Safety/security	• Crime: Paths with clear lines of sight; avoiding foliage obstructing views; good lighting; no dark or concealed areas • Emergency phone boxes, security technology (CCTV, emergency report systems) • Patrol of community volunteers to ensure the safety • Falls: non-slippery, even paving surfaces; flat or gently sloped paths; handrails on ramps and paths; avoid stairs. ~~No skateboarding or cycling in the park or only in designated areas;~~

Principles	Criteria
Contact with nature	• The predominance of "softscapes" (plants, greenery) over "hardscapes" (concrete) (recommended ratio of 30% hardscape and 70% vegetation) • Mature trees for adequate shade • Variety of plants, flowers, and vegetation (e.g., different colors, fragrances). In small parks, arrange flowers in multi-level plant beds to save space. • Well and *regular* maintenance • Include calm or slowly moving water elements (such as small ponds, creeks, and waterfalls) • Soothing and natural sounds (water, birds, breezes, wind chimes) • Urban spaces as a setting for unthreatening wildlife (e.g., birds, butterflies, squirrels, ducks) and *prohibit hunting in a city* • Provides opportunities for environmental learning
Age-friendly, ergonomic design	• Provide seats with ergonomic design, backs, and arms made from natural materials (resistant to high temperatures *and rain*); preferably wooden painted benches that allow a rapid drying, avoiding metal benches that are too cold or too hot • A seating area and pavement with contrasting colors (for compromised depth of field perception) • ~~Light, easily movable seats and tables~~
Physical activity	• Paths of different lengths and levels of walking difficulty • Exercise equipment for different capacity levels • Low-impact exercise equipment away from heavy-traffic park areas • Grassy, flat area for group exercise classes and Tai-chi • Organized physical activity classes for seniors *for free* • Gardening opportunities for seniors *by organizing small urban farms in neighborhood units or alleys and managed by the community*
Choice: flexibility in park design and offering different choices	• Offer opportunities for passive recreation (people, performance, and scenery-watch) and active recreation (e.g., direct contact with people, group games, promenades). • Provide seating options and spaces for a person alone and small and more significant groups in the shadow ~~or under the sun~~.
An aesthetic and sensory delight	• Place exciting sensory features at shorter intervals • Screen or transform unpleasant views (e.g., a blank wall, an asphalt parking lot) through vegetation, mural painting, or art placement • ~~Identify and use plants that have special meanings for particular cultural or ethnic groups that live in the park's vicinity~~ • Consider the installation of outdoor art pieces and fun and whimsical features in the park • Includes opportunities for discovery, delight, and challenge (e.g., *planned and controlled* crafts fairs, concerts, and flea markets) • The small scale: the careful attention paid to the human landscape offers visitors good conditions — at eye level. The bird's eye view and helicopter perspective do not play much of a role here
Comfort	• Add a cover to protect visitors from sun, wind, rain, and glare by planting trees and vegetation strategically to eliminate direct sunlight and minimize sun glare; providing elements that can cover the sun, such as umbrellas and kiosks; providing settings that offer overhead protection; orienting parks or adding in features to the park located in windy areas to

	Principles	Criteria
		protect visitors from prevailing winds; and, lastly, orienting park located in hot climates to allows cool breezes • Encourage food stands in the park served *with high-quality assurance* • Not being disturbed by noise, odor, *and dogs* • Places to sit without paying for goods and services; seating provided by businesses
	Adequate public toilets	• The availability of clean, convenient (near the walkways), and handicap-accessible toilets with a precise location directory • Prefer public toilet models ~~that are self-cleaning or~~ made with easily washable materials • Avoid the toilets located underground (difficult to access and risk of insecurity) • Provision of sufficient basic facilities with frequent maintenance
	Economic: Contribute economic benefits to the surrounding community	• Working space avoids *unused and unplanned spaces* and creates financial, property market prices, and functional custom. Dynamics of property price fluctuation and perception of business attraction & stability • Too little public space is a false economy; too much public space is a false luxury (recommend from 25 to 35% total area of a quarter or 7-9 m2 per capita for a neighborhood unit) • *Restrict using the wrong purpose of land use in a park*
	Connectivity	• Create a continuous 'walking loop'- an unbroken network of pedestrian-accessible public spaces and paths • Good connectivity between public spaces with attractive, continuous, or intervening footpaths • Park placement near ~~facilities used by seniors (e.g., senior centers, churches) and~~ transit stops • Create a small oasis (benches, water, vegetation, adequate lighting, trash containers, shelters against sun, rain, wind, and toilets), pleasant places to take a rest along pathways • Connect to the larger community both physically and programmatically through community events and activities that appeal to seniors (e.g., outdoor health clinic, yoga for seniors, farmers markets) • Build flat or gently sloped ramps and pathways ~~• Locate shared patios (or other common or shared open space) for parties and barbecue areas next to interior community areas~~
	Safe pedestrian crossings	• Safe crossings and signalized intersections provide more time to allow the elderly to cross the street safely; visible and audible crosswalk signaling • Non-slip strips on pedestrian crossings, bridges, ~~and tunnels~~ to assist pedestrians at crossroads,
Neighborhood characteristics	Age-friendly pavements	• A smooth, level, non-slip surface; sufficient width to accommodate wheelchairs; dropped curbs that taper off to be level with the road; clearance from obstructions such as street vendors, parked cars *and motorcycles*, and trees; and priority of access for pedestrians • Streets should have character and reflect local identity, history, and culture. Utilizing local art and architecture can help enhance the distinct and unique character and identity

	Principles	Criteria
Users' characteristics	*Functional (need for a tranquil environment*	• Reduce street noise: locate the park in a quiet location, use buffer planting for seating areas in parks, and use natural sounds (water, the breeze moving through tree leaves) • Offer some sub-areas that visitors can sit alone
	Democratic	• Governance: the city for the elderly is a city for all; Participation: the city *for all is built with the participants with all people.* • Mainstreaming: numerous ways to meet the needs and cover transversally different sectors of the public body: town planning, housing, social and health services. Creating a city for older people requires a comprehensive approach • Explicitly state what each outdoor community space is to be predominantly used for, *avoid using the wrong purpose of land use* • Being evaluated, redesigned, and improved over time • It is loved by those who use it and live or work nearby

Table 5.21 Design guidelines that match the needs of the elderly in HCMC

5.6.2 Expert interview results

The expert interview aims to collect the experts' experiences during their practices while working in several landscape design businesses in Vietnam. Their inputs of the two age-friendly design guidelines related to the synthesis design guidelines (Table 5.2) and the tailored new design guidelines (Table 5.21). During two weeks of interviewing the five experts virtually, several positive feedback was provided, including the current landscape design situation in Vietnam (guideline questions 1 to 3) and the evaluation of age-friendly design guidelines (guideline questions 4 to 6). The detailed guideline questions and the answers from experts can be viewed in Appendix C: Expert interview questionnaire and Appendix D: Expert interview results.

The current situation of landscape design in Vietnam

During the interview, the experts stated that they have been using several design guidelines, including the Vietnamese Code, Circular, and Vietnamese Standards, which regulate general functions and zoning design for all people, including accessibility, safety, facilities, and amenities in parks. The most popular Codes and Standards currently in use comprise QCVN 01:2019/BXD-National Technical Regulation Construction planning and TCVN 9257:2012-Greenery planning for public utilities in urban areas-Design standards.

In a typical landscaping business, the designers receive requests from investors who are essential in investigating the users' needs. They set up the objectives and goals for the designers to follow. After receiving the proposals, the designers explore the areas extensively and do exploratory research for ideas and insights. They then discuss options for designing parks with the investors to select the optimal choice. The design process follows legal and technical standards written in the preliminary and technical design stages. After the project proposal is approved, the designers continue to modify the design accordingly while providing direct supervision on the construction sites to ensure the project's success.

The evaluation of design guidelines

Regarding synthesizing global age-friendly design guidelines for urban spaces, the experts added some thoughts on accessibility, control, economics, connectivity, privacy, democracy, safety and security, nature enjoyment, aesthetics, and toilet principles for improvement. They preferred the strategy of separation to reduce overlapping among different functional zones. Some criteria, such as privacy, aesthetics, and sensory, were hard to define. The experts agreed on the remaining principles.

Regarding the tailored age-friendly design guidelines matching the needs of the elderly in HCMC, the experts focused on social support, functional, democratic, and safety principles. They recommended improvements to fit the Vietnamese elderly's needs, such as reading clubs for the elderly and isolation from the main roads. They also elaborated on the benefit of bringing in a consultant from the community to the designing process before getting approvals from the authorities. In addition, they emphasized the importance of safety and security principles but recognized a conflict between adding brushes for isolation and maintaining good visibility.

Remarkably, the tailored design guidelines were evaluated with excellent results. They were confident that these guidelines could be applied in practice in HCMC and other similar cities in Vietnam.

5.7 Summary

The six sub-chapters 5.1 to 5.6 bring out the results in the order of six related research questions in chapter 1.3. The results presented the process of developing age-friendly design guidelines. First, the POS age-friendly design guidelines as a framework were created by synthesizing 14 relevant articles, reports, and policies. Then, the second step analyzes data from participants. Their information and activities collected through survey questionnaires and observation are used to verify which factors impact the use of POS. Factors influenced the use, including time spent and visit frequency, differently. More than half of the participants visit POS daily. Eighty-five percent of elderly users stayed in POS from 30 to 90 minutes. After listing all impact factors and the use POS of the elderly, five series groups verified which factors impacted the use and how strong their impact was. Cleanliness, activities of the non-seniors, and current job influenced the use significantly. However, group series of social interaction generally impacted the use the most.

The results from analyzing data from the survey questionnaire have not fulfilled the overview of using POS. Therefore, the ANT generated the activities and elements in different types of POS from observation methods. There are six common actants, including "pathways," "open fields," "benches," "trees," "lights," and "people." These elements lead to seven general activities: "walking," "exercise with slow movement," "group exercise," "meeting," "sitting," "watching," and "enjoying the natural elements." Six actants are paid attention to in tailoring age-friendly design guidelines for the elderly in HCMC.

The highlighted result of this chapter was these tailored design guidelines. They presented the priority factors that impact the use of POS by the elderly, from moderated impact to weak impact. Social interaction plays the most crucial role, which puts the highest priority on designing POS in HCMC. The following was a series of proximity factors, the design of POS, and neighborhood characteristics. User characteristics impacted the used the least, which stood at the bottom of the guidelines. The priority of design guidelines supported the practitioner to focus on the essential factors that match the needs of a specific location. These tailored guidelines received a perfect evaluation from the experts through a virtual interview.

The next chapter, chapter 6, will explain and interpret these results in the context of research questions and comparing to other scholars' conclusions.

6 CHAPTER 6: DISCUSSION AND ANSWERS TO RESEARCH QUESTIONS

The results analyzed in chapter 5 and explanations of six questions regarding the POS topic proposed in section 1.3 are discussed in this chapter. The key points are rationalized in 6.1, followed by imperative findings compared to other scholars answered in 6.2.

6.1 Discussion

This study aims to define a feasible design of POS in HCMC in accordance with the needs of the elderly by examining the relative importance of the POS attributes and identifying the best routes using statistical analysis of Chi-square and Fisher's exact tests. Information of this nature (e.g., preferences in intended activities, duration of time spent, and the frequency of visits of the elderly) can offer valuable insight into mitigating negative issues and planning for an age-friendly POS environment. Seeking input from interest groups provides strong arguments to support initiatives in arranging facilities to benefit POS users. Chapter 5 presents several findings on the needs, activities, and expectations of the elderly while evaluating the impact factors on the use of POS, comparing the network between POS design features and the elderly's activities in all kinds of POS. These significant impact factors assemble new design features linked to behavioral and age-friendly design components for POS.

6.1.1. Impact factors

This study demonstrates correlations between the use of POS by the elderly and five series of impact aspects: (1) proximity, (2) neighborhood characteristics, (3) user characteristics, (4) design of POS, and (5) social interaction. The statistical results review that the most impactful series to visit frequency and time spent are "social interaction," followed by the "design of POS," then "proximity," and "neighborhood characteristics," while the least impactful aspect was "user characteristics." These findings reinforce the findings in previous studies done by other scholars, including Alves et al.(2008), Turel et al.(2007), Yung et al.(2017), and Zhu et al. (2017). They all state that the "design of POS" and "social interaction" have played essential roles in the elderly's use of POS. The three primary aspects attracting the elderly to POS in HCMC are "proximity" (nearly 28%), "greenery" (17%,) and "seniors' activities" (12%), which are similar to the findings in T.-H. Nguyen (2015). Section 6.1.1.1 to section 6.1.1.5 detail each impact factor within their series.

6.1.1.1 Proximity

"Proximity" is one of the critical factors that are most attractive to the elderly when visiting POS, according to a subjective selection of users. An objective assessment with GIS software calculating the **distance** between the users' locations and their favorite POS shows the mean of 615 m, which is approximately a 10 to 15-minute walk at an elderly's walking speed. Moreover, this distance equals two-thirds of an average trip to green spaces in Hanoi (an equivalently big city in Vietnam), according to Phan et al. (2015). However, a 615-m walking distance is further than the "500-m walkable distance" set out by Clarence Perry in 1929 and the Vietnamese code in 2021 (National Technical Regulation on Construction Planning, 2021). Despite inaccurate calculations using flying bird length techniques to measure the distance between people's location and POS in the survey, the result is still considered acceptable to portray the insufficient distribution of POS in Vietnam.

"Travel time" is also a concern for the elderly. Approximately 30% of the remaining respondents spent more than 15 minutes commuting, even 1 to 2 hours by bus (0.2%). This is not a sufficient travel time compared to the 2006 American Planning Association guidelines, which require 2 to 6 minutes of walking to a pocket park (Y. Park & Rogers, 2015)), given that there is no such standard in Vietnam.

The elderly rated public transport as the least of their favorite means of transportation; for example, only 1.6% chose this route due to delays or a lack of bus stops. Less than 20% of the users would drive motorcycles or bikes to POS because they are afraid of potentially having traffic accidents and might not react as quickly as younger people.

The result of the statistical analysis shows that proximity impacts the visit frequency of the elderly moderately. This research applies similar measurements used in Srichuae et al. (2016), including distance and travel time, but with different categorizations in ranking. In detail, the length used in this study is calculated with the estimation of elderly users' travel distance ranging from "< 300m," "300-600m," "600-1000m," and "> 1000m." Travel time is measured with the ranges of "<15 minutes," "15-30 minutes," and "30-60 minutes," regardless of the means of transport. Meanwhile, Srichuae et al. (2016) rank the travel distance "≤ 0.5," "0.6–3," and "3.1–8 km'' with a travel time of "10," "10–29," "30–59," and "≥ 60-minute walks". The discrepancies in categorization in rankings might affect the statistical analysis leading to the inconsistency in the statistical findings between this study and Srichuae's. Srichuae's investigation concluded that distance and travel time played an essential role in visiting the POS of the elderly in Thailand. In contrast, the results of this study showed that the travel distance factor significantly influenced the use of POS in Vietnam but not the time.
Despite the sub-standard distance and travel time, half of the users walked to their favorite POS, as elaborated by an interviewer:
"Walking to their favorite park is also a way of exercise."
The big gap in the distance reported by different users also lies in the quality and disparity of other POS systems in the city. For instance, Tao Dan Park - rated the best park in the CBD - would attract several people willing to ride on a motorbike for nearly 7 km to get to the park. Alternatively, Phu Lam Park, a district park in non-CBD, attracts the elderly to travel up to 4 km in the distance for its rich greenery and beautiful water surface. Meanwhile, the elderly would travel a shorter distance (3 km) to Binh Phu Park, a multifunctional park in the same district, because of its limited open spaces due to the occupation of restaurants and commercial activities. Hence, combining both studies' methods help researchers to get different perspectives. According to users, the distances to arrive in POS were subjectively perceived as "not far"; however, the results extracted from the calculations done in ArcMap software reviewed the opposite. Although the mean distance from non-users' houses to the nearest POS was less than 200 m and within their expectation, they had yet to visit the POS. Therefore, it can be interpreted that proximity may not be a critical factor impacting the visit frequency. However, other factors can also prevent the elderly from joining outdoor activities.
The sub-standard distance to POS suggests the unequal quality and distribution of POS in HCMC and the lack of POS in existing areas of the city. It also shows the need to use POS, even in the non-standard conditions of POS design. The improvement initiatives rest on the policy and decision-makers of the master plan, the supervision of the implementation and execution, as well as the management and maintenance of public spaces.

6.1.1.2 Neighborhood characteristics

"Climate," or **"microclimate,"** is one of the most significant obstacles for the elderly to visit POS frequently. In a study of HCMC, the road surface can present a real-feel temperature of over 40°C, which is caused by tropical weather and the urban heat island effect (Ha et al., 2021). This temperature is much higher than the optimal thermal comfort for humans, which is between 22° to 26°C (Cui et al., 2013). As a result, this factor takes in 30% of negative feedback from users and positions as the second to the most negative factor in the evaluation. Statistically, this result is similar to three studies: "The

review of physical activity for an aging population worldwide," published by King & King (2011), "Life between buildings: Using public space" in Denmark, published by Gehl (2011), and " Park in HCMC" published by T.-H. Nguyen (2015). Despite the differences in geographics and climates (worldwide, Denmark, or Vietnam) and survey methods (review, observation, or questionnaires), all findings suggest that climate factors impact the visit frequency. The high real-feel temperature causes discomfort among older users reducing their trips to POS. In the evaluation collected from the non-user elderly, this factor receives a 3.9 out of 5-point Linkert scale, with 5 being the highest agreement for an obstacle.
People in Vietnam tend to avoid direct sunlight because it makes their bodies too warm. One interviewee said:
"I could wait until it stops raining to visit POS. Nevertheless, in the middle of the day, the sun is shining too bright and warm outside, so I stay home instead."
To minimize the negative impact on visit frequency, the best way is to improve the climate factor by increasing greenery and shades to reduce the effect of the urban heat island inside the city.

From the statistical analysis, another factor that appears to have a weak effect on the time spent in POS but not visit frequency is **"trip to POS,"** which consists of the quality of sidewalk surface, risk of accidents, greenery on the way to POS, and availability of public transport. The visit frequency reflects the quantity of using POS, while the time spent represents the quality of the usage. Pickpocketing and robberies have become increasing risks of the trip to POS and leading problems in HCMC, with more than 1,300 cases of criminality every three months in 2016[14]. Nineteen percent of the surveyed elderly are afraid of such crimes, while 14% are disturbed by the vendors occupying the sidewalks. The results on the "trip to POS" factor are slightly different from the findings in Sugiyama et al. (2008), Turel et al. (2007), Mahmoudi et al. (2015), Sakip et al. (2015), and Gómez et al. (2010), but is supported by Alves et al. (2008). It can be argued that the elderly in HCMC include walking to POS as one component of the time spent. Hence, POS are places for the elderly to "walk on" and not only to "walk to."

"Age composition," also called "age distribution" in population studies, is the proportionate number of persons or generations living in the same household, which is very popular in Vietnamese culture. While the findings in Moore et al. (2010) 's study of Canada concludes that a mixed population of youth and seniors living in the same residential area can influence the use of POS, this research suggests that only the time spent in POS is truly affected. It can be understood that co-living with other groups distracts the elderly from spending more time in POS but does not determine their number of visits.

Regarding the "**resident location"** factor, the possibility of self-selection cannot be excluded as people may select their residential areas based on environmental attributes associated with physical activity. According to Cao et al. (Cao et al., 2009), if the duration of living in the same place is more than 20 years, self-selection bias is likely to be reduced over time. However, Gómez et al. (2010) report that the selection of residential areas is expected to be associated with economic factors rather than environmental attributes in a city with a high percentage of the population living below the poverty line. Therefore, the results of self-selection bias and the survey report of one-third of the users having lived in their homes for less than five years can be acceptable in this case, given the fast economic development of HCMC. Nevertheless, HCMC does not appear to influence the use of POS by the elderly statistically, despite 40% of respondents living below the poverty line and the differences in socioeconomic status between CBD and non-CBD locations. Thus, this dissociation can be rationalized

[14] Statistics of HCMC's Police for first three months of 2016, 1,305 robbery cases were recorded.

that the physical and neighborhood boundaries between CBD and non-CBD are still unclear, in addition to the perceptual effect of rapid changes in POS land use.

6.1.1.3 User characteristics

In the older population, the Vietnamese elderly's basic needs to live safely and comfortably at home and age in place consist of many aspects. They include availability of food and clothes, accommodation and mobility, financial and healthcare resources, living environment free of discrimination and violence, feeling of being respected and independent, ability to participate in household and social activities, as well as caring for or being cared by other family members (JAHR, 2018, p. 191; T. N. Nguyen et al., 2017). Their current needs are from previous jobs, ongoing livelihood, health status, and household type. The elderly seem happier and more optimistic when their basic demands are met. On the contrary, demographic, social, and economic status such as gender, age, ethnicity, type of residence, education, and professional and marital status do not appear to reduce their life satisfaction(T. N. Nguyen et al., 2017). In addition, living in residentials whether to have car access, clean water sources, good lighting, and common diseases, does not significantly affect how they enjoy their lives. Hence, these "user characteristics" factors have less impact on POS use than other group factors. Generally, user characteristics are not essential to the visit frequency of the elderly and time spent in POS.

In detail, "**gender**" does not impact the use of POS, which agrees with Alves et al. (2008). Similarly, "**income**" and "**household arrangement**" do not affect the use of POS, which differs from the findings in Daneshpour & Mahmoodpour (2009), Carr et al. (1992), and Alves et al. (2008). The different results are likely to be associated with the differences in the availability of public senior services and facilities in Vietnam compared to other countries. Poor supportive services in housing and amenities for low-income seniors force them to spend most of their time socializing, exercising, relaxing, or simply doing their housework in places that only offer free access, such as parks, sidewalks, or alleys. Most Vietnamese elderly prefer staying at home or "aging in place" while taking care of their family members or being cared for. Occasionally, some may live in nursing homes or assisted living settings but still need to be able to connect with families and the community (Dung et al., 2020).). In many developed countries, the elderly with higher income can live in several places developed and reserved specifically for seniors with access to better services. Older people tend to be less poor than the younger ones in European countries. In comparison, there is a higher poverty rate among older people in Asia compared to their overall population. In Vietnam, the income of the elderly is reported to be higher than the average revenue per capita; however, this income is partially collected from all economic agents, which combine the share of others living in the same household. Thus, the poverty rate among the elderly increases if there are changes in household composition or economic sources, such as when the elderly have to live independently or rely on remittances (Evans et al., 2007).
In this survey, most respondents report earning less (87%) or equal to an average income, with sources coming from pension (30%), remittance (24%), and self-earning (19%). Lack of social protections and limited financial support like annuities, disability benefits, and health insurance for low-income elderly groups worsen the vulnerability of the elderly and reflect a flaw in the social welfare system (Evans et al., 2007; United Nations, 2015). The percentage of pension sources collected in this survey is the same as the percentage of pension coverage in the United Nations report, with 35% of respondents in the statutory pension age for members of the 2015 Scheme (United Nations, 2017). The findings match the information about the elderly's lives in Vietnam published by Nguyen Quoc Anh (2006) in "The lives of the elderly are challenging when most rely on themselves to earn income."

Forty percent of respondents work to make a living because of their low incomes. The "**occupation status"** relating to previous careers and current jobs has a weak impact on the time spent in POS. However, it does not affect the visit frequency of the users statistically. In non-user groups, the mean value of this factor is 2.7 and lower than the average weight of 3 on a scale of 5 points. Because no studies have mentioned the influence of occupation factor on the use of POS before, it can be interpreted that having a job likely affects a user's free time leading to spending less time in POS, but not the frequency of visits.

The "**ethnicity"** previously discussed in Boros et al. (2016) and Ujang et al. (2018) is not a factor in this study as 93.5% of people in HCMC (located in South East of Vietnam) have the Kinh ethnicity, so-called Vietnamese (GSO, 2019). The statistical finding shows that less than 20% of the samples viewed "**age**" as impacting their POS use. This is similar to Wanka's (2018) findings suggesting older people distance their self-identity from environmental stigma. Although the life expectancy of Vietnamese people in 2015 is 73.3 years, the healthy life expectancy (updated in 2007) is in fact 64 years (GSO, 2015a). The Vietnamese elderly's health problems emerge from common illness conditions such as blood pressure (38.4%), eye disease, dementia, and osteoarthritis (31.9%), mainly caused by humid air, poor working conditions, and heavy lifting. In urban cities, hypertension is prevalent in older adults (V. H. Pham, 2017, p. 23); however, the physical and mental health of most elderly living in HCMC are still better managed than those who live in other cities of Vietnam. Among older people, women tend to have more passive and oppressed feelings than men because most women in this group are widows and have no partners to share their feelings with(Dop & Anh, 2013).
Furthermore, the elderly become weaker and more dependent as they get older, leading to an increasing withdrawal from the neighborhood community in order to maintain a positive self-image (Wanka, 2018). Results from this study show that "**health status"** also influences the time spent of the elderly in POS. The healthier people would stay longer, for an approximate duration between 30 to 60 minutes. The importance of health status impacting the use of POS is emphasized in Carr et al. (1992) but not much of a concern in Sugiyama et al. (2008) in which the health conditions are measured by the number of healthy and unhealthy days collected from participants. The discrepancies in findings can be explained by different methods for data analysis and inconsistent metrics measuring a health condition - the number of unhealthy days in Sugiyama's study as opposed to the health self-rate score in this study.
The process of evaluating and building a suitable recreational environment depends on the state and "**household arrangement"** of the elders within the jurisdictions. Interestingly, seniors who live alone are more concerned about the travel distance to POS, while those who live with others pay close attention to the type of facilities and parking (Alves et al. 2008). In contrast, the use of POS by the elderly in Vietnam has not been influenced by living conditions leading to some arguments about whether the private or shared spaces in Vietnam culture are clearly defined (Drummond, 2000; Kurfürst, 2011). The elderly often share living spaces with their children, partner, or grandchildren in micro-scale housing such as the living room, bedroom, worship space, terrace, or kiosk (Wijayanti et al., 2015). The **"living arrangement**," for example, "at home" or "shelter," was not mentioned in this study because all respondents lived in their homes.

This study shows that **"caring responsibility"** significantly impacts the visit frequency because it takes away some private time of the elderly. 61% of respondents of the survey pool live with their children's families and act as caregivers looking after the grandchildren whose parents have to be at work (of note, the maternal period lasts six months[15] in Vietnam). This factor has not been examined in any

[15] Degree 167/2013/ND-CP and 155/2016/ ND-CP

Western study because of household sizes. For instance, 95% of surveyed elderly in HCMC claim to live with someone as opposed to 64% reported in a UK study published by Alves et al. (2008). Moreover, the proportion of multiple-generation households is also different - 1% in the UK with an average household size of 2.4 persons (Amanda Sharfman & Pamela Cobb, 2021) compared to 3.6% in HCMC (GSO, 2019).

6.1.1.4 Design of POS

The factors in the Design of POS series affect the use of the elderly significantly, subsequently, social interaction series. The impact factor baring lowest reputation in the use of POS is "**cleanliness,**" with the most negative feedback (32%), followed by "**safety and security"** (30%), "**microclimate inside POS"** (30%), and "**equipment for doing exercises"** (29%). The statistical results conclude that cleanliness of POS moderately influences visit frequency by nearly 28% and time spent by 27%, while reduced safety decreases the time spent, giving a moderate sample size (22%). Afterall, cleanliness and safety bring comfort and hence, are the prerequisites that attract users to visit and retain longer in POS (Carr et al., 1992; Gehl, 2011).

There is no comparison for "**cleanliness"** as this factor is already a combination of maintenance and management factors taken from other studies. Therefore, the lack of cleanliness and security components reflects the poor management and maintenance of the current POS. In Vietnam, policies regulating cleanliness in POS consist of two administrative rules[16] for indiscriminate littering resulting in a fine of 2,000,000 - 7,000,000 VND for violation (equivalence to $86 - $300, as of 30th June 2022). When the supervision and scrutiny are not strict enough, and the law on POS is not properly reinforced (T. K. T. H. Tran et al., 2015), keeping Vietnamese POS clean is no longer a priority. People continue to utilize parks as their private or commercialized places for food services leading to dumping waste on the streets. In addition, dog waste can be found everywhere, as no designated dog station exists. Thus, with no strict supervision and enforcement of unlawful public deposit of garbage or litter, cleanliness is highly dependent on POS users for awareness, perceptions, and responsibilities.

Regarding "**safety and security"** factors, their influence levels differ in various types of POS. Prominently in low-income residential areas, the risks of being robbed by drug users, beggars, or homelessness are increasingly high in many poorly managed POS-like streets and roads. The essence of having security guards patrol or frequently circle on their watches in larger parks is the key to keeping the POS in order and safe. Even though interventions to protect the elderly against drug users and homeless people are the most highlighted topics in Boros et al. (2016) 's study, the "safety and security" component has only 30% weight of all constituents in this survey. One of the interviewees in the study states:

"I have visited Tao Dan parks for nearly forty years but have never witnessed any crime in this area. The police and park security have played their roles very well. I visit this park frequently, although it is far from my house."

"Lighting" at night in parks is necessary because it brings a safe feeling for the users. Typically, the elderly used parks from 5 until 19 o'clock, when they are still crowded and not too dark. Therefore, according to the statistical analysis, this factor negatively impacts POS usage.

The "**toilet"** factor is a vital encouragement for the elderly to visit POS more frequently and stay in longer. It receives 56% of positive feedback from older users. It is one of the three highest positive

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feedback when being viewed together with "food and beverage" and "elements for resting" factors (60% and 57%, respectively). Nonetheless, the availability of toilets has a weak influence on users as they still can perform outdoor activities on close-by sidewalks and neighborhood parks with no public restrooms. Only larger parks with good amenities attract more users willing to travel long distances and want to spend a longer time in POS. When being interviewed, a user in Tao Dan Park said:
"Sacombank (a private bank) sponsors the public restrooms in Tao Dan with modern and well-equipped toilets and sinks. The facilities are free of odor and cleaned frequently by maintenance. That is one of the important reasons that I travel far to this place because I feel comfortable staying in this park. I want to enjoy the greenery and hang out with my acquaintances, usually from early morning until lunchtime.".
Similarly, in Le Van Tam Park, one interviewer has shared:
"Toilet here is quite clean because we pay 2,000 VND ($0.1) for the cleaning service before usage. I can stay in this park for a long time".

In this study, "Park facilities" are more critical than "park amenities" statistically. Park facilities include a paved trail, unpaved trail, path, open space, wooded area, meadow, water area, playground, ball diamond, soccer pitch, tennis court, basketball court, and pool. Park amenities consist of a drinking fountain, picnic area, restroom, table, bench, trash can, shelter or pavilion, historical or educational feature, landscaping, bike rack, parking lot, rules sign, sidewalk adjacent, roadway through, and having more than one entrance (Kaczynski et al., 2008). Although "**sports equipment"** presents with 29% of negative feedback, this factor does not impact the user. However, "**design features,"** with water fountains and decorative statues, influence the visit frequency, which is unlikely in the US. In Kaczynski et al. (2008) 's study, the participant criteria are anyone over 18 years of age, and not just the elderly, who likely enjoy park objects, pay more attention to decorations and features, and spend longer time on less-movement activities. The impact of the design feature factor is aligned with the findings in Hajmirsadegh et al. (Iran, 2013) and T.-H. Nguyen (Vietnam, 2015) confirming that the elderly likely have more frequent visits to well-designed POS. Consequently, the poor design and low quality of some surveyed parks in HCMC drive the users to other parks with a better plan or higher quality.

One of the many reasons the elderly have a better experience with a longer time spent in POS is the feeling of being safe and comfortable. "**Greenery"** and "**interaction with people"** are significant factors that help users relax and enjoy POS. Because humans have an innate tendency to connect with nature and other forms of life on a genetic basis (Wilson, 1984), making a connection to greenery and interacting with other people are the basic needs of humans. Seventeen percent of the elderly visit POS to look for vegetation, as the other twelve percent like to watch and participate in seniors' activities. These low rates reflect the lack of green spaces and safe places, affecting people's social skills and interaction and reducing the desire to seek other forms of life in urban areas. HCMC's green space per capita is reported to be 0.49 m^2 (Thanh, 2019), much less than WHO standards of 9m^2 (Vaglione et al., 2013). Studies have shown that lacking green spaces can diminish people's health outcomes, both mentally and physically (Wilson, 1984). Statistically, this study presents similar results to the findings in Zhu et al. (2017), Sugiyama et al. (2015), and Alves et al. (2008), stating the positive effects of sheer enjoyment in being in nature while appraising the importance of greenery for moderately impacting time spent in POS.

Despite the poor quality of some green spaces and facilities, the elderly reluctantly provide positive feedback on the park conditions as they are familiar with the places and have limited POS options. They often view themselves as passive stakeholders and have less interest in playing a role in contributing ideas for master planning or distribution of POS. Only 18% of respondents expect an increase in green

spaces in the inner city, while 19% would rather improve the existing POS in terms of cleanliness and well maintenance.
One elderly who travels for 7 km to his favorite Tao Dan park states in his interview:
"Over the past, there were more green spaces before many people came to HCMC to work, took spaces for offices, and destroyed green spaces to benefit investors. The elderly, like us, have no power to make any changes. Besides, it is a huge challenge to alter the areas of green spaces inside a big city. So far, the authorities have done well, and I have no opinions or complaints."
The expert has also explained the same:
"It is not feasible to build an inner-city central park. A possible solution is to combine the sidewalk with greenery".

Other factors receiving highly positive feedback about their quality are "food and beverage" (60% as the highest) and relaxed equipment (57%). However, food and drink vendors do not impact the use of POS because only well-organized businesses receive good feedback, especially when they do not illegally occupy the sidewalks or alleys. "Relax equipment," e.g., benches and chairs under the shades, provide comfortable seating and relaxation, allowing the elderly to spend more time outdoors, boosting physical and mental health, and connecting them to their community through shared public spaces. The benefits of relaxed equipment in this study are also supported in Carr et al. (study of the US, 1992) and Holland et al. (study of England, 2007). Resting is an essential need for the elderly as they get older and require more time to catch their breath without standing too long. According to Carr et al. (1992), equipment used for relaxation strengthens comfort and is listed as the most critical need of all users in POS.

The remaining factors, including "**park size**," "**silence"** in parks, "**pollution,"** and **"maintenance,**" are not evaluated because the design structures for the questionnaire in this survey are different compared to other studies, which concentrate on park or pavement surfaces rather than other diverse types of POS such as sidewalks and alleys.

6.1.1.5 Social interaction

As mentioned in section 6.1.1, interacting with other people is most important because it is a basic need of humans (Wilson, 1984). People are prone to be attractive to others, especially in POS (Carr et al., 1992; J. Jacobs, 1961; Yung et al., 2017). The elderly likely engage more in POS for social interaction, either actively or passively. Moreover, "**senior activities in the group**" inside POS (12%), such as group performance of Tai-chi or meeting an acquaintance (s), promote more visits to the parks. The statistical analysis of a weak sample size (16% of respondents) concludes that the elderly truly need a place to see other seniors. Therefore, POS with more seniors' presences and activities attract the elderly to visit more frequently.

In previous studies, the youth and teenagers' actions negatively impact the elderly's use of POS. Many older people intend to avoid shared spaces crowded by young people (Holland et al., 2007; S. Moore et al., 2010). One of the conflicts in studying POS worldwide is being against homeless people, drug users, or even other groups with different agendas for POS visits, such as joggers, dog walkers, or families with small children (Boros et al., 2016). However, in Vietnam, the elderly are not disturbed by "**non-senior activities**." Statistically, non-senior activities impact the elderly's use moderately in a positive way. They enjoy bringing their kids to POS and watching aerobic practices performed by youth and kids running around. When being asked whether children, teenagers, or even illegal food vendors disturb the enjoyment in POS, one interviewee responds:

"I enjoy watching teenagers performing aerobics with loud music. It is fun when all people can utilize the parks. Plus, I like to observe the youth. They are like my grandchildren."

The oppositions of some statements are written by Boros et al. (2016), Holland et al. (2007), and S. Moore et al. (2010) regarding social interaction likely comes from the fact that multi-generations living together in the same household is the main part of Vietnamese culture. In 2019, the average household size in urban areas of Vietnam was 3.6 persons (GSO, 2019), while the number of households with multiple generations was 78% (General Statistics Office, 2021). The boundary between personal and shared spaces inside most Vietnamese families is minimal, and the elderly's private spaces, such as bedrooms, are commonly shared with the grandchildren (Wijayanti et al., 2015). Therefore, inter-generational parks should be well-incorporated into the design to attract more users to visit and stay longer. However, the elderly may benefit from having their spaces separated but still nearby other groups' activities. Generationen Park in Alzenau, Bayern, Germany, is a great example of a multi-generation park in which water walking is built for multiple purposes: a low-impact cardio exercise designed for the elderly with half their legs under cool water and a safe swimming pool for kids. (Figures 6.1 and 6.2).

Figure 6.1 Kneipp-facility in Generationen Park, Alzenau, Germany
Photo by Author, 2022

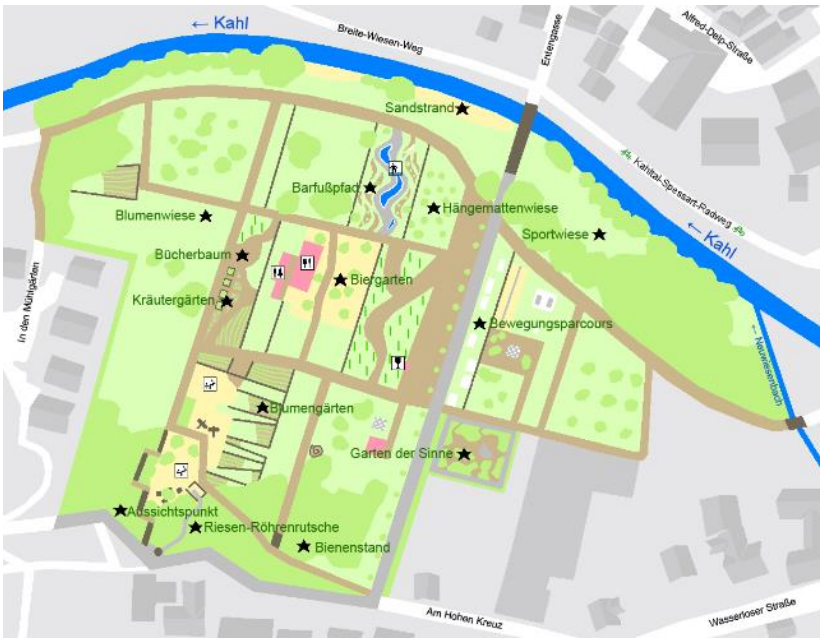

Figure 6.2 Generationen Park Alzenau – master plan

Photo: https://upload.wikimedia.org/wikipedia/commons/2/28/Generationenpark.png

6.1.2 Design features of POS connect to activities

In POS, the elderly prefer activities of **walking** (30%) and **moving slowly for traditional sports** (10%), such as Tai-chi, dancing, fan performance, and **exercising with sports equipment** (10%). After doing group exercises, they massage their muscles while sharing stories of their health or daily lives. Maintaining good health conditions and keeping contact with other seniors are the most critical needs in POS. The similarity between T.-H. Nguyen's findings and this survey suggest that the main reasons for visiting POS have not changed in ten years (her survey was implemented from 2006 to 2010 in four main parks: Tao Dan, Le Van Tam, Gia Dinh, and the Saigon Zoo with 50 random interviewed samples in each park). The findings of other studies also support these results. For instance, Veitch et al. (2015)

point out that 62% of visitors in their research are doing activities like lying down, sitting, or standing up, while the rest engage in strenuous and physical activity with moderate-intensity (29%) and vigorous-intensity (9%) for all age groups. According to Lindberg & Schipperijn (2015), many POS users need to socialize and play while staying physically active.

The common elements in POS where most activities occur include **open fields, pathways, vegetation, benches,** and **people**. Physical activities require facilities suitable for group games and plays rather than personal training and fitness (Lindberg & Schipperijn, 2015). Besenyi et al. (2013) recognize that seniors and adults prefer to invest their energy in exercises on paved trails and tennis courts compared to open spaces such as playgrounds or picnic shelters. However, the common actor network's connection shows the opposite. These elements are the core of POS regardless of whether that POS is a street with fewer facilities or a park with good amenities. Open fields are necessary for group activities and equipped with benches for resting and carrying small talks among users after an exercise. Furthermore, the elderly enjoy pathways as a place for walking to and walking within, especially at a slow speed. Vegetation brings in a sense of nature for the elderly, reduces stress and represents a crucial decoration feature in POS. This finding is supported by Almatarneh (2014) 's study of a public square reporting 58% of park activities (mostly walking) occur in walkways, followed by benches (29%) and edges (15%).

In addition, the network draws several patterns of connection between objects and activities, which are also described in the concept of a place from Canter's study (1997, p. 131): particular activity patterns are associated with specific places. By understanding these patterns, all types of POS can be improved with particular designs for these elements, as well as strategized to match the needs of certain users with affordable POS investing and maintenance. Thus, a well-designed and practical attribute will attract more people who act as an actor to connect with other actors leading to a lively place that will attract more people (J. Jacobs, 1961).

6.1.3 Age-friendly design guidelines for POS match the needs of the elderly in HCMC

It is understood that the practitioners have not applied findings from the scholarly studies properly due to discrepancies in communication, language differences, and lack of an appropriate system prioritizing the proposed requirements extracted from theory knowledge or guidelines (Araabi, 2018; Heide & Wijnbelt, 1996; Hjort et al., 2018). Similarly, the results of expert interviews from this study suggest that designers do not directly understand users' needs but rather choose to apply the design guidelines based on national policies and task assignments developed by the investors. Consequently, practical users are less likely to anticipate from the beginning of the processes like planning and designing public spaces. Moreover, many scholarly studies often describe a model of impact factors without showing a feasible implementation process for utilizing the respective model in such a design (Loukaitou-Sideris et al., 2016). After all, users, owners, and designers are the three main stakeholders in POS' best interest (Francis, 1989). The gap between theory and knowledge exists because the users cannot play their roles actively in the design process (A. Moore et al., 2022). Frequently, users' needs can only be assessed on a case basis, relying on the survey occasionally launched by investors. While the design guidelines seem to be generalized or well-defined, the needs of the elderly in each case study are still unique (Schön, 1983, p. 24).

The criteria for solving problems of mismatching between academic translating of design guidelines and practicality include:

- Making the study on a case basis and specific to each group of users while finding out the conflicts between the groups for improvement
- Prioritizing the key impact factors in the implementation
- Using short and concise language (El-Kholei & Yassein, 2022; Foroughmand Araabi, 2015).

The tailored age-friendly design guidelines for POS in HCMC, Vietnam, are developed to fit the above criteria listed in section 5.6, including six steps:

1. Perform desktop research to identify the factors that impact the choice of using POS and synthesize the design guidelines suitable for the elderly worldwide (including Vietnamese standards)
2. Launch a survey questionnaire and observe the activities of the elderly in some parks of HCMC, Vietnam
3. Analyze data to specify which factors statistically impact the choice of the elderly to use POS
4. Recommend the design guidelines based on the findings of the survey and statistical results
5. Evaluate the design guidelines by interviewing the experts
6. Develop appropriate applications to use in similar cities worldwide

After evaluating the development process for new design guidelines matching the need for POS in HCMC, the experts state that the goals and principles are at an excellent rate. This survey follows an evidence-based approach that requires a complete analysis of existing open spaces to collate them in a database with their function and size to assess the goals for planning (CABE, 2009; Hjort et al., 2018; Marcus & Sachs, 2014). This survey collects information on POS, then the users or the elderly. In this study, expert interviews evaluate quality metrics like an assessment tool indicating successful criteria of the urban design process while assessing various urban design practices (Asaad et al., 2017). The expert interview questions generally discuss the design guidelines' application and feasibility. As a result, they are confident that this study's findings can be applied to similar urban cities worldwide in designing age-friendly POS.

6.2 Answering the research questions from chapter 1.3

Based on the interpreted results, the research answers the relevant questions for research objectives in chapter 1.3 as the following with the most significant findings.

Question 1: What is the synthesis of age-friendly design guidelines worldwide?

The synthesis of age-friendly design guidelines worldwide is shown in Table 5.2. It includes 18 objectives based on Loukaitou et al.'s design guidelines (2014, 2016) that are divided into five groups: (1) proximity, (2) neighborhood characteristics, (3) user characteristics, (4) design of POS, and (5) social interaction. From these objectives, several principles are listed to guide the practitioners in their design process. All 30 impact factors listed in sub-chapter 2.2 are not addressed directly in these guidelines because of the differences in theory and application. However, these synthesized design guidelines are considered to include all these elements. These guidelines receive good feedback from the experts who work as practitioners in the Vietnam landscape field.

Question 2: Which factors impact the use?

Many factors impacting the use of the elderly in POS in terms of "visit frequency" and "time spent" are "activities of non-seniors," "cleanliness," "the availability of toilets," "lighting at night," "current job," and "age" with different effect strengths. Other factors impacting the "visit frequency" but not affecting time spent are "distance," "climate," "caring responsibility," "design features," and "activities

of the elderly." Factors that impact the "time spent" but not "visit frequency" are "nature enjoyment," "safety," "comfort with relaxed equipment," "age composition," and "trip to POS." Based on the effect strength calculated by SPSS in Chi-square tests, the significant impact factors with moderate sizes are concentrated chiefly in the "Social Interaction" group and gradually decreased in the following orders: the "Design of POS," "Proximity," and "Neighborhood characteristics." The group "User characteristics" have the most negligible impact on the use, with weak sizes. The reasons for the order of these impact series lie in the blurred boundary between private and public spaces in Vietnam. It also comes from the multi-generation of household arrangements in Vietnamese culture. Another reason is the lack of green spaces and insufficient distribution of POS in HCMC. Lastly, the POS planning management system passively makes users' roles; therefore, they do not contribute to the planning process. The levels of impact between the five groups are listed in Figure 6.3.

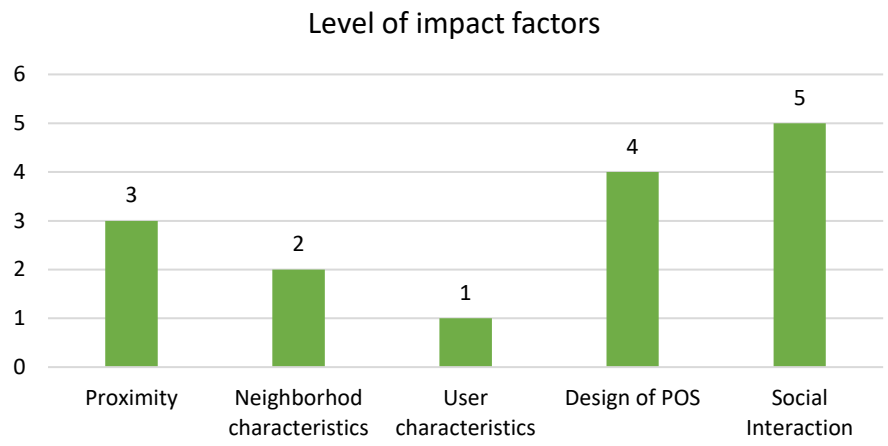

Figure 6.3 Impact degrees of five series of impact factors
Note: value 5 is the most impact, and value 1 is the most negligible impact

Question 3.1: Why do the elderly visit POS?

The elderly visit POS for several purposes. The survey finds 15 reasons to make a trip to POS: "proximity," "greenery," "sports equipment," "activities for the elderly," "cleanliness," "spaciousness," "safety," "quietness," "relaxing," "meeting friends or acquaintances," "watching and meeting strangers," "free of charge," "sufficient lighting," and "no alternative." The three most important reasons are "the location of POS near their house (or proximity)," "the need for green spaces (or greenery)," and "the interaction with other elderly through seniors' activities (or seniors' activities)," shown in Figure 6.4.

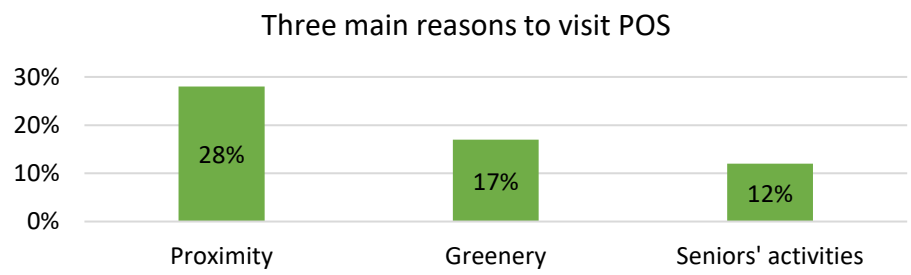

Figure 6.4 Three main reasons to visit POS

Question 3.2. What are the elderly doing there?

The elderly have different activities in various types of POS such as "walking," "jogging," "exercise with slow movement," "practicing with sports equipment," "group exercises," "playing a sport like a

shuttlecock," "meeting acquaintances or strangers," "watching people," "taking the kids outside," "accompanying the handicapped," "reading," "sitting to think," "enjoying the nature," and "for food." The most common activity that the elderly do is "walking." Remarkably, many walk-in well-designed parks or even alleys are mainly used for traffic. In contrast, others like to "exercise with sports equipment" conveniently installed in parks, greenery along the riverside, ample space on wide pavement, or in pocket parks. Another favorite activity was to "exercise with slow movements," called Tai-chi. The three main activities in POS are presented in Figure 6.5.

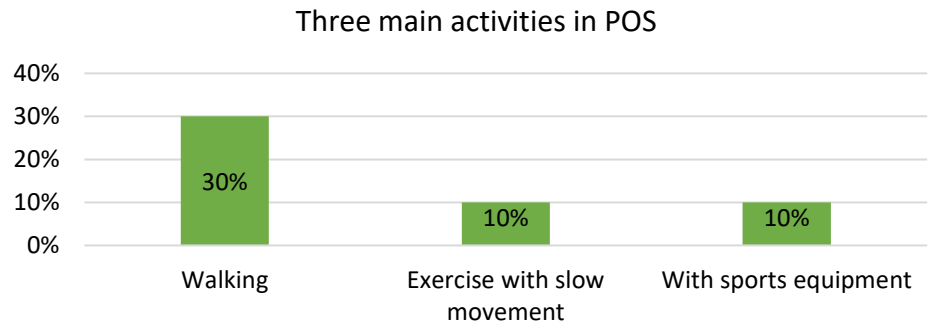

Figure 6.5 Three main activities of the elderly in POS

Question 3.3. What are the elderly's opinions about the current POS condition?

The elderly give positive feedback on the current setting of POS. Mostly, the excellent evaluation rates are higher than the not-good evaluation. "Greenery," "elements for relaxing," "toilet," "security," "sufficient lighting at night," "activities for the elderly," and "food and beverage" factors receive a good evaluation with greater than 50%. "Proximity," "separation from traffic," "climate," "sports equipment," "decoration," and "activities for the non-elderly" are in the range between 40 to 49% for good evaluation. "Cleanliness" receives the lowest positive feedback of 32%, with the highest negative feedback of 32%. "Other" unlisted factors present with negative feedback for a share of 70% in total, including inadequate maintenance of sports equipment, lousy organization of cleaning teams, bad caring for greenery, reduction of POS, or privatization of POS for beverage and commercial purposes. Figure 6.6 demonstrates the three factors that receive the highest positive and negative feedback from the elderly.

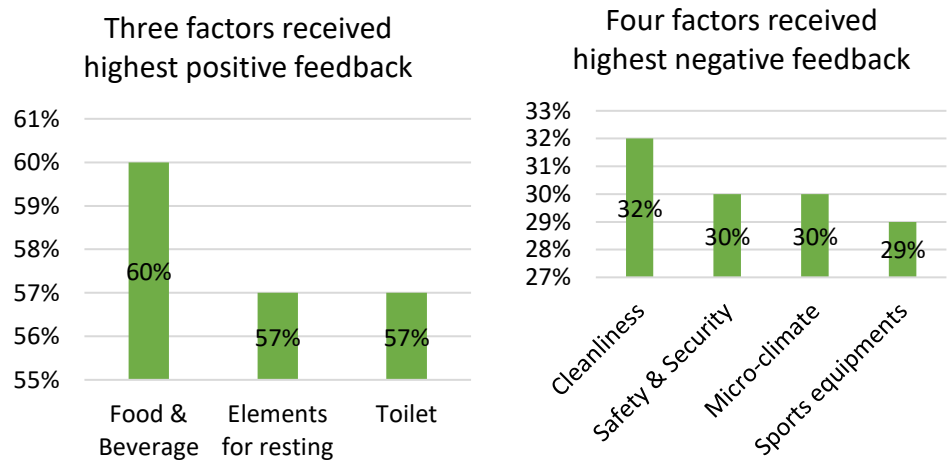

Figure 6.6 Top factors received positive and negative feedback

Question 4: How are factors associated with the visit frequency and time spent in POS?

Based on statistical analysis computed by Chi-square tests and Fisher's exact tests, the factors impact the visit frequency and time spent in POS differently. Some factors impact visit frequency and time

spent simultaneously, such as "cleanliness," "activities for the non-seniors," and "the availability of toilets." Clean POS with various activities for the youth, middle-aged, and children, and providing a toilet attracts the elderly to visit more often with a more prolonged stay. Others, including "distance to POS," "microclimate," and the "decoration of POS," only impact the frequency of visits but not the time of retaining inside the park. In contrast, "greenery," "safety," and "the availability of equipment" for relaxing influence the time spent in POS significantly but do not affect the number of visitors. The seniors tend to stay longer in POS with more vegetation, safety, and benches for relaxing. Other factors, including "resident location," "gender," "income," "living arrangement," "previous jobs," "sports equipment," and "food services," have no impact on either the visit frequency or time spent in POS. Whether residing in CBD or non-CBD, the elderly's visits and retention in POS posed no difference. Figure 6.7 shows the most impact to non-impact factors on the POS use of the elderly.

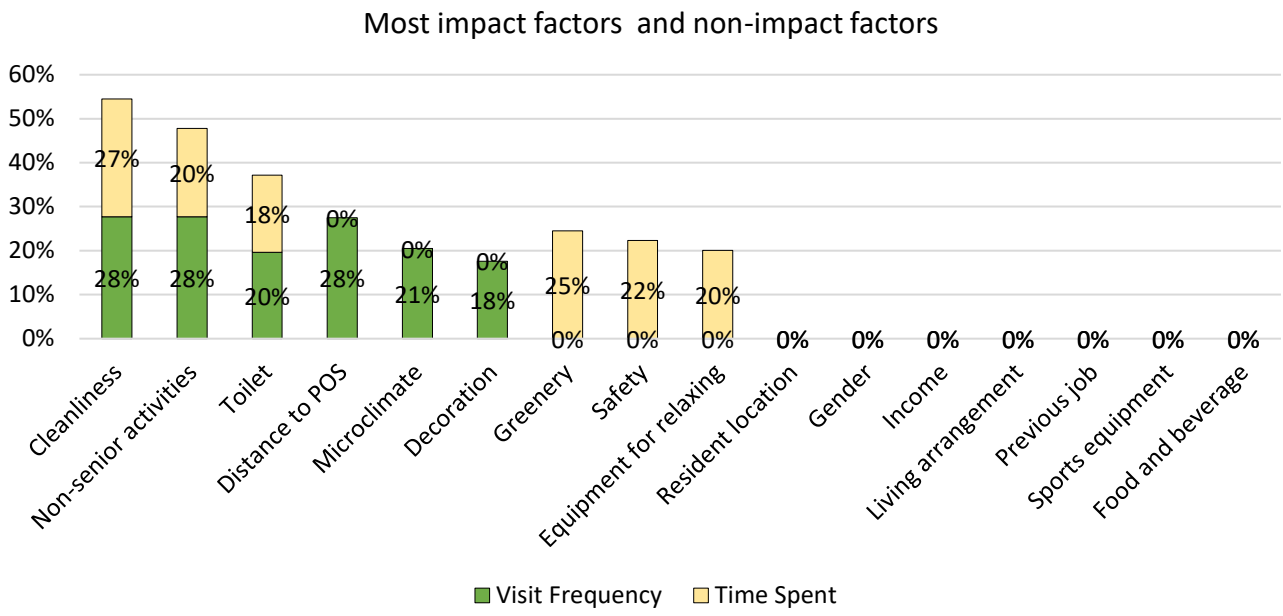

Figure 6.7 Most impact factors and non-impact factors to the elderly's visit frequency and time spent in POS

Question 5: How do design features of POS connect to activities?

Seven types of studied POS consisted of the park, greenery along the riverside, pocket park, walking boulevard, roundabout, sidewalk, and alley carrying various design features leading to a wide range of activities. Parks are the most well-designed POS, which provide at least 18 design features connecting to 17 popular activities for the elderly. "Playing with kids" is one of the parks' activities that differs from other types of POS as parks contain children's playgrounds. Alleys are designed mainly for traffic; therefore, they have fewer design features. However, they are suitable for walking and observing surroundings but in less adequate condition than other POS types. Different POS types' features contribute to varying comfort and aesthetic levels. Nevertheless, they are attached to a few daily routines: "walking," "exercise with slow movement," "group exercise," "meeting," "sitting," "watching," and "enjoying the natural elements.". Common elements of all POS contributing to most activities are "open field," "the pathway," "trees," "benches," and "people."

Question 6: Which models of age-friendly POS can be designed according to the needs of the elderly in HCMC?

Detailed design guidelines for the elderly in HCMC, Vietnam, are shown in Table 5.21. These guidelines are adjusted from the global age-friendy design guidelines in Table 5.1, still keeping all principles, but

criteria are added or removed to fit the need of the elderly in HCMC. The priority level of the five groups of impact factors is also re-ordered to follow the degree of association.
This section provides the facts about using POS by the elderly in HCMC through six answers to six research questions and how detailed objectives can be gained through answering these questions. The final purpose is to reach this research goal: How can the age-friendly POS be designed to match the needs of the elderly in HCMC? Finally, the answer to the main question is the summary of the six answers above.

6.3 Summary

This chapter interprets the main finding of the research in three key points:

- Impact factors
- POS design features
- Design guidelines to match the need of specific groups of people

Social interaction is an essential factor in the POS use of the elderly in HCMC. In contrast to other studies where the elderly avoid places crowded by the youth, this study shows that the elderly prefer multiple-generation POS to interact with different age groups. Co-living with numerous generations under one household, largely presented in Vietnamese culture, allows the elderly to get comfortable in the presence of other generations. Living with different ages also leads to more caring responsibility, which impacts the elderly's frequency of visiting POS. However, through statistical analysis, factors in user characteristics play less important roles in using POS. It is inferred that the elderly have fewer demands and passive roles in improving and planning POS. The objective distance calculated by ArcGIS from their house to their favorite POS presents sub-standard results; however, the elderly still provide positive feedback suggesting a flexible attitude toward accepting the poor living environment. Microclimate plays an important role in designing a pleasant POS. Poor weather conditions limit the visit frequency and time spent in POS, raising awareness of the need to reduce urban heat islands in HCMC. Design features of POS indicate that most activities occur on site relating to the presence of four objects: open fields, pathways, vegetation, and benches. The recommendation for age-friendly design guidelines is to focus on these objects.
Regarding the activities inside POS, the result shows no difference compared to T.-H. Nguyen 's study of HCMC (2015) was conducted ten years ago, indicating the stable patterns of activities and objects and their important roles e in creating design guidelines.
Therefore, based on the findings above, the development of tailored design guidelines receives an excellent appraisal from experts in the landscape design industry. The intensive assessment coming from the policy approach mostly meets the criteria to decrease the gap between practice and theory, as follows:

- Specifying study group in a particular location
- Focusing on the priority of impact factors for the current user to help designers with application
- Having short and readable language for the practitioners.

Therefore, this research contributes a new method of designing POS guidelines to match the needs of a specific group and can be applied to different groups of users to create POS design guidelines for all.

7 CHAPTER 7: CONCLUSION AND RECOMMENDATIONS

In a case study of HCMC, this research has successfully addressed the overarching question, "How can POS in HCMC be designed in accordance with the needs of the elderly?". Section 7.1 concluded the most significant results, followed by section 7.2 highlighting key contributions to the knowledge of urban planning for POS for the elderly. However, this research has a few limitations discussed in section 7.3. Considering all findings and limitations, recommendations and further research directions are suggested to improve these limitations described in section 7.4.

7.1 Summary of the research results

Firstly, the research explores impact factors on the use of the elderly in HCMC through survey questionnaires. The statistical results from Chi-square and Fisher's exact tests suggest the ideation of a pattern of behavior and the built-environment attributes examining five groups of factors that affect the use of POS in the elderly: proximity, neighborhood characteristics, users' characteristics, design of POS, and social interaction. Social interaction exhibits the most impact on the frequency and time spent in POS, followed by the design features, proximity, and neighborhood characteristics. In contrast, user characteristics appear to influence the least. As opposed to other scholars who report that the seniors avoid places crowded with or used mainly by youth, this study shows the elderly in HCMC, in fact, have no conflicts with having teenagers in POS. But rather, they prefer intergenerational POS as there are more opportunities to interact with younger populations. The concept is derived from a long-standing tradition of multiple generations living in the same households. In the series of design features, important factors such as safety, relaxed equipment, and greenery affect the time spent in POS but not the visit frequency. The excellent design of POS focusing on relaxation, resting, and comfortable seating likely keeps the elderly inside POS longer. Proximity accounting for distance to POS and travel time plays an essential role in the increased frequency of visiting POS and providing the adequate distribution of POS inside urban areas. Although the degree of association between those factors and the use of POS is not significant (less than 30%), it helps to show the need of the elderly in urban areas. From the elderly's perspectives, the problems of POS in HCMC are tolerable or manageable, given their positive evaluations of the general situations regarding POS.
Nevertheless, the subjective and objective indicators are inconsistent, referring to a gap between the two types of measures. In detail, proximity is acceptable and not too challenging for the elderly. At the same time, the GIS mapping, on the contrary, illustrates the longer average distance to POS compared to the standardized one, especially in non-CBD districts with fewer to no green spaces. Furthermore, the microclimate in the series of neighborhood characteristics influences POS usage statistically with a moderate effect. In HCMC, the urban heat island leading to warm or rather hot temperatures discourages older people from visiting POS and spending less time inside. In addition, the users' characteristics, such as the current job factor, impact the visit frequency due to availability and free time. Other factors, such as age, caring responsibility, and health, weakly influence POS usage.

Secondly, this research has accomplished the beginning objective by defining the features of POS through observation with the ANT and statistical methodology, which are connected to the user's activities. The most imperative design features in all kinds of POS consist of large open fields, pathways, vegetation, and benches where people can connect and attract others, promoting POS visits and better security. These objects and actors contribute to common activities (walking, playing slow-movement sports, and exercising with sports equipment) and support the concept of a place, stating that particular activity patterns are associated with specific places, published by Canter (1997, p. 131).

Having good features in POS helps improve the design and matches the users' needs by understanding the stable network among activities and objects.

Lastly, this paper highlights the need to narrow the gap between theory and practice. Many articles present POS models to fit the seniors' needs; however, these academic papers hardly translate into a format that can be applied easily by practitioners, architects, landscape designers, and urban planners. Besides language barriers and inadequate communication, the academic language is often unnecessarily detailed and extensive for the practitioners, given their limited time and resources. Therefore, the methodology of designing POS to meet the needs of the elderly should be retrieved from the design guidelines developed as an adjoining between academic results and practical application. Moreover, the design guidelines should incorporate the language of the practitioners in concise writing, along with the list of priorities for important impact factors. Thus, the tailored guidelines for the elderly in HCMC are created in this study based on the findings of the use of POS in the elderly and the framework design guidelines synthesized from 14 worldwide standards and articles. These guidelines receive plausible feedback from the experts during the interviews. The experts praise that the methods for POS development and the tailored guidelines are feasible and, therefore, can be useful in applications executed by practitioners.

7.2 Knowledge contributions

The most important contribution of this study is a new method of translating academic language to practical design guidelines for practitioners to use widely. Although the technique is not one-size-fits-all but case-specific, this knowledge raises awareness concerning the inadequate urban spaces for the elderly. It also narrows the gap between theory and practice and, most importantly, emphasizes the benefits of designing such POS to match the users' needs.

In addition, this paper advances a synthesis of global age-friendly design guidelines used as a framework for other tailored guidelines matching the needs of older people. Practitioners can use the principles developed in this research as recommendations and references in methodology when investigating their design guidelines framework.

More importantly, the definitions and evaluations of a series of impact factors on using POS in HCMC are great resources to solve common POS issues in an urban city with a severe scarcity of green spaces. The details of use and needs described in this study can also be a reference for similar studies on POS in Vietnam or cities similarly lacking green spaces.

The combined methods for surveying play an important role in collecting data for a successful result. In contrast, the models created from the ANT method provide optimal solutions for bridging the gap between statistical analysis and reality. Unlike other methods, the discovery of a network connection between an object and human activities reflects the objective observation of the researcher of actions and things inside POS. ANT is similar to the behavior mapping published by Gehl et al. (2013). Activities, people, and places can be successfully drawn as symbols on a POS site marking activities' counts, types, and locations. Meanwhile, the statistical results analyzed from data collected in the survey questionnaires build a picture of activities happening inside POS reported by users.

Finally, as the findings on the gap between practice and theory raise the awareness of the practitioners and theorists in POS design areas, the designers' roles should be re-evaluated in all architect training among architectural companies. The designing, planning, and implementation of POS should comply with the investors' guidelines and academic models to fulfill the users' needs. In contrast, academic researchers should focus on translating their findings to validate the practical applications.

7.3 Limitations

Although POS serve not only older people but also other age groups, this research studies solely the elderly and their perspectives. According to the experts, there may be conflicts or oppositions in activities between all age groups because the elderly are not the only group using POS. The survey also contains some questions regarding the conflicts or disturbances caused by other groups. While approaching all age groups is needed to understand their actions and to observe their activities in POS similarly to the elderly, requirements from different age groups are formulated differently in their benefits to avoid conflicts.

Besides, this dissertation does not investigate the elderly's psychological aspects or obtain advice from geriatric health specialists. According to environmental behavior design, these aspects can be inferred from the survey questionnaire results. In this study, many studies and articles from Psychologists and health specialists are reviewed for their inclusive findings.

The design guidelines cannot be a whole solution to the question, “How to design POS to fit the needs of the elderly in HCMC.” The tool to evaluate the success of the design guidelines has not been well-developed because the expert interviews are conducted mainly for their prediction, given their vast practical experience. Furthermore, due to the limited funding, time, and human resources, the new tailored design guidelines have not been verified in an experimental POS project to compare users’ evaluations and the goals set. Therefore, it is challenging to define whether the study areas are prosperous, but the experts’ evaluations of design guidelines can be accepted as the practitioners’ ideas.

Another limitation of this study is the number of case studies. Even though ten study areas can represent most of the POS in HCMC, an increased number of survey sites may provide more reliable results with better details.

7.4 Recommendations and the future research directions

Some recommendations are developed considering the findings for the five interest groups of POS (users, non-users, managers, owners, public officials, and designers) to answer the question: “How can POS in HCMC be designed following the needs of the elderly?”

- As for the policy makers or public officials, there should be a general design guidelines framework for specific types of users. Design guidelines should be made in a case-specific format to fit the current situation. The standards for POS should be updated every ten years, with better consideration for different groups of users. The current standards and code are for all and relatively general.
- The designers should follow the instructions from the design standards and other sources. They should spend more time reading the academic findings or the abstracts of research papers to get an overview of what is happening or changing with the published standard they are working on. The landscape and architecture company should best include designers who also hold the roles of researchers in their fields to reduce the gap between the users’ needs and the out-of-date design guidelines and to serve the POS users better. The role of landscape education needs to change to adapt to the new trend of designers.
- The users and non-users should play active roles in the design process by utilizing group surveys or questionnaires. They can raise their voices by incorporating feedback in local articles,

newspapers, or group meetings within their communities and proposing a different and unique characteristic for local POS.
- Managers and owners should conduct surveys to collect opinions from the users and non-users to create design tasks for the designers. It can be a workshop or an online survey at low-cost outsourcing for ideas about their kinds of expectations and evaluation.

In short, this research suggests actions for five groups involved in the interest of POS, including users, non-users, managers, owners, public officials, and designers. Their tasks can help the POS design match users' particular needs. The policymakers should update the standard guidelines, which are used as a framework for tailoring the specific policies for certain users in separate locations. The designers can combine their roles as architects and researchers who can integrate academic studies and practice. The users and non-users raise their voices through social media or community meetings to improve their living places. The investors and managers of POS care for users' needs, especially the marginal users. The design guidelines should use the practitioners' language to narrow the gap between the theories and the practice. It should be short, concise, and in the priority order for important impact factors.

On a larger scale, there should be a question of "how can POS in a specific place be designed in accordance with the needs of the specific group (the children, the teenagers, the middle age) who are living in these areas?" Case studies towards all age groups, not only the elderly, can be considered for future research directions. Future research can conduct a similar process as this study, focusing on other age groups. It can collect their opinions about current spaces and the conflicts among user groups. It can also be action research based on age-friendly design guidelines. The future research direction can combine design guidelines for all, including all groups, to resolve user disputes.

The approach to developing design guidelines that match the needs of the elderly in HCMC can be applied to other procedures, not only for the elderly and not only in Vietnam. The universal design guidelines seem impossible because they require the specific needs of users in different locations. Therefore, there should be a connection between scientific surveys to find the impact factors and the adjustment of design guidelines to meet the needs of users and investors. Additionally, the same method as summarized in the following can be applied:
- Focus on surveying questionnaire in one specific group
- Observation of activities to define the network among actants
- Adjust the ground framework of design guidelines to meet the need of the elderly
- Community workshop for the evaluation

The complete set of criteria as a toolkit for successful POS can be developed together with the design guidelines in further research. It should be applied to an actual project and be checked within a period of the success of Copenhagen city of Jan Gehl. It can be developed in the criteria system for success in further research.

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APPENDICES

A. Survey questionnaire to users/ non-users

Code: Interview location:

PUBLIC OPEN SPACES TOWARDS THE ELDERLY

This survey is about the activities of the elderly in public open spaces, such as parks, neighborhood yards, or sidewalks in Ho Chi Minh City as well as the reasons and factors that affect the choices of those activities and using those spaces. Besides, the research aims to get your opinions about public open spaces in Ho Chi Minh.
Therefore, your opinions are very important to support this research. The results would be used for my PhD research at Technical University of Darmstadt, Germany. All information will be confidential and used for research purposes only.
Thank you very much for your cooperation. The survey might take about 5 – 15 minutes.
Le Thi Thuy Hang

Part I: General Information

Q1. Gender
1. Male 2. Female *Q1*

Q2. Age
1.60 – 64 2. 65 - 69 3. 70 - 74 4. >75 *Q2*

Q3. State of health and mobility

Ability	*Good (1)*	*Fairy good (2)*	*Normal (3)*	*Bad (4)*	*Very bad (5)*	*Q3*
Body movement						
Walking						
Eyesight						
Hearing						
Stamina						
Memory						

Q4. Living Arrangement
1. Alone 2. With family (including children's family) *Q4*

Q5. Caring responsibility
1.Self-caring 2.Caring other people (spouse, children, relatives, grandchildren) 6. Other..... *Q5*

Q6. Income per month
1.< 4 mils VND 2. 4 - 10 mils VND 3. >10 mils VND *Q6*

Q7. Previous jobs
1. Jobs related to people *(administrators, Artist/ Creativity works, sellers, doctors, teachers, hotel staff, human resources,)* 2. Jobs related to nature *(farmers, garderners...)* 3. Jobs related to non-human environment *(industrial field, pilot, traditional crafts, engineers)* *Q7*

Q8. Current jobs
1. Retired 2. Continue working 3. Other …… *Q8*

Q9. Your address
Number (optional)…….Street……Ward……District…… *Q9*

Q10. Do you do any outdoor activities, such as walking, doing exercise, meeting friends in the public open spaces?
1. Yes, please come to **part II** 2. No/ Hardly, please come to **part III** *Q10*

Part II: For those who are using public open spaces

Q11. Could you please list out all public open spaces that you often visit with reasons, frequency, means of travel, etc.?

	Frequency	Reasons	How to come?	From?	Duration	Q11
	(Select 1 for "nearly daily"; 2 for "2-3 times per week"; 3 for "once a week"' 4 for "few times per month"; 5 for rarely 0 for "N/A or no idea")	*(Select 1 for "proximity" 2 for "comfortable (greenery, equipment)" 3 for "relaxing, quiet" 4 for "watching people" 5 for "contact with people" 6 for "discover new activities, new people" 7 for "security and safety" 8 for "cleaning" 9 for "exercising" 10 for "no choice" 11 for "other")*	*(Select 1 for "walking"; 2 for "bicycle"; 3 for "motorbike"; 4 for "bus"; 5 for "lifting by others"; 6 for "car"; 7 for "grab bike"; 8 for "other")*	*(Select 1 for "from home; 2 for "to home")*	*(Select 1 for "<15 min"; 2 for "15-30 min"; 3 for "30-60 min"; 4 for "1-2 hours"; 5 for ">2 hours")*	
a. Parks						
b. Riverside parks						
c. Square (*e.g., Nguyen Hue boulevards)*						
d. Neighborhood parks						
e. Courtyard of public buildings						
f. Cultural parks *(e.g. Ho Con Rua)*						
g. Sidewalks						
h. Vacant lands						
i. Alleys						
j. Other						

Q12. What are obstacles that you face on the way access to the place you have visited most often?

1. Weather (heat/rain/wind)
2. Risk of traffic accident
3. Prevent by vendors on the sidewalks
4. Risk of pickpocket/robbery
5. Unfriendly sidewalk for walking
6. Parking/entrance fee
7. Unfriendly crossing
8. Lacking of public transport to access
9. No sidewalks
10. Long distance
11. Other……

Q12

Q13. Why do you come to that place? (Please list all reasons)

1. Near to home/ workplaces
2. Spacious
3. Meeting strangers
4. Greenery & nature
5. Safety
6. No fee (entrance/parking)
7. Sport equipment
8. Quiet
9. No choice
10. The elderly's activities
11. Spaces for relaxing
12. Enough lighting at night
13. Cleanliness
14. Having friends
15. Other ……..

Q13

Q14. Which days of the week do you often come to that place?

1. Whole week
2. Monday
3. Tuesday
4. Wednesday
5. Thursday
6. Friday
7. Saturday
8. Sunday

Q15

Q15. What time are you often in the public open spaces?

1. Before 5h
2. 5h – 7h
3. 7h – 9h
4. 9h – 11h
5. 11h-13h
6. 13h-15h
7. 15h-17h
8. 17h-19h
9. 19h-21h
10. After 21h

Q16

Q16. How long have you been using that most favorite place (how long since your first time to visit that place)?

1. < 1 year 2.1-2 years 3. 2-5 years 4. 5-10 years 5. 10-20 years 6. > 20 years *Q17*

Q17. How long do you often spend in that POS?

1.< 30 min 2. 30 – 60 min 3. 60-90 min 4.>90 min *Q18*

Q18. What are your favorite activities in that POS and reasons why you choose those kinds of activities? (1: preference; 2: suitable for health condition; 3: benefit for health; 4: with friends; 5: with guidance; 6: other)?

	Activities	Reason (from 1-6)		Activities	Reason (from 1-6)
a.	Walking		i.	Watching people	
b.	Jogging		j.	Taking kids outside	
c.	Exercising/Tai-Chi.		k.	Accompanying older people	
d.	Group exercise		l.	Reading	
e.	Exercising with equipment		m.	Sitting and thinking	
f.	Play sports *(e.g. badminton)*		n.	Enjoy the nature	
g.	Meeting friends/acquaintances		p.	Eating/ drinking	
h.	Meeting new people		q.	Other: ……	

Q19. Your evaluation about your POS that you visited often

	Very good	Good	Neutral	Not good	Bad	*Q20*
1. Proximity						
2. Separate with traffic						
3. Microclimate						
4. Greenery						
5. Equipment for relaxing *(e.g., benches)*						
6. Equipment for doing exercise/ sport						
7. Decoration *(e.g., fountain, plant box, sculpture)*						
8. Toilet/ WC						
9. Cleanliness						
10. Safety/ security						
11. Lighting at night						
12. Group activities for old people *(e.g., dancing, Tai-chi)*						
13. Other groups' activities *(the youth, teenagers, couples, vendors, etc.)*						
14. Service (food & beverage)						
15. Other: ……						
16. Your interaction with strangers						
17. Your interaction with acquaintance						

Q20. Among 15 factors listed above, which factor do you like and dislike the most? And the second favorite factor (if any)?

…… *Q21*

Q21. What do you want to change in public open spaces that you used to use?

1.Increase quantity of POS	2.Increase area of POS	
3.Improve equipment & facility in POS	4.More greenery and water surface	
5.Increase safety/security	6.Increase public transport to POS	*Q22*
7.Increase sidewalk quality *(e.g., more shadow/stop vendors/surface material)*	8.Increase cleanliness and hygiene *(stop littering/ more toilet)*	
9.No change	10.Other……	

Q22. Further comments, if any:

……

Thank you very much for your cooperation!

Part III. For those who do not use public open spaces:

Q23. Instead of doing outdoor activities (e.g. taking a walk to get breath of fresh air, standing around enjoying life, or sitting and sunbathing, or greetings and conversations, seeing and hearing people), what kind of activities do you often do when you have free time?

1.Improve knowledge *(e.g. listen radio, travel, reading, gardening)*	2.Indoor exercises *(yoga, swimming)*	
3.Religious activities *(e.g. Going to church, pagoda, temples)*	4.Social activities *(neighborhood meeting)*	
5.Spending time for family *(cooking/caring)*	6.Food& beverage *(restaurant, cafeteria)*	
7.Joining clubs	8.Commercial places *(markets)*	
9.Other …….		*Q24*

Q24. Please specify the following factors that prevent you to visit POS

	Totally agree	Agree	Neutral	Disagree	Totally disagree	*Q25*
1.Proximity						
2.Separate with traffic						
3.Microclimate						
4.Greenery						
5.Equipment for relaxing *(e.g. benches)*						
6.Sport Equipment for the elderly						
7.Decoration						
8.Toilet/ WC						
9.Cleanliness						
10.Safety						
11.Lighting at night						
12.Activities for the elderly						
13.Other groups' activities *(the youth, teenagers, couples, vendors, etc.)*						
14.Service (food & beverage)						
15.Your interaction with strangers						
16.Your interaction with acquaintances						

Q25. Reasons prevent to visit POS

	Totally agree	Agree	Somewhat agree	Disagree	Totally disagree	*Q26*
17. My health condition prevents me to go out						
18. Have no time due to caring responsibility						
19. Have no time due to working/ earning						
20. Outdoor activities bring no benefit for me						
21. Prefer doing indoor exercise/ sports						
22. Do not know anyone in POS						
23. Do not feel comfortable with strangers						
24. I do not like going out						
25. Never think about that						
26. Pollution						
27. Have enough private garden/spaces at my place						
28. Lack of public transportation to POS						
29. Risk of traffic accident						
30. Parking/entrance fee						
31. Inappropriate size/area of POS						
32. Bad maintenance						
33. Bad management						
34. Other…….						

Q26. Among 32 factors above, which are the main factors that prevent you to use POS? Please explain

……

Q27

……

……

Q27. Is there anything to change that can encourage you to go to POS?

……

……

Q28. What is the acceptable distance for you to go to a park/playground?

1.< 100m 2.Từ 100–199m 3. Từ 200-299m 4.Từ 300-399m 5.400-499m 6.>500m *Q29*

Q29. What are your expectations about to change the current situation of POS in Ho Chi Minh City?

1.Increase quantity of POS	2.Increase area of POS
3.Improve equipment & facility in POS	4.More greenery and water surface
5.Increase safety/security	6.Increase public transport to POS
7.Increase sidewalk quality *(e.g., more shadow/stop vendors/surface material)*	8.Increase cleanliness and hygiene *(stop littering/ more toilet)*
9.No change	10.Other……

Q30

Q30. What are your ideal public open spaces? Which activities should be there and its properties?

……

……

……

Q31. Further comments, if any:

……

……

……

Thank you very much for your cooperation!

B. Interview guidance to users and non-users

1. *Do you think that outdoor activities are important for the elderly?*
2. *What kind of places where the seniors often visit?*
3. *The reasons why the elderly visit POS, if yes. Or if not, why? And why do you choose this POS not others? Most important reasons affect to your visitation?*
4. *In your opinion, what do the other seniors do in POS?*
5. *Do the weather/climate affect to your outdoor activities, such as in the rainy season you are less inactive than in dry season?*
6. *Do you think health condition affect to outdoor activities of the seniors?*
7. *Do you think that living condition affect to outdoor activities of the seniors?*
8. *What should do with public open spaces to fit to the seniors?*
9. *Your general ideas of POS in HCMC? Can you compare with those in other countries (if possible)?*
10. *Have you ever witnessed any problems/ criminals in this POS?*
11. *Is there any limitation in this POS?*
12. *Your opinion about activities of other group?*
13. *Any comment?*

C. Experts interview questionnaire

Dear Sir/ Madam,
Kính gửi ông/ bà,

This survey is about experts' opinion of age-friendly design guidelines in public open spaces. Your opinions are very important to support my Ph.D. research at Technical University of Darmstadt, Germany. All information will be used for research purposes only. Thank you very much for your cooperation.
Đây là bảng khảo sát lấy ý kiến chuyên gia về hướng dẫn thiết kế không gian công cộng hướng tới người cao tuổi. Ý kiến của ông bà rất quan trọng để hỗ trợ cho nghiên cứu luận văn tiến sĩ của tôi tại trường đại học kỹ thuật Darmstadt, Đức. Tất cả các thông tin chỉ được sử dụng nhằm mục dích nghiên cứu. Tôi xin chân thành cảm ơn sự giúp đỡ hợp tác của quý ông bà.
Lê Thị Thúy Hằng

1. Which design guidelines that you have been used when designing an urban park in Vietnam?/
   Khi thiết kế một công viên ở Việt Nam, xin cho biết tiêu chuẩn thiết kế nào ông bà đã sử dụng?
   ……
   ……
   ……
   ……
2. How many types of design guidelines for the parks in Vietnam, if possible?
   Xin ông bà vui lòng giúp liệt kê các loại tiêu chuẩn Việt Nam về thiết kế công viên (nếu có thể)?
   ……
   ……
   ……
   ……
3. According to your experience, how is the process of design a park in Vietnam in a landscape company?
   Theo kinh nghiệm của ông bà, quy trình thiết kế 1 công viên ở Việt Nam được các công ty thiết kế cảnh quan thực hiện như thế nào (nếu có thể)?
   ……
   ……
   ……
   ……

4. From previous studies and review global design guidelines (including Vietnam Design Standard TCVN 9257:2012), the age-friendly design guidelines for urban open spaces are synthesized based on 5 factors: Proximity, neighborhood's characteristics, users' characteristics, design of public open spaces, and social interaction (see Table 1). Please give your opinions if there are missing any factors, principles, and indicators?
   Dựa trên những tiêu chuẩn thiết kế trước đây (bao gồm cả Tiêu chuẩn Việt Nam TCVN 9257:2012), một bảng tổng hợp tiêu chuẩn thiết kế được tạo ra với 5 yếu tố chính: sự gần gũi, đặc điểm vùng lân cận, đặc điểm người sử dụng, thiết kế không gian công cộng, và sự tương tác xã hội (xem bảng 1). Xin ông bà vui lòng nhận xét hay bổ sung nếu như còn thiếu những yếu tố nào, hay nguyên tắc nào, hay chỉ số nào?

Table 1 Briefly synthesis of global design guidelines (mainly based on the guidelines for senior-friendly parks of Loukaitou et al [1], [2]/
Bảng 1. Bảng tóm tắt tổng hợp tiêu chuẩn thiết kế dựa theo hướng dẫn thiết kế công viên thân thiện với người cao tuổi của Loukaitou và cộng sự (năm 2014, 2016)

	Principles/ ***Nguyên tắc***	**Criteria/** ***Tiêu chí***	**Experts' comments/** ***Ý kiến chuyên gia***

Proximity/ *Tính gần gũi*	**Accessibility**: Quickly, safely, and easily access/ ***Có thể tiếp cận được*** *: Nhanh chóng, an toàn và dễ dàng*	- Barrier-free/ *Không có rào chắn*; - Ample handicapped parking/ *Bãi đậu xe rộng rãi cho người khuyết tật;* - Walkable distance (recommended around 400 to 800m to pocket park, playground centered in neighborhod unit or 2-6 minute walk / *Có thể đi bộ tới được (gợi ý tới công viên khu ở trong khoảng 400 đến 800m hay 2-6 phút đi bộ)* [3], [4] - Increase number of public spaces (recommend: inner the radius of 900m of existing downtowns in lacking POS cities as HCMC and Hanoi, Vietnam)/ *Tăng thêm số lượng không gian công cộng (đề xuất: trong bán kính phục vụ 900m ở khu đô thị hiện hữu đối với những thành phố thiếu mảng xanh như TPHCM và Hà Nội, Việt Nam)* [5]	
	Control: have a good sense of orientation and understanding of the park's layout and offerings/ ***Kiểm soát****: giúp người sử dụng định được hướng và hiểu về các hoạt động cũng như bày trí công viên*	- Provide a visible sign at the entrance, way-finding signage to the parks and inside the parks, layout information/ map/ programs by flyers in many languages (including graphic and Braille) at the entrance and other areas inside the parks/ *Lối vào có bảng chỉ dẫn dễ thấy, bảng chỉ dẫn về hướng đi tới công viên và bên trong công viên được bố trí ở lối vào và một số khu vực khác trong công viên dưới dạng tờ rơi với nhiều ngôn ngữ khác nhau(cả đồ họa và chữ nổi) về thông tin phân khu công viên / bản đồ / chương trình.* - Provide oriental features in large parks (e.g. a kiosk, a clock tower, a fountain, some boulders, etc.)/ *Cần một số công trình giúp định hướng ở những công viên lớn (như ki-ốt, tháp đồng hồ, đài phun nước, tảng đá, v.v.)* - Avoid the creation of dead-end paths/ *Tránh tạo ra những đường cụt.* - Provide educational and informational signs/ other sensory cues (sound patterns, flower fragrances) inside the parks/ *Bên trong công viên bố trí những bảng hiệu mang tính chất giáo dục hoặc thiết bị phát ra âm thanh, mùi hương.*	
Neighbourhood characteristics/ *Đặc điểm khu vực xung quanh*	**Economic**: Contribute economic benefits to surrounding community/ ***Kinh tế****: Đóng góp lợi ích kinh tế cho cộng đồng xung quanh* [6]	- Space as a place of work, Creates economic, property market price and functional custom, Dynamics of property price fluctuation, Perception of business attraction & stability / *Không gian là một nơi hoạt động, Tạo ra giá trị kinh tế, đóng góp cho kinh tế thị trường và có công năng sử dụng, biến đổi giá trị theo sự biến động thị trường, tạo sự thu hút đầu tư ổn định* [7]; - Too little public space is a false economy, too much public space, a false luxury (recommended from 25 to 35% total area of quarter [8, p. 163] or 7-9 m2 per capita for a neighborhood unit [9]) / *Quá ít không gian công cộng không mang giá trị kinh tế, còn quá nhiều không gian công cộng là một sự xa xỉ (được khuyến nghị từ 25 đến 35% tổng diện tích hoặc 7-9 m2 trên đầu người cho một đơn vị ở).*	
	Connectivity / ***Tính kết nối*** [10]	- Creation of a continuous 'walking loop'- an unbroken network of pedestrian accessible public spaces and paths/ *Tạo 'đường vòng đi bộ' liên tục - mạng lưới không gian công cộng và lối đi dành cho người đi bộ không bị gián đoạn* [11]; - A good connectivity between public spaces: The footpaths are attractive, continuous and are intervene/ *Kết nối tốt giữa các không gian công cộng: Các lối đi bộ hấp dẫn, liền mạch và có sự xen kẽ* [10]. - Park placement near facilities used by seniors (senior centers, churches, etc.) and transit stops;/ *Vị trí công viên gần các cơ sở mà người cao tuổi hay sử dụng (trung tâm dưỡng lão, nhà thờ, v.v.) và các trạm xe công cộng;* - Create little oasis (benches, water, vegetation, adequate lighting, trash containers, shelters against sun, rain and wind and toilets), pleasant places to take a rest along pathways/ *Tạo ốc đảo nhỏ làm nơi nghỉ ngơi thư giãn dọc theo lối đi (như ghế dài, hồ nước, bãi hoa cỏ với ánh sáng đầy đủ, có thùng đựng rác, có mái che nắng, mưa gió và nhà vệ sinh)* [10]. - Connect to the larger community both physically and programmatically through community events and activities that appeal to seniors (e.g. outdoor health clinic; yoga for seniors, farmers markets, etc.)/ *Kết nối rộng ra với cộng đồng thông qua các sự kiện và hoạt động thu hút người cao tuổi (ví dụ: phòng khám sức khỏe ngoài trời; yoga cho người cao tuổi, chợ nông sản, v.v.).* - Limited grade changes and flat or gently sloped ramps and pathways;/ *Đường đi bộ nên hạn chế thay đổi cao độ hoặc dốc nhẹ;*	

		- Linked to the presence of people and activities of consumption and trade. The presence of bars, restaurants, shops, public services, etc. favors the attractiveness and frequency of squares/ *Lôi cuốn sự có mặt của mọi người thông qua việc mua sắm. Việc bố trí quán bar, nhà hàng, cửa hàng, hay các dịch vụ công cộng v.v. tạo nên sức hấp dẫn và tăng tần suất ghé thăm* [10]	
	Safe pedestrian crossings/ *Việc băng qua đường an toàn* [12]	- Safe crossings and signalized intersections with adequate times longer for the elderly to cross the street [10]; Visible and audible crosswalk signalling/ *Nơi qua đường an toàn và chỗ đường giao nhau có đèn báo hiệu với thời gian chờ lâu hơn cho người cao tuổi băng qua đường; Tín hiệu sang đường có thể nhìn thấy và nghe được* - Non-slip strips on pedestrian crossings, bridges, and tunnels to assist pedestrians to crossroads, / *Làn băng qua đường được thiết kế chống trượt, có thể thiết kế cầu và đường hầm để hỗ trợ người đi bộ sang đường* [12]	
	Age-friendly pavements/ *Vỉa hè thân thiện người cao tuổi* [12]	- A smooth, level, non-slip surface; sufficient width to accommodate wheelchairs; dropped curbs that taper off to be level with the road; clearance from obstructions such as street vendors, parked cars, and trees; and priority of access for pedestrians/ *Bề mặt vỉa hè nhẵn, phẳng, không trơn trượt; chiều rộng đủ cho xe lăn; lề đường bằng cao độ với mặt đường; giải tỏa các chướng ngại vật như người bán hàng rong, bãi đậu xe và cây cối; và ưu tiên dành cho người đi bộ* [12]. - Streets should have character and reflect local identify, history, and culture. Utilising local art and architecture can help enhance distinct and unique character and identity/ *Đường phố phải có đặc điểm riêng và phản ánh bản sắc, lịch sử và văn hóa của địa phương. Sử dụng nghệ thuật và kiến trúc địa phương có thể giúp nâng cao bản sắc riêng biệt và độc đáo này* [13]	
Users' characteristics/ *Đặc điểm người sử dụng*	**Privacy** (need for a tranquil environment at the park)/ ***Sự riêng tư*** *(cần một môi trường yên tĩnh tại công viên)*	- Reduce street noise: locate park in quiet location, use buffer planting for seating areas in parks, use natural sounds (water, breeze moving through tree leaves, etc.)/ *Giảm tiếng ồn đường phố bằng cách bố trí công viên ở vị trí yên tĩnh, trồng cây đệm cách li cho khu vực chỗ ngồi trong công viên, sử dụng âm thanh tự nhiên (nước, gió thổi qua lá cây, v.v.)* - Offer some sub-areas that visitors can sit alone/ *Cung cấp một số khu vực phụ mà du khách có thể ngồi một mình*	
	Democratic/ *Dân chủ* [6]	- Governance: the city for the elderly is a city for all, Participation: the city for the elderly is built with the elderly / *Trong lĩnh vực quản trị: thành phố cho người cao tuổi là thành phố cho tất cả mọi người, Về vấn đề tham gia: thành phố dành cho người cao tuổi được xây dựng với người cao tuổi* [10]. - Mainstreaming: numerous ways to meet the needs and cover transversally different sectors of public body: town planning, housing, social and health services. Create a city for older people require a comprehensive approach/ *Có tính chất lồng ghép: Do nhiều tầng bậc tiếp cận để đáp ứng những nhu cầu người dân đối với các cơ quan nhà nước khác nhau như quy hoạch thị trấn, nhà ở, dịch vụ xã hội và y tế, nên khi thiết kế thành phố cho người lớn tuổi đòi hỏi một cách tiếp cận toàn diện* [10]. - Explicitly state what each outdoor community space is to be predomninanttly used for/ *Xác định rõ ràng mỗi không gian cộng đồng ngoài trời được sử dụng chủ yếu để làm gì* [14] - Is evaluated, redesigned, and improved over time/ *Được đánh giá, tái thiết kế, và nâng cấp sau một thời gian* [6] - Is loved by those who use it and live or work nearby/ *Được người sử dụng và những người sống và làm việc gần đó ưu thích* [6]	

Design of POS/ *Thiết kế của không gian công cộng*	**Safety/security/** ***An toàn/ An ninh***	- Crime: Paths with clear lines of sight; avoidance of foliage that obstructs views; Good lighting; no dark or concealed areas/ *Vấn đề phòng chống tội phạm: Đường phố cần có tầm nhìn rõ ràng, tránh tán cây che lấp tầm nhìn; Đủ sáng; không có vùng tối hoặc bị che khuất* - Emergency phone boxes, Security technology (CCTV, emergency report systems) / *Bố trí trụ điện thoại khẩn cấp, công nghệ an ninh như camera giám sát, hệ thống báo cáo khẩn cấp.* - Community volunteers overseeing safety/ *Kêu gọi tình nguyện viên giám sát an toàn cho cộng đồng.* - Falls: Non-slippery, even paving surfaces; Flat or gently sloped paths; Handrails on-ramps, paths; Avoid stairs; No skateboarding or cycling in the park, or only in designated areas;/ *Nguy cơ trượt ngã: bề mặt chống trượt, đường đi bằng phẳng hoặc dốc nhẹ, có tay vịn ở chỗ dốc và trên đường đi, tránh bậc thang, không bố trí trượt ván hay đi xe đạp trong công viên, nếu có chỉ ở những nơi được thiết kế riêng.*	
	Contact with nature/ ***Tiếp xúc với thiên nhiên***	- The predominance of "softscapes" (plants, greenery) over "hardscapes" (concrete) (recommended ratio of 30% hardscape and 70% vegetation)/ *Sự chiếm ưu thế của "bề mặt mềm" (thực vật, cây xanh) so với "bề mặt cứng" (bê tông) (tỷ lệ được khuyến nghị là 30% bề mặt bê tông và 70% thảm thực vật)* - Mature trees for adequate shade/ *Bố trí cây cao cho bóng mát;* - Variety of plants and flowers, vegetables (different colors, fragrances, etc.). In small parks, arrange flowers in multi-level plant beds to save space. / *Trồng các loại cây và hoa, rau (màu sắc khác nhau, mùi thơm, v.v.). Trong các công viên nhỏ, bố trí hoa trong các luống cây nhiều tầng để tiết kiệm diện tích.* - Include calm or slowly moving water elements (such as small ponds, creeks, waterfalls)/ *Bao gồm cả các yếu tố mặt nước nhẹ nhàng êm ái (như hồ nhỏ, rãnh nước, thác nước,)* - Soothing and natural sounds (water, birds, breezes, wind chimes)/ *Bố trí âm thanh tự nhiên êm dịu (nước, tiếng chim hót, tiếng côn trùng, gió).* - Urban spaces as a setting for unthreatening wildlife (birds, butterflies, squirrels, ducks, etc.)/ *Thiết kế không gian công cộng không được đe dọa đến đời sống động thực vật hoang dã (chim chóc, bướm bướm, sóc, vịt, v.v.)* - Provides opportunities for environmental learning [6]/ *Tạo ra cơ hội để tìm hiểu về môi trường* - Better maintenance/ *Nâng cao việc bảo trì bảo dưỡng cây xanh* [12]	
	Age-friendly, ergonomic design/ ***Thiết kế tiện dụng, thân thiện với người cao tuổi***	- Seating with ergonomic design, backs, and arms made from natural materials (resistant to high temperatures); preferably wooden painted benches that allows a rapid drying, avoiding metal benches that are too cold or too hot [10] / *Chỗ ngồi được thiết kế tiện dụng, lưng và tay làm từ chất liệu tự nhiên (chịu được nhiệt độ cao); ưu tiên băng ghế bằng gỗ sơn màu để nhanh khô, tránh để băng ghế kim loại sẽ bị quá lạnh hoặc quá nóng* - Light, easily movable seats and tables;/ *Bàn ghế nhẹ, dễ di chuyển;* - Seating and pavement with contrasting colors (for compromised depth of field perception)/ *Chỗ ngồi và mặt đường có màu sắc tương phản (để giảm độ sâu trường ảnh);*	
	Physical activity/ ***Hoạt động vật lý***	- Paths of different lengths and levels of walking difficulty/ *Bố trí các con đường có độ dài khác nhau và mức độ khó đi bộ;* - Exercise equipment for different capacity levels/ *Bố trí các thiết bị tập thể dục với các mức công suất khác nhau;* - Low-impact exercise equipment away from heavy-traffic park areas/ *Bố trí các thiết bị tập thể dục cách xa khu vực công viên đông xe cộ;* - Grassy, flat area for group exercise classes and tai-chi/ *Thiết kế khu vực bằng phẳng trên cỏ cho các lớp tập thể dục theo nhóm và thái cực quyền;* - Organized physical activity classes for seniors/ *Tổ chức các lớp thể dục cho người cao tuổi;* - Gardening opportunities for seniors / *Tạo cơ hội cho người cao tuổi có thể làm vườn*	
	Choice: flexibility in	- Offer opportunities for both passive recreation (people, performance and scenery-watch) and active recreation (direct contact to people, groups game,	

	park design and offering different choices/ ***Sự lựa chọn**: thiết kế linh hoạt và đa dạng*	promenade, etc). / *Đem lại cơ hội thực hiện những hoạt động giải trí thụ động (như ngắm người, hoạt động và cảnh vật) và chủ động (tiếp xúc trực tiếp với người, hoạt động nhóm, đi dạo, v.v)* [15] - Provide a variety of seating options and spaces for a person alone, for small and larger groups, in the shadow or under the sun/ *Cung cấp nhiều lựa chọn về chỗ ngồi và các loại không gian thích hợp cho nhiều người hoặc một người, cho các nhóm lớn nhỏ, trong bóng râm hoặc dưới ánh nắng mặt trời.*	
	Aesthetic and sensory delight / *Yếu tố thẩm mỹ và thú vị*	- Sensory interesting features should be placed at shorter intervals/ *Các yếu tố mang lại sự thú vị nên được bố trí với khoảng cách ngắn hơn thích hợp với cảm nhận của người cao tuổi* - Screen or transform unpleasant views (e.g. a blank wall, an asphalt parking lot) through vegetation, mural painting, or art placement/ *Dùng cây cối, tranh tường hoặc nghệ thuật sắp đặt để làm giảm các góc xấu (ví dụ: che tầm nhìn vào bức tường trống, hoặc một bãi đậu xe)* - Identify and use plants that have special meanings for particular cultural or ethnic groups that live in the park's vicinity/ *Xác định và sử dụng các loại cây có ý nghĩa đặc biệt đối với các nhóm văn hóa dân tộc sống xung quanh công viên.* - Consider the installation of outdoor art pieces and fun and whimsical features in the park/ *Xem xét việc sắp đặt và thường xuyên thay đổi các tác phẩm nghệ thuật ngoài trời mang tính chất vui nhộn trong công viên.* - Includes opportunities for discovery, delight, and challenge (e.g. crafts fairs, concerts, flea market), / *Thiết kế nên các cơ hội khám phá, tận hưởng và thử thách cho người sử dụng (ví dụ: hội chợ hàng thủ công, buổi hòa nhạc, chợ trời* - The small scale: the careful attention paid to the human landscape is offering good conditions to visitors - at eye level. The bird's eye view and helicopter perspective don't play much of a role here/ *Thiết kế theo tỉ lệ nhỏ: thiết kế ngang tầm mắt – cần quan tâm kỹ lưỡng đến việc thiết kế cảnh quan theo tỉ lệ và góc nhìn mắt người sẽ cuốn hút du khách. Thiết kế với góc nhìn chim bay không đóng góp nhiều vai trò trong việc thiết kế* [16]	
	Comfort/ *Sự thoải mái*	- Protection from Sun, Wind, Rain, and Glare: Place trees and vegetation strategically to protect from direct sunlight and minimize glare from the sun; Provide elements that can protect from the sun such as umbrellas, kiosks, etc.; Provide settings that offer overhead protection; In windy areas, orient parks or elements in the park to protect from prevailing winds; In hot climates, orient park in a way that allows cool breezes/ *Bảo vệ khỏi nắng, gió, mưa và chói mắt: Bố trí cây cối che ánh nắng trực tiếp và giảm thiểu chói nắng; Thiết kế các vật dụng có thể bảo vệ khỏi ánh nắng mặt trời như dù che, ki-ốt, v.v.; Cung cấp lắp đặt mái che; Trong khu vực có gió, thiết kế hướng công viên sao cho tránh gió giật dữ dội; Ở những nơi có khí hậu nóng, thiết kế hướng công viên đón gió mát,* - Encourage food stands in the park/ *Khuyến khích các quầy bán đồ ăn trong công viên.* - Not being disturbed by noise and odour/ *Không bị ảnh hưởng bởi tiếng ồn và mùi khó chịu* [12] - Places to sit without paying for goods and services; Seating provided by businesses/ *Không phải trả tiền cho các tiện ích trong công viên; Chỗ ngồi do doanh nghiệp tài trợ* [17]	
	Adequate public toilets/ *Bố trí đầy đủ nhà vệ sinh công cộng* [12]	- The availability of clean, conveniently located (near the walkways), handicap-accessible toilets, well-signed [12], information on the location of public toilets [10] / *Bố trí nhà vệ sinh sạch sẽ, vị trí thuận tiện (gần lối đi bộ), có biển báo, phù hợp cho người khuyết tật, thông tin về địa điểm của nhà vệ sinh công cộng* - Favoring public toilet models self-cleaning or made with materials easily washable/ *Ưa chuộng các mô hình nhà vệ sinh tự làm sạch hoặc làm bằng vật liệu dễ chùi rửa* [10]; - Avoid the toilets underground (difficult to access and sense of insecurity)/ *Tránh nhà vệ sinh ngầm (khó đi vào và cảm giác không an toàn).* [10] - The provision of sufficient basic facilities with frequent maintenance / *Cung cấp đầy đủ các tiện nghi cơ bản được bảo trì thường xuyên* [18].	

Social Interaction/ *Tương tác xã hội*	**Social Support**: wanting to be connected with other human beings and be cared for and supported by them/ ***Hỗ trợ từ xã hội:*** *muốn được kết nối với những người khác và được người khác chăm sóc và hỗ trợ lại*	- Seating that facilitates interaction BBQ pits, chess tables, board games/ *Chỗ ngồi có thể nướng BBQ, có thể chơi cờ vua, hoặc các trò chơi cờ khác;* - Neighborhood events at the park; or events that bring youth and seniors together (e.g.youth orchestra performances)/ *Tổ chức các sự kiện cho khu ở tại công viên; hoặc các sự kiện gắn kết giới trẻ và người cao tuổi lại với nhau (ví dụ: biểu diễn của dàn nhạc thiếu niên)* - Outdoor reading room ("little free library" to donate and read books)/ *Phòng đọc ngoài trời ("thư viện nhỏ miễn phí" để quyên góp và đọc sách);* - Provide "foils for conversation"—architectural, natural, or landscape elements (kiosks, water fountains, flowers, pigeons, etc.) that bring people together around a common focus/ *Cung cấp "các yếu tố cho cuộc trò chuyện" để giúp mọi người có một điểm chung dễ thảo luận như các yếu tố kiến trúc, tự nhiên hoặc cảnh quan (như ki-ốt, đài phun nước, hoa, chim bồ câu, v.v.)* - Facilitate community exchanges such as food banks, community-supported agriculture, and exhibits of neighborhood photos taken by the elders/ *Tạo điều kiện thuận lợi cho cộng đồng trao đổi với nhau như ngân hàng lương thực, nông nghiệp cộng đồng và triển lãm các bức ảnh của khu phố do người lớn tuổi chụp* - Create a node for local information exchange with a bulletin board and a newsstand/ *Tạo một điểm để trao đổi thông tin trong địa phương như một bảng thông báo hoặc một quầy báo* - Creation of an amicable community in the neighbourhood- compact, walkable, self-sustained zones/ *Tạo ra một cộng đồng thân thiện trong khu ở với các không gian nhỏ gọn, có thể đi bộ và tự duy trì* [11]	
	Park Operation: Towards an Intergenerational Playground?/ ***Hoạt động Công viên****: Hướng tới một Sân chơi liên kết các thế hệ?*	- Provide facilities for the elderly's use in parallel with facilities for use by non-seniors, but still privilege the elderly in the use of particular equipment and facilities / *Cung cấp trang thiết bị để người cao tuổi sử dụng song song với những nhóm thế hệ khác nhưng vẫn ưu tiên người cao tuổi sử dụng một số trang thiết bị cụ thể; ;* - Exclude certain activities that are deemed dangerous by older adults/ *Loại bỏ một số hoạt động nguy hiểm cho người lớn tuổi* - Provide a "haven" within the park – an area in the park that elders can call their own/ *Cung cấp một "thiên đường" trong công viên - một khu vực trong công viên mà người lớn tuổi có thể gọi là của riêng họ.* - Locate a carefully designed children's play area (for visiting children) where residents can watch without having their privacy invaded/ *Xác định vị trí khu vui chơi trẻ em cần cẩn thận, nơi mà người lớn có thể xem nhưng không bị xâm phạm quyền riêng tư của họ* [14]; - Locate shared areas so that visitors are accessible and visible from a maximum number of points, while ensuring that individual units maintain their visual and acoustic privacy/ *Xác định vị trí các khu vực chung để người sử dụng có thể tiếp cận và tối đa hóa điểm nhìn, nhưng đồng thời vẫn đảm bảo rằng cho từng cá nhân có không gian riêng* [14];	

Other, if any/ *Bổ sung thêm (nếu có)*

From 2017 until 2021, I surveyed more than 350 elderly living in Ho Chi Minh City about their usage and opinions about public open spaces. Based on the survey results and the synthesis design guidelines above, I adjusted and made new age-friendly design guidelines for Vietnam as table 2 below. Please help to give your opinion about table 2 below.

Từ năm 2017 tời 2021, tôi đã thực hiện khảo sát với hơn 350 người cao tuổi sống tại TP.HCM về ý kiến của họ đối với không gian công cộng. Dựa vào kết quả khảo sát và bảng tổng hợp thiết kế trên (bảng 1), tôi đã điều chỉnh và tạo 1 bảng khảo sát mới về hướng dẫn thiết kế hướng tới người cao tuổi ở Việt Nam như bảng 2 bên dưới. Xin vui lòng đánh giá giúp bảng 2 phía dưới.

The design guideline for Public open spaces towards the elderly is developed through the following stages:
Bảng tiêu chuẩn thiết kế Không gian công cộng hướng tới người cao tuổi được phát triển theo các bước sau:

a. *Desktop research to find out the factors that impact the choice of using POS of the elderly and synthesize the design guidelines towards the elderly worldwide (including Vietnamese standard).*
Nghiên cứu các văn bản dữ liệu để tìm ra các yếu tố tác động đến việc lựa chọn sử dụng POS của người cao tuổi và tổng hợp các hướng dẫn thiết kế hướng tới người cao tuổi trên toàn thế giới (bao gồm cả tiêu chuẩn Việt Nam).
b. *Survey questionnaire and observing the activities of the elderly in some parks of Ho Chi Minh City, Vietnam.*
Khảo sát bảng hỏi và quan sát hoạt động của người cao tuổi tại một số công viên của Thành phố Hồ Chí Minh, Việt Nam.
c. *Apply data analysis methods to specify which factors impact the choice of the elderly to use POS*
Áp dụng những phương pháp phân tích số liệu thu thập được để chỉ rõ yếu tố nào tác động đến việc lựa chọn sử dụng máy POS của người cao tuổi
d. *Suggest the design guidelines based on the findings of the survey.*
Đề xuất các hướng dẫn thiết kế dựa trên kết quả của cuộc khảo sát.
e. *Opinions of the experts about the design guidelines through the expert interview (this survey)*
Xin ý kiến của các chuyên gia về hướng dẫn thiết kế thông qua phỏng vấn (bảng này)
f. *Improve the design guidelines as the experts' suggestion*
Cải thiện các nguyên tắc thiết kế theo đề xuất của các chuyên gia
g. *Suggest to apply for similar cities worldwide (high-density cities and lacking of POS)*
Đề xuất áp dụng cho các thành phố tương tự trên toàn thế giới (những thành phố đông dân nhưng thiếu không gian công cộng)

5. Please give your opinion about the method that I developed the design guidelines. Is there any step that should be added?
Vui lòng cho biết ý kiến của ông bà về phương pháp mà tôi đã phát triển các hướng dẫn thiết kế. Có cần bổ sung thêm bước nào vào nữa không?

……
……
……

The new design guidelines as table 2. Please give your opinions about:
Bảng hướng dẫn thiết kế mới như bảng 2. Xin ông bà cho ý kiến về:

- Missing factors/ principles/ criteria? / *Những yếu tố/ Nguyên tắc/ chỉ số còn thiếu?*
……
……
- The ability to apply of those guidelines to Vietnam in practice:
Xin vui lòng đánh giá giá trị thực tiễn của bảng hướng dẫn thiết kế này dành cho Việt Nam

☐ Very good *Rất tốt* ☐ Good *Tốt* ☐ Neutral *Bình thường* ☐ Bad *Không tốt* ☐ Very Bad *Rất tệ*

Please explain/ *Xin vui lòng giải thích*
……
……
- The flexibility of these guidelines to apply for similar cities in Vietnam?
Xin vui lòng đánh giá tính linh hoạt của bảng thiết kế này cho những thành phố

☐ Very good *Rất tốt* ☐ Good *Tốt* ☐ Neutral *Bình thường* ☐ Bad *Không tốt* ☐ Very Bad *Rất tệ*

Please explain/ *Xin vui lòng giải thích*

……
……

How to use this design guideline? /*Sử dụng hướng dẫn thiết kề này như thế nào?*

The guideline gives an overview of different criteria that need for age-friendly public open spaces in different types of existing POS. It is not specific for any site of POS but can use as a reference for the strategy for urban planners, landscape architects, authorities, and investors when setting up or developing public space.

Hướng dẫn này cung cấp một cái nhìn tổng quan về các tiêu chí khác nhau cần cho không gian mở công cộng thân thiện với lứa tuổi trong các loại POS hiện có khác nhau. Nó không dành riêng cho bất kỳ vị trí nào của POS nhưng có thể được sử dụng làm tài liệu tham khảo cho chiến lược cho các nhà quy hoạch đô thị, kiến trúc sư cảnh quan, chính quyền và các nhà đầu tư khi thiết lập hoặc phát triển không gian công cộng.

Table 2 Age-friendly design guidelines for POS in Vietnam

Bảng 2. Hướng dẫn thiết kế hướng tới người cao tuổi ở Việt Nam

Note/ *Ghi chú*:

- The yellow highlights are marked for adjudgment of the design guidelines in table 1/ *Những chỗ tô vàng được sử dụng đánh dấu việc thay đổi so với bảng hướng dẫn thiết kế ở bảng 1*
- The orders of factors, principles, and criteria are rearranged as the priority due to the degrees of associations (results of the survey) among those impact factors to frequency to visit POS and the time spent there. According to the findings, the order of decreasing impact factors as the follows: social interaction, users' characteristics, proximity, design of POS, and neighborhood characteristics / *Thứ tự của các yếu tố, nguyên tắc và tiêu chí được sắp xếp lại theo thứ tự ưu tiên từ kết quả khảo sát về việc liên quan giữa những yếu tố ảnh hưởng tới tần suất và thời gian ở không gian công cộng. Theo như kết quả đạt được từ bảng khảo sát, thứ tự các yếu tố ảnh hưởng giảm dần như sau: tương tác xã hội, đặc điểm người sử dụng, sự gần gũi, thiết kế không gian công cộng, và đặc điểm khu vực xung quanh.*

	Principles/ ***Nguyên tắc***	**Criteria/** ***Tiêu chí***	**Experts' comments/** ***Ý kiến chuyên gia***
Social Interaction/ *Tương tác xã hội*	Towards an Intergeneratio nal Playground/: *Hướng tới một Sân chơi liên kết các thế hệ*	- Locate a carefully designed children's play area next to the activities place of the elderly and increase number of benches so that the elderly can sit and watch the children playing/ *Thiết kế vị trí của khu vui chơi trẻ em gần khu vực hoạt động của người cao tuổi, đồng thời tăng số lượng ghế nghỉ chân để người cao tuổi có thể nghỉ ngơi và quan sát trẻ em vui chơi.* - Locate shared areas so that visitors are accessible and visible from a maximum number of points, while ensuring that individual units maintain their visual and acoustic privacy/ *Xác định vị trí các khu vực chung để người sử dụng có thể tiếp cận và tối đa hóa điểm nhìn, nhưng đồng thời vẫn đảm bảo rằng cho từng cá nhân có không gian riêng* - Provide facilities for their use in parallel with facilities for use by non-seniors, especially the children; but still privilege the elderly in the use of particular equipment and facilities / *Cung cấp trang thiết bị để người cao tuổi sử dụng song song với những nhóm thế hệ khác, đặc biệt là với trẻ nhỏ, nhưng vẫn ưu tiên người cao tuổi sử dụng một số trang thiết bị cụ thể;* - Creation of an amicable community in the neighbourhood- compact, walkable, self-sustained zones/ *Tạo ra một cộng đồng thân thiện trong khu ở với các không gian nhỏ gọn, có thể đi bộ và tự duy trì* ~~- Exclude certain activities that are deemed dangerous by older adults/ *Loại trừ một số hoạt động nguy hiểm cho người lớn tuổi*~~ - ~~Provide a "haven" within the park – an area in the park that elders can call their own/ *Cung cấp một "thiên đường" trong công viên – một khu vực trong công viên mà người lớn tuổi có thể gọi là của riêng họ.*~~	
	Social Support: wanting to be	- Seating that facilitates interaction ~~BBQ pits,~~ Chinese/ chess tables, board games/ *Chỗ ngồi ~~có thể nướng BBQ,~~ có thể chơi cờ tướng/ vua, hoặc các trò chơi cờ khác;*	

	connected with other human beings and be cared for and supported by them/ ***Hỗ trợ từ xã hội:*** *muốn được kết nối với những người khác và được người khác chăm sóc và hỗ trợ lại*	- Neighborhood events at the park; or events that bring youth and seniors together (e.g. youth orchestra performances)/ *Tổ chức các sự kiện của khu ở tại công viên; hoặc các sự kiện gắn kết giới trẻ và người cao tuổi lại với nhau (ví dụ: biểu diễn của dàn nhạc thiếu niên)* - Facilitate community exchanges such as food banks, community-supported agriculture, and exhibits of neighborhood photos taken by the elders/ *Tạo điều kiện thuận lợi cho cộng đồng trao đổi với nhau như ngân hàng lương thực, nông nghiệp cộng đồng và triển lãm các bức ảnh của khu phố do người lớn tuổi chụp* - Create a node for local information exchange with a bulletin board and a newsstand/ *Tạo một điểm để trao đổi thông tin trong địa phương như một bảng thông báo hoặc một quầy báo* ~~- Outdoor reading room ("little free library" to donate and read books)/ *Phòng đọc ngoài trời ("thư viện nhỏ miễn phí" để quyên góp và đọc sách);*~~ ~~- Provide "foils for conversation"—architectural, natural, or landscape elements (kiosks, water fountains, flowers, pigeons, etc.) that bring people together around a common focus/ *Cung cấp "các yếu tố cho cuộc trò chuyện" để giúp mọi người có một điểm chung dễ thảo luận như các yếu tố kiến trúc, tự nhiên hoặc cảnh quan (như ki-ốt, đài phun nước, hoa, chim bồ câu, v.v.)*~~	
Users' characteristics/ *Đặc điểm người sử dụng*	**Functional** (need for a tranquil environment)/ ***Phân khu chức năng*** *(cần một môi trường yên tĩnh)*	- Reduce street noise: locate park in quiet location, use buffer planting for seating areas in parks, use natural sounds (water, breeze moving through tree leaves, etc.)/ *Giảm tiếng ồn đường phố bằng cách bố trí công viên ở vị trí yên tĩnh, trồng cây đệm cách li cho khu vực chỗ ngồi trong công viên, sử dụng âm thanh tự nhiên (nước, gió thổi qua lá cây, v.v.)* - Offer some sub-areas that visitors can sit alone/ *Cung cấp một số khu vực phụ mà du khách có thể ngồi một mình*	
	Democratic/ ***Dân chủ***	- Governance: the city for the elderly is a city for all; Participation: the city for all is built with the participants with all people. / *Trong lĩnh vực quản trị: thành phố cho người cao tuổi là thành phố cho tất cả mọi người, Về vấn đề tham gia: thành phố dành cho mọi người được xây dựng với sự tham gia của mọi người* [10] - Mainstreaming: numerous ways to meet the needs and cover transversally different sectors of public body: town planning, housing, social and health services. Create a city for older people require a comprehensive approach/ *Có tính chất lồng ghép: Do nhiều tầng bậc tiếp cận để đáp ứng những nhu cầu người dân đối với các cơ quan nhà nước khác nhau như quy hoạch thị trấn, nhà ở, dịch vụ xã hội và y tế, nên khi thiết kế thành phố cho người lớn tuổi đòi hỏi một cách tiếp cận toàn diện* [10]. - Explicitly state what each outdoor community space is to be predomninanttly used for, avoid using wrong purpose of land use/ *Nêu rõ ràng mỗi không gian cộng đồng ngoài trời được sử dụng chủ yếu để làm gì, tránh việc sử dụng đất sai mục đích* - Is evaluated, redesigned, and improved over time/ *Được đánh giá, tái thiết kế, và nâng cấp sau một thời gian* - Is loved by those who use it and live or work nearby/ *Được người sử dụng và những người sống làm việc gần đó ưu thích*	

Proximity/ *Tính gần gũi*	**Accessibility**: Quickly, safely, and easily access/ ***Có thể tiếp cận được*** *: Nhanh chóng, an toàn và dễ dàng*	- Natural barriers such as small shrubs/ *Tạo hàng rào tự nhiên với những cây bụi nhỏ* - Ample handicapped parking with a discount for the seniors/ *Bãi đậu xe dành cho người tàn tật với những giảm giá đi kèm* - Walkable distance (recommended around 300m to an oasis or semi-public spaces in the walkway (e.g. using the outdoor lobby of public buildings with benches) so that the elderly can take a rest./ *Khoảng cách đi bộ (đề xuất trong bán kính 300m có 1 ốc đảo hay 1 nơi bán công cộng (sử dụng sảnh của công trình công cộng có bang ghế) để người lớn tuổi có thể nghỉ chân)* - Increase number of public spaces and semi-public spaces (outdoor lobby of commercial buildings, schools, religious buildings) (recommend: inner the radius of 900m of existing downtowns ~~in lacking POS cities as HCMC and Hanoi, Vietnam~~) / *Tăng số lượng không gian công cộng và bán công cộng (sảnh bên ngoài của các công trình thương mại, trường học, công trình tôn giáo) (đề xuất trong bán kính phục vụ 900m đối với khu trung tâm hiện hữu ~~trong những thành phố thiếu không gian xanh như TPHCM và Hà Nội~~)*	
	Control: have a good sense of orientation and understanding of the park's layout and its different offerings/ ***Kiểm soát****: giúp người sử dụng định được hướng và hiểu về các hoạt động cũng như bày trí công viên*	- Provide a visible sign at the entrance, way-finding signage to the parks and inside the parks, layout information/ map/ programs by flyers in many languages (including graphic and Braille) at the entrance and other areas inside the multifunctional and district parks (which are larger than 10 ha) / *Lối vào có bảng chỉ dẫn dễ thấy, bảng chỉ dẫn về hướng đi tới công viên và bên trong công viên được bố trí ở lối vào và một số khu vực khác trong công viên dưới dạng tờ rơi với nhiều ngôn ngữ khác nhau(cả đồ họa và chữ nổi) về thông tin phân khu công viên / bản đồ / chương trình. (cho công viên đa chức năng và công viên cấp quận diện tích lớn hơn 10 ha).* - Provide oriental features in large parks (> 10 ha) (e.g. a kiosk, a clock tower, a fountain, some boulders, etc.)/ *Cần một số công trình giúp định hướng ở những công viên lớn (hơn 10 ha) (như ki-ốt, tháp đồng hồ, đài phun nước, tảng đá, v.v.)* - Avoid the creation of dead-end paths/ *Tránh tạo ra những đường cụt.* - Provide educational and informational signs/ ~~other sensory cues (sound patterns, flower fragrances)~~ inside the parks/ *Bên trong công viên có những bảng hiệu mang tính chất giáo dục ~~hoặc thiết bị âm thanh phát âm thanh, mùi hương.~~*	
Design of POS/ *Thiết kế của không gian công cộng*	**Safety/security/** ***An toàn/ An ninh***	- Crime: Paths with clear lines of sight; avoidance of foliage that obstructs views; Good lighting; no dark or concealed areas/ *Vấn đề phòng chống tội phạm: Đường phố cần có tầm nhìn rõ ràng, tránh tán cây che lấp tầm nhìn; Đủ sáng; không có vùng tối hoặc bị che khuất* - Emergency phone boxes, Security technology (CCTV, emergency report systems) / *Bố trí trụ điện thoại khẩn cấp, công nghệ an ninh như camera giám sát, hệ thống báo cáo khẩn cấp.* - Community volunteers overseeing safety/ *Kêu gọi tình nguyện viên giám sát an toàn cho cộng đồng.* - Falls: Non-slippery, even paving surfaces; Flat or gently sloped paths; Handrails on-ramps, paths; Avoid stairs; ~~No skateboarding or cycling in the park, or only in designated areas;~~/ *Nguy cơ trượt ngã: bề mặt chống trượt, đường đi bằng phẳng hoặc dốc nhẹ, có tay vịn ở chỗ dốc và trên đường đi, tránh bậc thang, ~~không bố trí trượt ván hay đi xe đạp trong công viên, nếu có chỉ ở những nơi được thiết kế riêng.~~*	

	Contact with nature/ ***Tiếp xúc với thiên nhiên***	- The predominance of "softscapes" (plants, greenery) over "hardscapes" (concrete) (recommended ratio of 30% hardscape and 70% vegetation)/ *Sự chiếm ưu thế của "bề mặt mềm" (thực vật, cây xanh) so với "bề mặt cứng" (bê tông) (tỷ lệ được khuyến nghị là 30% bề mặt bê tông và 70% thảm thực vật)* - Mature trees for adequate shade/ *Bố trí cây cao cho bóng mát;* - Variety of plants and flowers, vegetables (different colors, fragrances, etc.). In small parks, arrange flowers in multi-level plant beds to save space. / *Trồng các loại cây và hoa, rau (màu sắc khác nhau, mùi thơm, v.v.). Trong các công viên nhỏ, bố trí hoa trong các luống cây nhiều tầng để tiết kiệm diện tích.* - Better maintenance regularly/ *Nâng cao việc bảo trì bảo dưỡng cây xanh thường xuyên* - Include calm or slowly moving water elements (such as small ponds, creeks, waterfalls)/ *Bao gồm cả các yếu tố mặt nước nhẹ nhàng êm ái (như hồ nhỏ, rãnh nước, thác nước,)* - Soothing and natural sounds (water, birds, breezes, wind chimes)/ *Bố trí âm thanh tự nhiên êm dịu (nước, tiếng chim hót, tiếng côn trùng, gió).* - Urban spaces as a setting for unthreatening wildlife (birds, butterflies, squirrels, ducks, etc.), prohibit hunting in city / *Thiết kế không gian công cộng không được đe dọa đến đời sống động thực vật hoang dã (chim chóc, bươm bướm, sóc, vịt, v.v., cấm săn bắt trong thành phố* - Provides opportunities for environmental learning / *Tạo ra cơ hội để tìm hiểu về môi trường*	
	Age-friendly, ergonomic design/ ***Thiết kế tiện dụng, thân thiện với người cao tuổi***	- Seating with ergonomic design, backs, and arms made from natural materials (resistant to high temperatures and rain); preferably wooden painted benches that allows a rapid drying, avoiding metal benches that are too cold or too hot / *Chỗ ngồi được thiết kế tiện dụng, lưng và tay ghế làm từ chất liệu tự nhiên (chịu được nhiệt độ cao và nước mưa); ưu tiên băng ghế bằng gỗ sơn màu để nhanh khô, tránh để băng ghế kim loại sẽ bị quá lạnh hoặc quá nóng* - Seating and pavement with contrasting colors (for compromised depth of field perception)/ *Chỗ ngồi và mặt đường có màu sắc tương phản (để giảm độ sâu trường ảnh);* - ~~Light, easily movable seats and tables~~*~~/ Bàn ghế nhẹ, dễ di chuyển;~~*	
	Physical activity/ ***Hoạt động vật lý***	- Paths of different lengths and levels of walking difficulty/ *Bố trí các con đường có độ dài khác nhau và mức độ khó đi bộ;* - Exercise equipment for different capacity levels/ *Bố trí các thiết bị tập thể dục với các mức công suất khác nhau;* - Low-impact exercise equipment away from heavy-traffic park areas/ *Bố trí các thiết bị tập thể dục cách xa khu vực công viên đông xe cộ;* - Grassy, flat area for group exercise classes and tai-chi/ *Thiết kế khu vực bằng phẳng trên cỏ cho các lớp tập thể dục theo nhóm và thái cực quyền;* - Organized physical activity classes for seniors for free/ *Tổ chức các lớp thể dục miễn phí cho người cao tuổi;* - Gardening opportunities for seniors by organizing small urban farm in neighborhood unit or in alleys and managed by the community/ *Tạo cơ hội cho người cao tuổi có thể làm vườn bằng cách tổ chức những khu vườn chung trong đơn vị ở được quản lí bởi cộng đồng sống xung quanh*	
	Choice: flexibility in park design and offering different choices/ ***Sự lựa chọn****: thiết kế linh hoạt và đa dạng*	- Offer opportunities for both passive recreation (people, performance and scenery-watch) and active recreation (direct contact to people, groups game, promenade, etc). / *Đem lại cơ hội thực hiện những hoạt động giải trí thụ động (như ngắm người, hoạt động và cảnh vật) và chủ động (tiếp xúc trực tiếp với người, hoạt động nhóm, đi dạo, v.v)* [15] - Provide a variety of seating options and spaces for a person alone, for small and larger groups in the shadow ~~or under the sun.~~/ *Cung cấp nhiều lựa chọn về chỗ ngồi và các loại không gian thích hợp cho nhiều người hoặc một người, cho các nhóm lớn nhỏ, trong bóng râm ~~hoặc dưới ánh nắng mặt trời.~~*	
	Aesthetic and sensory delight / ***Yếu***	- Sensory interesting features should be placed at shorter intervals/ *Các yếu tố mang lại sự thú vị nên được bố trí với khoảng cách ngắn hơn* - Screen or transform unpleasant views (e.g. a blank wall, an asphalt parking lot) through vegetation, mural painting, or art placement / *Dùng cây cối, tranh*	

	tố thẩm mỹ và thú vị	*tường hoặc nghệ thuật sắp đặt để làm giảm các góc xấu (ví dụ: che tầm nhìn vào bức tường trống, hoặc một bãi đậu xe)* ~~- Identify and use plants that have special meanings for particular cultural or ethnic groups that live in the park's vicinity/ *Xác định và sử dụng các loài thực vật có ý nghĩa đặc biệt đối với các nhóm văn hóa dân tộc sống xung quanh công viên.*~~ - Consider the installation of outdoor art pieces and fun and whimsical features in the park/ *Xem xét việc sắp đặt và thường xuyên thay đổi các tác phẩm nghệ thuật ngoài trời mang tính chất vui nhộn trong công viên*. - Includes opportunities for discovery, delight, and challenge (e.g. planned and controlled crafts fairs, concerts, flea market) / *Thiết kế nên các cơ hội khám phá, tận hưởng và thử thách cho người sử dụng (ví dụ: hội chợ hàng thủ công, buổi hòa nhạc, chợ trời được quy hoạch và quản lý),* - The small scale: the careful attention paid to the human landscape is offering good conditions to visitors — at eye level. The bird's eye view and helicopter perspective don't play much of a role here/ *Thiết kế theo tỉ lệ nhỏ: thiết kế ngang tầm mắt – cần quan tâm kỹ lưỡng đến việc thiết kế cảnh quan theo tỉ lệ và góc nhìn mắt người sẽ cuốn hút du khách. Thiết kế với góc nhìn chim bay không đóng góp nhiều vai trò trong việc thiết kế* [16]	
	Comfort/ *Sự thoải mái*	- Protection from Sun, Wind, Rain, and Glare: Place trees and vegetation strategically to protect from direct sunlight and minimize glare from the sun; Provide elements that can protect from the sun such as umbrellas, kiosks, etc.; Provide settings that offer overhead protection; In windy areas, orient parks or elements in the park to protect from prevailing winds; In hot climates, orient park in a way that allows cool breezes/ *Bảo vệ khỏi nắng, gió, mưa và chói mắt: Bố trí cây cối che ánh nắng trực tiếp và giảm thiểu chói nắng; Thiết kế các vật dụng có thể bảo vệ khỏi ánh nắng mặt trời như dù che, ki-ốt, v.v.; Cung cấp lắp đặt mái che; Trong khu vực có gió, thiết kế hướng công viên sao cho tránh gió giật dữ dội; Ở những nơi có khí hậu nóng, thiết kế hướng công viên đón gió mát,* - Encourage food stands in the park with well controlled food quality/ *Khuyến khích các quầy bán đồ ăn trong công viên với chất lượng thức ăn được kiểm tra kỹ.* - Not being disturbed by noise and odour, and dogs/ *Không bị ảnh hưởng bởi tiếng ồn và mùi khó chịu, và chó* - Places to sit without paying for goods and services; Seating provided by businesses/ *Không phải trả tiền cho các tiện ích trong công viên; Chỗ ngồi do doanh nghiệp tài trợ* [17]	
	Adequate public toilets/ *Bố trí đầy đủ nhà vệ sinh công cộng* [12]	- The availability of clean, conveniently located (near the walkways), handicap-accessible toilets, well-signed [12], information on the location of public toilets [10] / *Bố trí nhà vệ sinh sạch sẽ, vị trí thuận tiện (gần lối đi bộ), có biển báo, phù hợp cho người khuyết tật, thông tin về địa điểm của nhà vệ sinh công cộng* - Favoring public toilet models ~~self-cleaning or~~ made with materials easily washable/ *Ưa chuộng các mô hình nhà vệ sinh ~~tự làm sạch hoặc~~ làm bằng vật liệu dễ chùi rửa* - Avoid the toilets underground (difficult to access and sense of insecurity)/ *Tránh nhà vệ sinh ngầm (khó đi vào và cảm giác bất an).* - The provision of sufficient basic facilities with frequent maintenance / *Cung cấp đầy đủ các tiện nghi cơ bản được bảo trì thường xuyên*	
Neighbourhood characteristics/ *Đặc điểm khu vực xung quanh*	**Economic**: Contribute economic benefits to surrounding community/ ***Kinh tế**: Đóng góp lợi ích kinh tế cho cộng đồng xung quanh*	- Space as a place of work avoid un-used and unplanned spaces, Creates economic, property market price and functional custom, Dynamics of property price fluctuation, Perception of business attraction & stability / *Không gian là một nơi hoạt động, tránh những không gian không được sử dụng và quy hoạch, Tạo ra giá trị kinh tế, đóng góp cho kinh tế thị trường và có công năng sử dụng, biến đổi giá trị theo sự biến động thị trường, tạo sự thu hút đầu tư ổn định* [7] - Too little public space is a false economy, too much public space, a false luxury (recommended from 25 to 35% total area of quarter [8, p. 163] or 7-9 m2 per capita for a neighborhood unit [9]) / *Quá ít không gian công cộng không mang giá trị kinh tế, còn quá nhiều không gian công cộng là một sự*	

		xa xỉ (được khuyến nghị từ 25 đến 35% tổng diện tích hoặc 7-9 m2 trên đầu người cho một đơn vị ở). - Restrict the land use for park being used in wrong purpose / *Nghiêm cấm việc sử dụng đất công viên sai mục đích*	
	Connectivity / ***Tính kết nối***	- Creation of a continuous 'walking loop'- an unbroken network of pedestrian accessible public spaces and paths/ *Tạo 'đường vòng đi bộ' liên tục - mạng lưới không gian công cộng và lối đi dành cho người đi bộ không bị gián đoạn* - A good connectivity between public spaces: The footpaths are attractive, continuous and are intervene/ *Kết nối tốt giữa các không gian công cộng: Các lối đi bộ hấp dẫn, liền mạch và có sự xen kẽ* - Park placement near ~~facilities used by seniors (senior centers, churches, etc.) and~~ transit stops;/ *Vị trí công viên gần ~~các cơ sở mà người cao tuổi hay sử dụng (trung tâm dưỡng lão, nhà thờ, v.v.) và~~ các trạm xe công cộng;* - Create little oasis (benches, water, vegetation, adequate lighting, trash containers, shelters against sun, rain and wind and toilets), pleasant places to take a rest along pathways/ *Tạo ốc đảo nhỏ làm nơi nghỉ ngơi thư giãn dọc theo lối đi (như ghế dài, hồ nước, thảm thực vật, với ánh sáng đầy đủ, có thùng đựng rác, mái che nắng, mưa gió và nhà vệ sinh)* - Connect to the larger community both physically and programmatically through community events and activities that appeal to seniors (e.g. outdoor health clinic; yoga for seniors, farmers markets, etc.)/ *Kết nối rộng ra với cộng đồng thông qua các sự kiện và hoạt động thu hút người cao tuổi (ví dụ: phòng khám sức khỏe ngoài trời; yoga cho người cao tuổi, chợ nông sản, v.v.)* - Limited grade changes and flat or gently sloped ramps and pathways;/ *Đường đi bộ nên hạn chế thay đổi cao độ hoặc dốc nhẹ;* ~~- Locate shared patios (or other common or shared open space) for parties and barbecue areas next to interior community areas/ Tạo khoảng sân chung (hoặc không gian mở chung) để tổ chức tiệc và nướng thịt cạnh khu ở cộng đồng~~	
	Safe pedestrian crossings/ ***Việc băng qua đường an toàn***	- Safe crossings and signalized intersections with adequate times longer for the elderly to cross the street [10]; Visible and audible crosswalk signalling/ *Nơi qua đường an toàn và chỗ đường giao nhau có đèn báo hiệu với thời gian chờ lâu hơn cho người cao tuổi băng qua đường; Tín hiệu sang đường có thể nhìn thấy và nghe được* - Non-slip strips on pedestrian crossings, bridges, ~~and tunnels~~ to assist pedestrians to crossroads, / *Làn băng qua đường chống trượt, thiết kế cầu ~~và đường hầm~~ để hỗ trợ người đi bộ sang đường*	
	Age-friendly pavements/ ***Vỉa hè thân thiện người cao tuổi***	- A smooth, level, non-slip surface; sufficient width to accommodate wheelchairs; dropped curbs that taper off to be level with the road; clearance from obstructions such as street vendors, parked cars and motorcycles, and trees; and priority of access for pedestrians/ *Bề mặt vỉa hè nhẵn, phẳng, không trơn trượt; chiều rộng đủ cho xe lăn; lề đường bằng cao độ với mặt đường; giải tỏa các chướng ngại vật như người bán hàng rong, bãi đậu xe hơi xe máy trái phép và cây cối; và ưu tiên dành cho người đi bộ* [12]. - Streets should have character and reflect local identify, history, and culture. Utilising local art and architecture can help enhance distinct and unique character and identity/ *Đường phố phải có đặc điểm riêng và phản ánh bản sắc, lịch sử và văn hóa của địa phương. Sử dụng nghệ thuật và kiến trúc địa phương có thể giúp nâng cao bản sắc riêng biệt và độc đáo này*	

Thanks a lot for your time and consideration.
Xin chân thành cảm ơn ông bà đã dành thời gian làm khảo sát.

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D. Expert interview results

Question 1: Which design guidelines have you used when designing an urban park in Vietnam?

Interviewee 1	Interviewee 2
- The general function and functional zoning of the park are suitable for the urban area - Accessible - The design matches the local identity - Safety - Equity for all: children, teenagers, adolescents, middle-aged, the elderly, and the disabled - Improve facilities and amenities: sports equipment, playing equipment for kids and adults, trash bins, and toilets.	Refer to the Vietnam construction code and Design Standard as the followings: - QCVN 01:2019/BXD-National Technical Regulation Construction planning - QCVN 03:2012/BXD-National Technical Regulation on Rules of Classifications and Grading of Civil and Industrial Buildings and Urban Infrastructures - Circular 06/2021/TT-BXD providing Guidance Decree on Classifications and Management of Investment in Construction activities - QCVN 10:2014/BXD- National Technical Regulation on Construction for Disabled Acess to Buildings and Facilities - QCVN 07:2016/BXD- National Technical Regulation on The Technical Infrastructure works - TCVN 9257:2012-Greenery planning for public utilities in urban areas-Design standards In case there are some unspecified items in parks, the documents can be referred to as: - Other National Technical regulations are in the reference list of the mentioned document above. - Other Design standards are still valid that can be referred to the Ministry of Construction or Department of Construction - Foreign design standards (suggested by the Vietnam Ministry of Construction) meet the requirement in Decree 15/2021/NĐ-CP.

Question 2: How many design guidelines are for the parks in Vietnam, if possible?

- Interviewee 1: TCVN9257-2012, QCVN 01:2019/BXD
- Interviewee 2: Listed above

Question 3: According to your experience, how is the process of designing a park in Vietnam in a landscape company?

Interviewee 1	Interviewee 2
- Understand the need of users (usually the investors) to create design objectives and tasks. - Site survey - Design idea - Functionalize the site - Concept design - Develop construction design document	- Receive requirements and tasks from the investors - Survey - Research for ideas → report → choose the best option (with types of plants that match the local climate, wind and sun direction, the orientation of the site in Fengshui, or landmark aspects. The valuable landmarks should be kept or preserved as the heritage of the place - Finish design ideas → report → choose the best option - The legal and technical design, including preliminary and technical design (if any) and construction drawings (referred to Decree 59/2015/ND-CP). During the design process, the design can be adjusted to fit the new data and the reality. - Author supervision during the construction - Acceptance

Question 4: Expert's comments on synthesis design guidelines

Interviewee 1:

- Accessibility: Organize traffic and convenient access for disabled people and the elderly: appropriate heights, ramps, and elevators (if necessary)

- Control: separate each functional zones and reduce overlapping; e.g., quiet zones should not have any trading activities
- Economic: Increase the quality of urban space, thereby increasing the economic value of urban living areas
- Connectivity:
  - Internal roads are easy to orient, avoiding cul-de-sacs.
  - Organizing at least one main road to all functional zones in the park is necessary.
  - The park may have a path for cyclists and boaters (depending on the park's function). It is necessary to arrange appropriate types of traffic to avoid conflicts.
- Privacy: This criterion depends on the type and function zones of the park.
- Democracy: The park serves all, no matter their ages or social-economic conditions.
- Safety and security: When the park has many "attractive" functions for use, it will "attract" many people to the park. People can use a park at different times of the day is "safe." Criminals often avoid crowded places.
- Contact with nature: three levels of trees in the park: shade trees, shrubs, and grass.
- Aesthetics and sensory delight factors are hard to define.
- Adequate public toilets: Plants and shrubs create a green fence for restrooms. Need a solution to deal with odors and maintain hygiene

Interviewee 2:

- Accessibility: It is effective when increasing green areas in urban districts of HCMC along traffic routes (sidewalks combined with green regions). It increases the proximity and interaction within the community and physical activities. However, the challenges of this option are the small business characteristics, the unmanaged "sticking to the road" job (e.g., vendors), and the awareness of the importance of greenery value. Regarding sub-urban districts, a centralized park as a criterion in design guidelines is enough (of course, plants on the sidewalks still need proper attention). The existing urban districts have no land to build a centralized park, or the current park is too far away. Therefore, the guidelines for increasing urban space are not feasible.
- Control: In addition to the orientation in the park, the users also need a unique landmark, a particular icon, to create an "identity" for that park.
- Economic: Agree. Some parks currently have somewhat blurred landmarks. Alternatively, the whole park does not have a focal point. There is no linear to the landmark or highlight a specific local theme of the entire park. The current park situation has green areas with a few yards, fountains, and a few food and beverage places. It is not good. It feels like the park has not been "lived." Arranging landscape highlights alternately and opening and closing paths appropriately is necessary to create an exciting emotion. It can have small trading activities with appropriate density.

<u>Question 5: Expert's comments on new design guidelines that match the needs of the elderly in HCMC, Vietnam</u>

Interviewee 1:

- Social support: Arrange reading areas or clubs for the elderly: nursing, ornamental birds, and pets.
- Functional: The location of the park in the city needs to be far from the main roads of the city (preferably located in the middle of the residential area)
- Democratic: The design plan needs to consult the community before the management agency approves it

- Safety & Security: It will be challenging to satisfy both criteria: against noise (planting isolated trees) and having to be safe with good visibility

Interviewee 2: No comment

Question 6: Evaluation of the experts on the design guidelines matching the needs of the elderly

- **Interviewee 1:** The ability to apply those guidelines to Vietnam in practice: 50% good, 50% excellent
- **Interviewee 2:** The flexibility of these guidelines to apply to similar cities in Vietnam? 50% good, 50% excellent

E. Statistics result

1. Cronbach's Alpha test result

Reliability Statistics

Cronbach's Alpha	Cronbach's Alpha Based on Standardized Items	N of Items
.770	.787	11

Item-Total Statistics

	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item-Total Correlation	Squared Multiple Correlation	Cronbach's Alpha if Item Deleted
Greenery	34.33	33.066	.478	.552	.745
Relaxing equipment	35.45	33.269	.378	.694	.760
Sport equipment	35.16	33.818	.584	.499	.737
Decoration	35.12	35.792	.446	.509	.753
Toilet	35.28	40.554	-.092	.263	.805
Cleanliness	34.98	30.508	.508	.371	.742
Safety & Security	34.90	30.972	.471	.387	.748
Lighting	35.26	34.827	.372	.707	.758
Food&Beverage	34.67	32.505	.616	.733	.730
Senior's activities	35.00	35.404	.554	.668	.746
Non-senior's activities	35.21	34.623	.538	.616	.743

2. Cross-tabulations of Hypotheses tests

Visit Frequency * Distance to POS Cross-tabulation

			Distance to POS				
			<300m	300-600m	600-1000m	>1000m	Total
Visit Frequency	Rarely	Count	72	9	2	3	86
		Expected Count	52.6	12.9	11.9	8.5	86.0
		% of Total	20.4%	2.5%	0.6%	0.8%	24.4%
	Often	Count	144	44	47	32	267
		Expected Count	163.4	40.1	37.1	26.5	267.0
		% of Total	40.8%	12.5%	13.3%	9.1%	75.6%
Total		Count	216	53	49	35	353
		Expected Count	216.0	53.0	49.0	35.0	353.0
		% of Total	61.2%	15.0%	13.9%	9.9%	100.0%

Visit Frequency * Travel time Cross-tabulation

			Travel time			
			< 15 minutes	15 - 30 minutes	30 - 60 minutes	Total
Visit Frequency	Rarely	Count	5	2	0	7
		Expected Count	5.7	1.2	.1	7.0
		% of Total	1.9%	0.8%	0.0%	2.7%
	Often	Count	209	41	4	254
		Expected Count	208.3	41.8	3.9	254.0
		% of Total	80.1%	15.7%	1.5%	97.3%
Total		Count	214	43	4	261
		Expected Count	214.0	43.0	4.0	261.0
		% of Total	82.0%	16.5%	1.5%	100.0%

Visit Frequency * Micro-climate Cross-tabulation

			Micro-climate			
			Agree	Neutral	Somewhat disagree	Total
Visit Frequency	Rarely	Count	14	15	49	78
		Expected Count	25.9	16.5	35.6	78.0
		% of Total	4.2%	4.5%	14.8%	23.6%
	Often	Count	96	55	102	253
		Expected Count	84.1	53.5	115.4	253.0
		% of Total	29.0%	16.6%	30.8%	76.4%
Total		Count	110	70	151	331
		Expected Count	110.0	70.0	151.0	331.0
		% of Total	33.2%	21.1%	45.6%	100.0%

Visit Frequency * Trip to POS Cross-tabulation

			Trip to POS			
			Good	Neutral	Not good	Total
Visit Frequency	Rarely	Count	1	4	2	7
		Expected Count	2.0	2.4	2.5	7.0
		% of Total	0.4%	1.6%	0.8%	2.8%
	Often	Count	73	84	89	246
		Expected Count	72.0	85.6	88.5	246.0
		% of Total	28.9%	33.2%	35.2%	97.2%
Total		Count	74	88	91	253
		Expected Count	74.0	88.0	91.0	253.0
		% of Total	29.2%	34.8%	36.0%	100.0%

Visit Frequency * Proximity Cross-tabulation

			Proximity			
			Good	Neutral	Bad	Total
Visit Frequency	Rarely	Count	38	18	25	81
		Expected Count	30.6	23.8	26.7	81.0
		% of Total	11.4%	5.4%	7.5%	24.3%
	Often	Count	88	80	85	253
		Expected Count	95.4	74.2	83.3	253.0
		% of Total	26.3%	24.0%	25.4%	75.7%
Total		Count	126	98	110	334
		Expected Count	126.0	98.0	110.0	334.0
		% of Total	37.7%	29.3%	32.9%	100.0%

Visit Frequency * Resident location Cross-tabulation

			Resident location		
			CBD	NON-CBD	Total
Visit Frequency	Rarely	Count	35	51	86
		Expected Count	38.7	47.3	86.0
		% of Total	9.9%	14.4%	24.4%
	Often	Count	124	143	267
		Expected Count	120.3	146.7	267.0
		% of Total	35.1%	40.5%	75.6%
Total		Count	159	194	353
		Expected Count	159.0	194.0	353.0
		% of Total	45.0%	55.0%	100.0%

Visit Frequency * Age Cross-tabulation

			Age				
			60-64	65-69	70-74	75 and above	Total
Visit Frequency	Rarely	Count	27	33	19	7	86
		Expected Count	23.4	26.3	22.4	13.9	86.0
		% of Total	7.6%	9.3%	5.4%	2.0%	24.4%
	Often	Count	69	75	73	50	267
		Expected Count	72.6	81.7	69.6	43.1	267.0
		% of Total	19.5%	21.2%	20.7%	14.2%	75.6%
Total		Count	96	108	92	57	353
		Expected Count	96.0	108.0	92.0	57.0	353.0
		% of Total	27.2%	30.6%	26.1%	16.1%	100.0%

Visit Frequency * Gender Cross-tabulation

			Gender		Total

			Male	Female	
Visit Frequency	Rarely	Count	50	36	86
		Expected Count	44.3	41.7	86.0
		% of Total	14.2%	10.2%	24.4%
	Often	Count	132	135	267
		Expected Count	137.7	129.3	267.0
		% of Total	37.4%	38.2%	75.6%
Total		Count	182	171	353
		Expected Count	182.0	171.0	353.0
		% of Total	51.6%	48.4%	100.0%

Visit Frequency * Health Cross-tabulation

			Health					
			Very bad	Bad	Normal	Good	Very good	Total
Visit Frequency	Rarely	Count	2	10	31	18	25	86
		Expected Count	4.9	14.4	31.4	15.6	19.7	86.0
		% of Total	0.6%	2.8%	8.8%	5.1%	7.1%	24.4%
	Often	Count	18	49	98	46	56	267
		Expected Count	15.1	44.6	97.6	48.4	61.3	267.0
		% of Total	5.1%	13.9%	27.8%	13.0%	15.9%	75.6%
Total		Count	20	59	129	64	81	353
		Expected Count	20.0	59.0	129.0	64.0	81.0	353.0
		% of Total	5.7%	16.7%	36.5%	18.1%	22.9%	100.0%

Visit Frequency * Income Cross-tabulation

			Income			
			<4 Mils VND	4 to 10 Mils VND	>10 Mils VND	Total
Visit Frequency	Rarely	Count	34	36	16	86
		Expected Count	34.8	39.7	11.5	86.0
		% of Total	9.6%	10.2%	4.5%	24.4%
	Often	Count	109	127	31	267
		Expected Count	108.2	123.3	35.5	267.0
		% of Total	30.9%	36.0%	8.8%	75.6%
Total		Count	143	163	47	353
		Expected Count	143.0	163.0	47.0	353.0
		% of Total	40.5%	46.2%	13.3%	100.0%

Visit Frequency * Caring Responsibility Cross-tabulation

			Caring Responsibility		
			Self-caring	Caring others	Total
Visit Frequency	Rarely	Count	25	61	86

		Expected Count	33.6	52.4	86.0
		% of Total	7.1%	17.3%	24.4%
	Often	Count	113	154	267
		Expected Count	104.4	162.6	267.0
		% of Total	32.0%	43.6%	75.6%
Total		Count	138	215	353
		Expected Count	138.0	215.0	353.0
		% of Total	39.1%	60.9%	100.0%

Visit Frequency * Living Arrangement Cross-tabulation

			Living Arrangement		
			Alone	With family	Total
Visit Frequency	Rarely	Count	1	85	86
		Expected Count	2.4	83.6	86.0
		% of Total	0.3%	24.1%	24.4%
	Often	Count	9	258	267
		Expected Count	7.6	259.4	267.0
		% of Total	2.5%	73.1%	75.6%
Total		Count	10	343	353
		Expected Count	10.0	343.0	353.0
		% of Total	2.8%	97.2%	100.0%

Visit Frequency * Previous job Cross-tabulation

			Previous job			
			Working in crowded environment	Working in natural environment (farmers, garderners...)	Working in less people environment	Total
Visit Frequency	Rarely	Count	61	1	24	86
		Expected Count	58.2	3.4	24.4	86.0
		% of Total	17.3%	0.3%	6.8%	24.4%
	Often	Count	178	13	76	267
		Expected Count	180.8	10.6	75.6	267.0
		% of Total	50.4%	3.7%	21.5%	75.6%
Total		Count	239	14	100	353
		Expected Count	239.0	14.0	100.0	353.0
		% of Total	67.7%	4.0%	28.3%	100.0%

Visit Frequency * Current job Cross-tabulation

			Current job	Total

			Retirement	Continue working	Start new work	
Visit Frequency	Rarely	Count	37	39	10	86
		Expected Count	51.6	24.8	9.5	86.0
		% of Total	10.5%	11.0%	2.8%	24.4%
	Often	Count	175	63	29	267
		Expected Count	160.4	77.2	29.5	267.0
		% of Total	49.6%	17.8%	8.2%	75.6%
Total		Count	212	102	39	353
		Expected Count	212.0	102.0	39.0	353.0
		% of Total	60.1%	28.9%	11.0%	100.0%

Visit Frequency * Greenery Cross-tabulation

			Greenery					
			Very good	Good	Neutral	Not good	Bad	Total
Visit Frequency	Rarely	Count	5	17	20	12	24	78
		Expected Count	7.2	15.4	21.1	9.8	24.5	78.0
		% of Total	1.5%	5.2%	6.2%	3.7%	7.4%	24.0%
	Often	Count	25	47	68	29	78	247
		Expected Count	22.8	48.6	66.9	31.2	77.5	247.0
		% of Total	7.7%	14.5%	20.9%	8.9%	24.0%	76.0%
Total		Count	30	64	88	41	102	325
		Expected Count	30.0	64.0	88.0	41.0	102.0	325.0
		% of Total	9.2%	19.7%	27.1%	12.6%	31.4%	100.0%

Visit Frequency * Relaxing equipment Cross-tabulation

			Relaxing equipment			
			Good	Neutral	Not good	Total
Visit Frequency	Rarely	Count	4	4	1	9
		Expected Count	2.5	2.5	4.0	9.0
		% of Total	1.6%	1.6%	0.4%	3.6%
	Often	Count	67	65	110	242
		Expected Count	68.5	66.5	107.0	242.0
		% of Total	26.7%	25.9%	43.8%	96.4%
Total		Count	71	69	111	251
		Expected Count	71.0	69.0	111.0	251.0
		% of Total	28.3%	27.5%	44.2%	100.0%

Visit Frequency * Sport equipment Cross-tabulation

			Sport equipment			
			Good	Neutral	Not good	Total
Visit Frequency	Rarely	Count	21	15	40	76

		Expected Count	24.5	17.0	34.5	76.0
		% of Total	7.2%	5.2%	13.7%	26.1%
	Often	Count	73	50	92	215
		Expected Count	69.5	48.0	97.5	215.0
		% of Total	25.1%	17.2%	31.6%	73.9%
Total		Count	94	65	132	291
		Expected Count	94.0	65.0	132.0	291.0
		% of Total	32.3%	22.3%	45.4%	100.0%

Visit Frequency * Decoration Cross-tabulation

			Decoration			
			Good	Neutral	Not good	Total
Visit Frequency	Rarely	Count	16	21	39	76
		Expected Count	10.1	30.7	35.2	76.0
		% of Total	5.3%	7.0%	12.9%	25.2%
	Often	Count	24	101	101	226
		Expected Count	29.9	91.3	104.8	226.0
		% of Total	7.9%	33.4%	33.4%	74.8%
Total		Count	40	122	140	302
		Expected Count	40.0	122.0	140.0	302.0
		% of Total	13.2%	40.4%	46.4%	100.0%

Visit Frequency * Toilet Cross-tabulation

			Toilet			
			Good	Neutral	Not good	Total
Visit Frequency	Rarely	Count	0	5	2	7
		Expected Count	1.4	1.8	3.8	7.0
		% of Total	0.0%	2.3%	0.9%	3.3%
	Often	Count	44	50	114	208
		Expected Count	42.6	53.2	112.2	208.0
		% of Total	20.5%	23.3%	53.0%	96.7%
Total		Count	44	55	116	215
		Expected Count	44.0	55.0	116.0	215.0
		% of Total	20.5%	25.6%	54.0%	100.0%

Visit Frequency * Cleanliness Cross-tabulation

			Cleanliness					
			Very good	Good	Neutral	Not good	Bad	Total
Visit Frequency	Rarely	Count	9	11	13	23	23	79
		Expected Count	10.6	15.6	22.0	11.1	19.8	79.0
		% of Total	2.8%	3.4%	4.1%	7.2%	7.2%	24.7%

	Often	Count	34	52	76	22	57	241
		Expected Count	32.4	47.4	67.0	33.9	60.3	241.0
		% of Total	10.6%	16.3%	23.8%	6.9%	17.8%	75.3%
Total		Count	43	63	89	45	80	320
		Expected Count	43.0	63.0	89.0	45.0	80.0	320.0
		% of Total	13.4%	19.7%	27.8%	14.1%	25.0%	100.0%

Visit Frequency * Safety & Security Cross-tabulation

			Safety & Security					
			Very good	Good	Neutral	Not good	Bad	Total
Visit Frequency	Rarely	Count	8	10	19	21	20	78
		Expected Count	11.3	15.0	15.5	16.2	20.0	78.0
		% of Total	2.5%	3.1%	5.9%	6.5%	6.2%	24.1%
	Often	Count	39	52	45	46	63	245
		Expected Count	35.7	47.0	48.5	50.8	63.0	245.0
		% of Total	12.1%	16.1%	13.9%	14.2%	19.5%	75.9%
Total		Count	47	62	64	67	83	323
		Expected Count	47.0	62.0	64.0	67.0	83.0	323.0
		% of Total	14.6%	19.2%	19.8%	20.7%	25.7%	100.0%

Visit Frequency * Lighting Cross-tabulation

			Lighting			
			Good	Neutral	Not good	Total
Visit Frequency	Rarely	Count	1	6	0	7
		Expected Count	1.2	2.9	2.9	7.0
		% of Total	0.4%	2.5%	0.0%	2.9%
	Often	Count	42	94	99	235
		Expected Count	41.8	97.1	96.1	235.0
		% of Total	17.4%	38.8%	40.9%	97.1%
Total		Count	43	100	99	242
		Expected Count	43.0	100.0	99.0	242.0
		% of Total	17.8%	41.3%	40.9%	100.0%

Visit Frequency * Food&Beverage Cross-tabulation

			Food&Beverage			
			Good	Neutral	Not good	Total
Visit Frequency	Rarely	Count	0	1	0	1
		Expected Count	.1	.4	.6	1.0
		% of Total	0.0%	0.7%	0.0%	0.7%
	Often	Count	8	50	83	141
		Expected Count	7.9	50.6	82.4	141.0

		% of Total	5.6%	35.2%	58.5%	99.3%
Total		Count	8	51	83	142
		Expected Count	8.0	51.0	83.0	142.0
		% of Total	5.6%	35.9%	58.5%	100.0%

Visit Frequency * Senior's activities Cross-tabulation

			Senior's activities			
			Not good	Neutral	Good	Total
Visit Frequency	Rarely	Count	19	17	41	77
		Expected Count	14.2	26.8	36.0	77.0
		% of Total	6.3%	5.6%	13.5%	25.3%
	Often	Count	37	89	101	227
		Expected Count	41.8	79.2	106.0	227.0
		% of Total	12.2%	29.3%	33.2%	74.7%
Total		Count	56	106	142	304
		Expected Count	56.0	106.0	142.0	304.0
		% of Total	18.4%	34.9%	46.7%	100.0%

Visit Frequency * Non-senior's activities Cross-tabulation

			Non-senior's activities			
			Not good	Neutral	Good	Total
Visit Frequency	Rarely	Count	19	15	41	75
		Expected Count	11.2	32.3	31.6	75.0
		% of Total	6.0%	4.7%	13.0%	23.7%
	Often	Count	28	121	92	241
		Expected Count	35.8	103.7	101.4	241.0
		% of Total	8.9%	38.3%	29.1%	76.3%
Total		Count	47	136	133	316
		Expected Count	47.0	136.0	133.0	316.0
		% of Total	14.9%	43.0%	42.1%	100.0%

Time spent * Distance to POS Cross-tabulation

			Distance to POS				
			<300m	300-600m	600-1000m	>1000m	Total
Time spent	< 30 minutes	Count	24	6	4	2	36
		Expected Count	19.5	5.9	6.3	4.3	36.0
		% of Total	9.0%	2.2%	1.5%	0.7%	13.4%
	30-60 minutes	Count	76	16	28	18	138
		Expected Count	74.7	22.7	24.2	16.5	138.0
		% of Total	28.4%	6.0%	10.4%	6.7%	51.5%
	>60 minutes	Count	45	22	15	12	94

		Expected Count	50.9	15.4	16.5	11.2	94.0
		% of Total	16.8%	8.2%	5.6%	4.5%	35.1%
Total		Count	145	44	47	32	268
		Expected Count	145.0	44.0	47.0	32.0	268.0
		% of Total	54.1%	16.4%	17.5%	11.9%	100.0%

Time spent * Travel time Cross-tabulation

			Travel time			
			< 15 minutes	15 - 30 minutes	30 - 60 minutes	Total
Time spent	< 30 minutes	Count	24	4	1	29
		Expected Count	23.9	4.7	.5	29.0
		% of Total	9.4%	1.6%	0.4%	11.4%
	30-60 minutes	Count	114	17	1	132
		Expected Count	108.7	21.2	2.1	132.0
		% of Total	44.7%	6.7%	0.4%	51.8%
	>60 minutes	Count	72	20	2	94
		Expected Count	77.4	15.1	1.5	94.0
		% of Total	28.2%	7.8%	0.8%	36.9%
Total		Count	210	41	4	255
		Expected Count	210.0	41.0	4.0	255.0
		% of Total	82.4%	16.1%	1.6%	100.0%

Time spent * Micro-climate Cross-tabulation

			Micro-climate			
			Agree	Neutral	Somewhat disagree	Total
Time spent	< 30 minutes	Count	15	11	7	33
		Expected Count	12.6	7.1	13.3	33.0
		% of Total	5.9%	4.3%	2.8%	13.0%
	30-60 minutes	Count	52	27	53	132
		Expected Count	50.4	28.6	53.0	132.0
		% of Total	20.5%	10.6%	20.9%	52.0%
	>60 minutes	Count	30	17	42	89
		Expected Count	34.0	19.3	35.7	89.0
		% of Total	11.8%	6.7%	16.5%	35.0%
Total		Count	97	55	102	254
		Expected Count	97.0	55.0	102.0	254.0
		% of Total	38.2%	21.7%	40.2%	100.0%

Time spent * Trip to POS Cross-tabulation

			Trip to POS	Total

			Good	Neutral	Not good	
Time spent	< 30 minutes	Count	12	11	9	32
		Expected Count	9.5	11.0	11.5	32.0
		% of Total	4.9%	4.5%	3.6%	13.0%
	30-60 minutes	Count	44	47	38	129
		Expected Count	38.1	44.4	46.5	129.0
		% of Total	17.8%	19.0%	15.4%	52.2%
	>60 minutes	Count	17	27	42	86
		Expected Count	25.4	29.6	31.0	86.0
		% of Total	6.9%	10.9%	17.0%	34.8%
Total		Count	73	85	89	247
		Expected Count	73.0	85.0	89.0	247.0
		% of Total	29.6%	34.4%	36.0%	100.0%

Time spent * Proximity Cross-tabulation

			Proximity			
			Good	Neutral	Bad	Total
Time spent	< 30 minutes	Count	19	6	5	30
		Expected Count	10.4	9.6	10.0	30.0
		% of Total	7.5%	2.4%	2.0%	11.8%
	30-60 minutes	Count	49	40	44	133
		Expected Count	46.1	42.4	44.5	133.0
		% of Total	19.3%	15.7%	17.3%	52.4%
	>60 minutes	Count	20	35	36	91
		Expected Count	31.5	29.0	30.5	91.0
		% of Total	7.9%	13.8%	14.2%	35.8%
Total		Count	88	81	85	254
		Expected Count	88.0	81.0	85.0	254.0
		% of Total	34.6%	31.9%	33.5%	100.0%

Time spent * Resident location Cross-tabulation

			Resident location		
			CBD	NON-CBD	Total
Time spent	< 30 minutes	Count	22	14	36
		Expected Count	16.7	19.3	36.0
		% of Total	8.2%	5.2%	13.4%
	30-60 minutes	Count	63	75	138
		Expected Count	63.9	74.1	138.0
		% of Total	23.5%	28.0%	51.5%
	>60 minutes	Count	39	55	94
		Expected Count	43.5	50.5	94.0

	% of Total	14.6%	20.5%	35.1%
Total	Count	124	144	268
	Expected Count	124.0	144.0	268.0
	% of Total	46.3%	53.7%	100.0%

Time spent * Age Cross-tabulation

			Age				
			60-64	65-69	70-74	75 and above	Total
Time spent	< 30 minutes	Count	12	10	5	9	36
		Expected Count	9.4	10.1	9.8	6.7	36.0
		% of Total	4.5%	3.7%	1.9%	3.4%	13.4%
	30-60 minutes	Count	37	41	44	16	138
		Expected Count	36.0	38.6	37.6	25.7	138.0
		% of Total	13.8%	15.3%	16.4%	6.0%	51.5%
	>60 minutes	Count	21	24	24	25	94
		Expected Count	24.6	26.3	25.6	17.5	94.0
		% of Total	7.8%	9.0%	9.0%	9.3%	35.1%
Total		Count	70	75	73	50	268
		Expected Count	70.0	75.0	73.0	50.0	268.0
		% of Total	26.1%	28.0%	27.2%	18.7%	100.0%

Time spent * Gender Cross-tabulation

			Gender		
			Male	Female	Total
Time spent	< 30 minutes	Count	16	20	36
		Expected Count	17.9	18.1	36.0
		% of Total	6.0%	7.5%	13.4%
	30-60 minutes	Count	62	76	138
		Expected Count	68.5	69.5	138.0
		% of Total	23.1%	28.4%	51.5%
	>60 minutes	Count	55	39	94
		Expected Count	46.6	47.4	94.0
		% of Total	20.5%	14.6%	35.1%
Total		Count	133	135	268
		Expected Count	133.0	135.0	268.0
		% of Total	49.6%	50.4%	100.0%

Time spent * Health Cross-tabulation

			Health					
			Very bad	Bad	Normal	Good	Very good	Total
Time spent	< 30 minutes	Count	2	10	17	4	3	36

		Expected Count	2.4	6.7	13.2	6.2	7.5	36.0
		% of Total	0.7%	3.7%	6.3%	1.5%	1.1%	13.4%
	30-60 minutes	Count	5	25	55	20	33	138
		Expected Count	9.3	25.7	50.5	23.7	28.8	138.0
		% of Total	1.9%	9.3%	20.5%	7.5%	12.3%	51.5%
	>60 minutes	Count	11	15	26	22	20	94
		Expected Count	6.3	17.5	34.4	16.1	19.6	94.0
		% of Total	4.1%	5.6%	9.7%	8.2%	7.5%	35.1%
Total		Count	18	50	98	46	56	268
		Expected Count	18.0	50.0	98.0	46.0	56.0	268.0
		% of Total	6.7%	18.7%	36.6%	17.2%	20.9%	100.0%

Time spent * Income Cross-tabulation

			Income			
			<4 Mils VND	4 to 10 Mils VND	>10 Mils VND	Total
Time spent	< 30 minutes	Count	16	17	3	36
		Expected Count	14.6	17.2	4.2	36.0
		% of Total	6.0%	6.3%	1.1%	13.4%
	30-60 minutes	Count	53	67	18	138
		Expected Count	56.1	65.9	16.0	138.0
		% of Total	19.8%	25.0%	6.7%	51.5%
	>60 minutes	Count	40	44	10	94
		Expected Count	38.2	44.9	10.9	94.0
		% of Total	14.9%	16.4%	3.7%	35.1%
Total		Count	109	128	31	268
		Expected Count	109.0	128.0	31.0	268.0
		% of Total	40.7%	47.8%	11.6%	100.0%

Time spent * Caring Responsibility Cross-tabulation

			Caring Responsibility		
			Self-caring	Caring others	Total
Time spent	< 30 minutes	Count	21	15	36
		Expected Count	15.2	20.8	36.0
		% of Total	7.8%	5.6%	13.4%
	30-60 minutes	Count	55	83	138
		Expected Count	58.2	79.8	138.0
		% of Total	20.5%	31.0%	51.5%
	>60 minutes	Count	37	57	94
		Expected Count	39.6	54.4	94.0
		% of Total	13.8%	21.3%	35.1%
Total		Count	113	155	268

	Expected Count	113.0	155.0	268.0
	% of Total	42.2%	57.8%	100.0%

Time spent * Living Arrangement Cross-tabulation

			Living Arrangement		
			Alone	With family	Total
Time spent	< 30 minutes	Count	3	33	36
		Expected Count	1.2	34.8	36.0
		% of Total	1.1%	12.3%	13.4%
	30-60 minutes	Count	3	135	138
		Expected Count	4.6	133.4	138.0
		% of Total	1.1%	50.4%	51.5%
	>60 minutes	Count	3	91	94
		Expected Count	3.2	90.8	94.0
		% of Total	1.1%	34.0%	35.1%
Total		Count	9	259	268
		Expected Count	9.0	259.0	268.0
		% of Total	3.4%	96.6%	100.0%

Time spent * Previous job Cross-tabulation

			Previous job			
			Working in crowded environment	Working in natural environment (farmers, garderners...)	Working in less people environment	Total
Time spent	< 30 minutes	Count	26	1	9	36
		Expected Count	24.0	1.7	10.2	36.0
		% of Total	9.7%	0.4%	3.4%	13.4%
	30-60 minutes	Count	94	4	40	138
		Expected Count	92.2	6.7	39.1	138.0
		% of Total	35.1%	1.5%	14.9%	51.5%
	>60 minutes	Count	59	8	27	94
		Expected Count	62.8	4.6	26.7	94.0
		% of Total	22.0%	3.0%	10.1%	35.1%
Total		Count	179	13	76	268
		Expected Count	179.0	13.0	76.0	268.0
		% of Total	66.8%	4.9%	28.4%	100.0%

Time spent * Current job Cross-tabulation

	Current job	Total

			Retirement	Continue working	Start new work	
Time spent	< 30 minutes	Count	22	6	8	36
		Expected Count	23.6	8.5	3.9	36.0
		% of Total	8.2%	2.2%	3.0%	13.4%
	30-60 minutes	Count	89	40	9	138
		Expected Count	90.6	32.4	14.9	138.0
		% of Total	33.2%	14.9%	3.4%	51.5%
	>60 minutes	Count	65	17	12	94
		Expected Count	61.7	22.1	10.2	94.0
		% of Total	24.3%	6.3%	4.5%	35.1%
Total		Count	176	63	29	268
		Expected Count	176.0	63.0	29.0	268.0
		% of Total	65.7%	23.5%	10.8%	100.0%

Time spent * Greenery Cross-tabulation

			Greenery					
			Very good	Good	Neutral	Not good	Bad	Total
Time spent	< 30 minutes	Count	5	3	14	6	1	29
		Expected Count	2.9	5.5	8.1	3.4	9.1	29.0
		% of Total	2.0%	1.2%	5.6%	2.4%	0.4%	11.7%
	30-60 minutes	Count	8	30	40	9	45	132
		Expected Count	13.3	25.0	36.7	15.4	41.5	132.0
		% of Total	3.2%	12.1%	16.1%	3.6%	18.1%	53.2%
	>60 minutes	Count	12	14	15	14	32	87
		Expected Count	8.8	16.5	24.2	10.2	27.4	87.0
		% of Total	4.8%	5.6%	6.0%	5.6%	12.9%	35.1%
Total		Count	25	47	69	29	78	248
		Expected Count	25.0	47.0	69.0	29.0	78.0	248.0
		% of Total	10.1%	19.0%	27.8%	11.7%	31.5%	100.0%

Time spent * Relaxing equipment Cross-tabulation

			Relaxing equipment			
			Good	Neutral	Not good	Total
Time spent	< 30 minutes	Count	8	13	4	25
		Expected Count	7.0	6.7	11.3	25.0
		% of Total	3.3%	5.3%	1.6%	10.3%
	30-60 minutes	Count	37	39	55	131
		Expected Count	36.7	35.0	59.3	131.0
		% of Total	15.2%	16.0%	22.6%	53.9%
	>60 minutes	Count	23	13	51	87

		Expected Count	24.3	23.3	39.4	87.0
		% of Total	9.5%	5.3%	21.0%	35.8%
Total		Count	68	65	110	243
		Expected Count	68.0	65.0	110.0	243.0
		% of Total	28.0%	26.7%	45.3%	100.0%

Time spent * Sport equipment Cross-tabulation

			Sport equipment			
			Good	Neutral	Not good	Total
Time spent	< 30 minutes	Count	3	4	8	15
		Expected Count	5.1	3.5	6.4	15.0
		% of Total	1.4%	1.9%	3.7%	7.0%
	30-60 minutes	Count	45	33	42	120
		Expected Count	40.7	27.9	51.3	120.0
		% of Total	20.9%	15.3%	19.5%	55.8%
	>60 minutes	Count	25	13	42	80
		Expected Count	27.2	18.6	34.2	80.0
		% of Total	11.6%	6.0%	19.5%	37.2%
Total		Count	73	50	92	215
		Expected Count	73.0	50.0	92.0	215.0
		% of Total	34.0%	23.3%	42.8%	100.0%

Time spent * Decoration Cross-tabulation

			Decoration			
			Good	Neutral	Not good	Total
Time spent	< 30 minutes	Count	1	10	5	16
		Expected Count	1.8	7.1	7.1	16.0
		% of Total	0.4%	4.4%	2.2%	7.0%
	30-60 minutes	Count	14	55	58	127
		Expected Count	14.0	56.5	56.5	127.0
		% of Total	6.2%	24.2%	25.6%	55.9%
	>60 minutes	Count	10	36	38	84
		Expected Count	9.3	37.4	37.4	84.0
		% of Total	4.4%	15.9%	16.7%	37.0%
Total		Count	25	101	101	227
		Expected Count	25.0	101.0	101.0	227.0
		% of Total	11.0%	44.5%	44.5%	100.0%

Time spent * Toilet Cross-tabulation

	Toilet		
Good	Neutral	Not good	Total

Time spent	< 30 minutes	Count	4	5	3	12
		Expected Count	2.5	2.9	6.5	12.0
		% of Total	1.9%	2.4%	1.4%	5.7%
	30-60 minutes	Count	17	34	67	118
		Expected Count	24.8	28.8	64.4	118.0
		% of Total	8.1%	16.3%	32.1%	56.5%
	>60 minutes	Count	23	12	44	79
		Expected Count	16.6	19.3	43.1	79.0
		% of Total	11.0%	5.7%	21.1%	37.8%
Total		Count	44	51	114	209
		Expected Count	44.0	51.0	114.0	209.0
		% of Total	21.1%	24.4%	54.5%	100.0%

Time spent * Cleanliness Cross-tabulation

			Cleanliness					
			Very good	Good	Neutral	Not good	Bad	Total
Time spent	< 30 minutes	Count	5	4	11	5	0	25
		Expected Count	3.5	5.4	8.0	2.3	5.9	25.0
		% of Total	2.1%	1.7%	4.5%	2.1%	0.0%	10.3%
	30-60 minutes	Count	12	21	54	11	33	131
		Expected Count	18.4	28.1	41.7	11.9	30.9	131.0
		% of Total	5.0%	8.7%	22.3%	4.5%	13.6%	54.1%
	>60 minutes	Count	17	27	12	6	24	86
		Expected Count	12.1	18.5	27.4	7.8	20.3	86.0
		% of Total	7.0%	11.2%	5.0%	2.5%	9.9%	35.5%
Total		Count	34	52	77	22	57	242
		Expected Count	34.0	52.0	77.0	22.0	57.0	242.0
		% of Total	14.0%	21.5%	31.8%	9.1%	23.6%	100.0%

Time spent * Safety & Security Cross-tabulation

			Safety & Security					
			Very good	Good	Neutral	Not good	Bad	Total
Time spent	< 30 minutes	Count	4	6	10	9	0	29
		Expected Count	4.6	6.1	5.4	5.4	7.4	29.0
		% of Total	1.6%	2.4%	4.1%	3.7%	0.0%	11.8%
	30-60 minutes	Count	17	29	29	23	34	132
		Expected Count	20.9	27.9	24.7	24.7	33.8	132.0
		% of Total	6.9%	11.8%	11.8%	9.3%	13.8%	53.7%
	>60 minutes	Count	18	17	7	14	29	85
		Expected Count	13.5	18.0	15.9	15.9	21.8	85.0
		% of Total	7.3%	6.9%	2.8%	5.7%	11.8%	34.6%

Total		Count	39	52	46	46	63	246
		Expected Count	39.0	52.0	46.0	46.0	63.0	246.0
		% of Total	15.9%	21.1%	18.7%	18.7%	25.6%	100.0%

Time spent * Lighting Cross-tabulation

			Lighting			
			Good	Neutral	Not good	Total
Time spent	< 30 minutes	Count	7	14	6	27
		Expected Count	4.8	10.9	11.3	27.0
		% of Total	3.0%	5.9%	2.5%	11.4%
	30-60 minutes	Count	21	59	48	128
		Expected Count	22.8	51.5	53.7	128.0
		% of Total	8.9%	25.0%	20.3%	54.2%
	>60 minutes	Count	14	22	45	81
		Expected Count	14.4	32.6	34.0	81.0
		% of Total	5.9%	9.3%	19.1%	34.3%
Total		Count	42	95	99	236
		Expected Count	42.0	95.0	99.0	236.0
		% of Total	17.8%	40.3%	41.9%	100.0%

Time spent * Food&Beverage Cross-tabulation

			Food&Beverage			
			Good	Neutral	Not good	Total
Time spent	< 30 minutes	Count	1	3	5	9
		Expected Count	.5	3.2	5.3	9.0
		% of Total	0.7%	2.1%	3.5%	6.4%
	30-60 minutes	Count	4	28	39	71
		Expected Count	4.0	25.2	41.8	71.0
		% of Total	2.8%	19.9%	27.7%	50.4%
	>60 minutes	Count	3	19	39	61
		Expected Count	3.5	21.6	35.9	61.0
		% of Total	2.1%	13.5%	27.7%	43.3%
Total		Count	8	50	83	141
		Expected Count	8.0	50.0	83.0	141.0
		% of Total	5.7%	35.5%	58.9%	100.0%

Time spent * Senior's activities Cross-tabulation

			Senior's activities			
			Not good	Neutral	Good	Total
Time spent	< 30 minutes	Count	7	10	8	25
		Expected Count	4.1	9.8	11.1	25.0

		% of Total	3.1%	4.4%	3.5%	11.0%
	30-60 minutes	Count	16	52	49	117
		Expected Count	19.1	45.9	52.1	117.0
		% of Total	7.0%	22.9%	21.6%	51.5%
	>60 minutes	Count	14	27	44	85
		Expected Count	13.9	33.3	37.8	85.0
		% of Total	6.2%	11.9%	19.4%	37.4%
Total		Count	37	89	101	227
		Expected Count	37.0	89.0	101.0	227.0
		% of Total	16.3%	39.2%	44.5%	100.0%

Time spent * Non-senior's activities Cross-tabulation

			Non-senior's activities			
			Not good	Neutral	Good	Total
Time spent	< 30 minutes	Count	1	22	6	29
		Expected Count	3.4	14.6	11.0	29.0
		% of Total	0.4%	9.1%	2.5%	12.0%
	30-60 minutes	Count	13	71	42	126
		Expected Count	14.6	63.5	47.9	126.0
		% of Total	5.4%	29.3%	17.4%	52.1%
	>60 minutes	Count	14	29	44	87
		Expected Count	10.1	43.9	33.1	87.0
		% of Total	5.8%	12.0%	18.2%	36.0%
Total		Count	28	122	92	242
		Expected Count	28.0	122.0	92.0	242.0
		% of Total	11.6%	50.4%	38.0%	100.0%