A POLICY FRAMEWORK FOR AGE-FRIENDLY COMMUNITY REFURBISHMENT IN CHINA: COMMUNITY ENVIRONMENT AND ACTIVE AGEING

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A Policy Framework for Age-Friendly Community Refurbishment in China: Community Environment and Active Ageing

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CERTIFICATE OF ORIGINALITY

I hereby declare that this thesis is my own work and that, to the best of my knowledge and belief, it reproduces no material previously published or written, nor material that has been accepted for the award of any other degree or diploma, except where due acknowledgement has been made in the text.

_____(Signed)

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LIST OF RESEARCH OUTCOMES

The work presented in Chapter 2 to 4 has appeared, or has been submitted to the following journals and conferences:

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Abstract

Nowadays, population ageing has become a significant concern for urban neighbourhood development. The concentration of older people residing in old neighbourhoods worsens the deterioration of living environments and service facilities. Meanwhile, age-friendly communities are thought to facilitate active ageing and empower older people to have positive roles in their neighbourhood development. Thus, age-friendly community development can be a solution to the "double ageing" issue of urban neighbourhoods.

On the other hand, age-friendly community development still lacks policy support. Among urban development agendas, age-friendly community development tends to have a lower policy priority. Thus, the incentives, invested resources, and sustainability of age-friendly community development would be declined. One of the measures to increase policy support for age-friendly community development is to integrate it with some other urban agendas preferred by policymakers, and, currently, old neighbourhood renovation can be one such urban agenda, especially in China. Thus, age-friendly community development and old neighbourhood renovation can mutually benefit.

This study aims to develop a framework to realise the integration of these two agendas through three sub-tasks: (1) theoretical development, (2) practical development, and (3) raising policy recommendations.

The theoretical development of age-friendly community studies was broadly reviewed in this

study. Although the ecological theory is dominant in the research area, this study found that the theory of "the production of space" is more capable of analysing the barriers to age-friendly community development. The theory was used to underpin the policy framework development in this study. The framework has two dimensions: the strategic dimension and the component dimension. (1) The strategic dimension concerns community developers and users' spatial practices, including commercialisation, bureaucratisation, and expanding social relations. (2) The component dimension concerns the spatial representations of community developers and the representational spaces of community users, including community services, human activities, and housing functions.

This study operationalised the theoretical framework by taking Hong Kong as a pioneering case of age-friendly community development. First, the commercialisation of community services is the core measure to facilitate continuous neighbourhood development through age-friendly community development. Then, the commercialised human activities, bureaucratised human activities and bureaucratised community services can support commercialised community services. Lastly, community housing functions can be realised through the social relations expanded in community elderly services, which means the built environment of age-friendly communities should be developed in responding to the requirements of community elderly services.

As the central government's policies play an important role in China, in the last part of this study, some practical policy recommendations were given by investigating the related policies

issued by the Chinese central government. A policy analysis tool was developed to evaluate the consideration of ageing issues. Chinese policies can well support community elderly services. The attention to the commercialised and bureaucratised community services, especially those for older people, has just emerged. Weaker policy support includes commercialised and bureaucratised human activities, housing functions and expanded social relations in community elderly services. These weaker points deserve further studies.

This study expands the application of “the production of space” in age-friendly community studies. From a practical perspective, this study provides a benchmark pathway to increase policy support for age-friendly community development, especially in old neighbourhoods. It also provides a framework to develop policy evaluation tools to support intelligent policymaking.

Chapter 1 Introduction

1.1 Background

1.1.1 Population ageing: a challenging opportunity

Population ageing is a global demographic change trend. By 2050, the global population aged above 60 will account for about 21.3 per cent of the whole population (Zheng et al., 2021). China is predicted to become one of the countries with the largest aged population (Lei & Feng, 2021; Shi et al., 2021). According to the United Nations (2019), the proportion of the Chinese population aged above 65 will double in 2045 and reach a peak of 30.14 per cent in 2065.

The increasing proportion of cities' older people imposes negative impacts on different aspects of urban development, such as burdens on the healthcare system (Lei & Feng, 2021; Liu et al., 2021), intensive demands on land resources (Mulliner et al., 2020), and reduced workforces (Merchant et al., 2021). Communities, the basic units of urban society, are also influenced by population ageing (Podgórniak-Krzykacz et al., 2020). According to the neighbourhood life-cycle theory, some old neighbourhoods cannot sustain their development because of the shrinking and ageing of their resident population (Wiesel, 2012). In a vicious cycle, these declining communities would lose their liveability because of deteriorated support networks and infrastructures (Buffel et al., 2020; Yu et al., 2019), poorly equipped transportation services (Brüchert et al., 2020), and insufficient public open spaces (Gan et al., 2020).

Meanwhile, increasing policymakers have realised that addressing older citizens' environmental demands through strategic community development can mitigate population ageing's negative impacts on economic development and urban growth (Brossoie & Burns, 2020; Chui et al., 2018; Hebert & Scales, 2019; Lee & Dean, 2018). Moreover, actively and continuously contributing to society has become a demand of current and future older people (del Barrio et al., 2018). Several real cases have indicated that, through age-friendly community development, older people can have proper environments and opportunities to become independent contributors to communities' revitalisation and continuous development (Crossen-White et al., 2020; Dalmer, 2019; Ravi et al., 2021; Reuter et al., 2020; Van Hees et al., 2018; van Hoof et al., 2021).

Older people can be seen as both financial and social assets for neighbourhoods. Phillips et al. (2021) found that introducing the *age-friendly community* principles into British high street development turns older people into consumers. Thus, the town centres' economic growth, lost before and during the pandemic, has been facilitated. A Netherlands study about green care farms proves older people's productivity. Older people with dementia can participate in agricultural work while receiving nursing services (de Boer et al., 2021). Older people can also benefit their communities with their knowledge and leadership (Bui et al., 2021). Golenko et al. (2020) found that, through intergenerational learning programmes, older people can reduce younger generations' antisocial behaviours and create more inclusive community environments. The importance of intergenerational programmes was also found by Radford et al. (2018) and

Parekh et al. (2018). Oetzel et al. (2019) found that Māori older people can maintain their communities' culture and cohesiveness in peer education initiatives. Shih et al. (2018) found that older people can improve community resilience in the face of climate-related disasters. The opportunities for older people to benefit their neighbourhoods are also seen as social well-being provided by age-friendly communities (Nieboer & Cramm, 2018).

At the city level, facilitating older people's contributions is seen as a method of sustainable urban development (Doolan-Noble et al., 2019). For example, the Steering Committee on Population Policy in Hong Kong suggests setting a higher retirement age to boost the local economy (He et al., 2020). In addition, older people are given opportunities to participate in policymaking to enhance other citizens' well-being (von Faber et al., 2020).

1.1.2 Concept and research gap of active ageing

Age-friendly community concept was developed from *active ageing* (Joy, 2021; Neville et al., 2021). Active ageing was coined by the World Health Organization in 2002. Active ageing is officially defined as:

> "optimising opportunities for health, participation and security to enhance older people's quality of life." (Neville et al., 2021; World Health Organization, 2002)

Currently, active ageing studies have mainly focused on employment and activity participation (He et al., 2020). The concept gives older people new roles and responsibilities different from

the traditional images of ageing. However, older people's consumer role has not been thoroughly investigated.

Phillips et al. (2021) indicated that older people contribute to regional economic development by consuming behaviours, contrasting with welfare recipients. However, very few studies have focused on facilitating older people's consumer role by providing suitable environments or markets (Doolan-Noble et al., 2019). Some current research trends about older people's consumer role are summarised below.

Some studies use the terms related to the "consumer" to describe older people and try to facilitate mindset changes by terminology. For example, Mulliner et al. (2020) suggested that housing provision should take a *consumer*-led approach to respond to older people's preferences. Arakawa Martins et al. (2021) regarded older patients as the *customers* of hospitals in their study about hospital environments. Chen et al. (2020) found that Canada's social security policies can facilitate older people becoming a strong *purchase power* of high-end services.

Other studies predict expanding silver hair markets, especially given proper adaptations to current products for older people. Rogelj and Bogataj (2019) found that future older people will have different consuming habits from previous generations. Thus, the demands for services in silver hair markets will increase and diversify along with the Europe population ageing. Podgórniak-Krzykacz et al. (2020) found that incorporating older people in digital product

design benefits silver hair markets' supply side.

Another group of studies find increasing private sector investment in age-friendly community development (Finlay & Finn, 2020; Teixeira-Poit, 2020). For example, by coordinating with health and care professionals, convenience stores in Japan have become vital nodes of older people's support networks (Igarashi et al., 2020). In addition, Nielson et al. (2019) found that commercially operated residential communities bring positive social experiences to older people. In Rhode Island, the Long Term Care Coordinating Council funds local businesses to participate in age-friendly industries (Filinson & Raimondo, 2019). Currently, the booming care markets increase the likelihood for older people to age-in-place regardless of their physical, cognitive and social conditions (Evans et al., 2019).

1.1.3 Concept of age-friendly community and its lack of policy support

Recognising the importance of the environments to facilitate active ageing, the World Health Organization proposed the concept of the age-friendly community in 2007 (Gan et al., 2021; World Health Organization, 2007). In previous studies, age-friendly communities do not have a unique definition, and the following are some widely cited ones.

In its guidebook, the World Health Organization (2007) defined age-friendly communities as:

"policies, services, settings and structures support and enable people to *age actively*."

Another definition was given by Fitzgerald and Caro (2014) and stated as:

> "a place where older people are *actively* involved, valued and supported with infrastructure and services that effectively accommodate their needs." (del Barrio et al., 2021; Krok-Schoen et al., 2021; van Hoof et al., 2020; von Faber et al., 2020)

Liddle et al. (2014) defined age-friendly communities as:

> "a strategic and ongoing process to facilitate *active ageing* by optimising the community's physical and social environments and its supporting infrastructure." (Liddle et al., 2020)

Another widely cited definition was given by Alley et al. (2007) regarding age-friendly communities as:

> "spaces that value and *actively* involve older adults, providing opportunities, services, and supports that enable aging in place and enhance older adults' quality of life." (Dalmer, 2019)

According to Menec et al. (2011), age-friendly communities was defined as:

> "governance and practice to promote and sustain supportive environments for the engagement and participation of older adults pursuing *active ageing* in their communities." (Nykiforuk et al., 2019)

Although all the definitions stress active ageing, the components of the age-friendly community are slightly different between definitions. These slight differences can serve different research

purposes.

This study adopted the World Health Organization's definition because it is seen as the most influential in guiding policymaking (Atkins, 2020). In addition, the definition was adopted for the following two more reasons. (1) The World Health Organization's definition is the most cited one in recent age-friendly community studies (e.g. Colibaba et al., 2020; Dikken et al., 2020; Kam, 2021; Latham-Mintus et al., 2021; Marston & Samuels, 2019; Menec et al., 2021; Ronzi et al., 2020; Woo & Choi, 2020; Woolrych et al., 2021). Thus, this study conducted research and analysis based on this mainstream definition. (2) In the World Health Organization's definition, policies are an essential component of age-friendly community development, which some other previous studies also have proved (Davern et al., 2020; Dikken et al., 2020; Kano et al., 2018; Klicnik & Dogra, 2019). As the policy is one of the core research subjects of this study, the definition was used to serve the purpose of this study.

As an essential component, policies have the following four functions in age-friendly community development. (1) The primary function of policies is to guide the improvement of environments (Duppen et al., 2019). (2) Policies can sustain large-scale age-friendly community development instead of the scattered initiatives at the city level and national level (Choi, 2020). (3) Policies can ensure equal support for age-friendly community development in different communities, especially those deprived (Krok-Schoen et al., 2021). (4) Practitioners also rely on policies to support and sustain their age-friendly community businesses and avoid being ad hoc initiatives (Channer et al., 2020). The World Health Organization (2007) suggests

age-friendly community policies should cover eight aspects: *outdoor space and buildings*, *transportation*, *housing*, *social participation*, *respect and social inclusion*, *civic participation and employment*, *communication and information*, and *community support and health services*.

The advocates for the age-friendly community have been followed up by governments worldwide. China is also an active member to follow up the concept of active ageing and the age-friendly community in policymaking. China has started age-friendly community pilot projects, locally named the "age-liveable community", since September 2009 (CGTN, 2020; Xie, 2018). In 2011, the "liveable environments" for older people was put in the "12th five-year plan on elderly care" as one of the six systems to actively respond to population ageing (Yuan & Jin, 2021). As a legislative measure to protect and promote age-friendly community development, "liveable environments" was put as a separate chapter of the "Law of the People's Republic of China on Protection of the Rights and Interest of the Elderly" in 2012 (Du & Xie, 2015). In 2016, 25 subordinate ministries of the State Council published a national guideline for the liveable community for older people to improve their independence and quality of life (Xiang, Yu, et al., 2020; J. Yu et al., 2021). Currently, the Chinese government takes "actively responding to population ageing" as a national development strategy (Zhu et al., 2019).

After more than ten years, the age-friendly community development in China is still comparatively slow. Currently, there is a Global Network of Age-Friendly Cities and Communities (GNAFCC) containing more than 1,000 members accredited by WHO (Menec et al., 2021). However, China only has two cities in the GNAFCC: Hong Kong S.A.R. and Qiqihar

(Xiang, Yu, et al., 2020; J. Yu et al., 2021). Previous studies identify several challenges to age-friendly community development in China, and a lack of policy support is a predominant one, like the situation in many other countries (Brossoie & Burns, 2020; Joy, 2021).

The lack of policy support may result from the following four reasons. (1) Older people are likely to be neglected in policymaking. There was a tradition that policies took an "average people" perspective and seldom considered age differences in the past (Bu et al., 2021; Chui et al., 2018; Shih et al., 2018). Some urban environments and services are even intentionally designed for younger generations (Adlakha et al., 2020; Carandang et al., 2019) because cities need to attract younger generations to participate in their future development (Xiang, Yu, et al., 2020). Another contributor to the neglect is an ageism perspective taken by policies regarding older people as unworthy of right-based support (Joy, 2018). (2) The lack of policy support can be attributed to political dynamics. In urban development policymaking, age-friendly community development needs to compete with many other agendas thought to be essential for urban growth (Murtagh et al., 2021). Sometimes, the local departments in charge of ageing issues have a low capacity for decision making about urban policy agendas (Suriastini et al., 2019). The low policy priority of age-friendly community development at the national level can also hinder municipal age-friendly community development (Russell et al., 2019). (3) The lack of bottom-up participation results in age-friendly community policies being very general and vague in their statements related to environment design (van Hoof et al., 2021). At the same time, older people lack the opportunities to voice in policymaking (Kurian et al., 2019). (4) The

lack of policy support is due to the limitation of public financial resources. The economic austerity makes age-friendly community development much more reliant on private markets (Chui et al., 2018; Joy, 2021). Moreover, age-friendly community development often goes beyond local governments' budgets (Davern et al., 2020).

1.1.4 Concept of policy integration

One solution to increase the policy support for age-friendly community development is to integrate age-friendly community development with the policy agendas regarded as important by policymakers. Thus, policy integration is another core concept underpinning this study. Policy integration's definition shifts between the studies with different purposes (Baulenas, 2021; Bornemann & Weiland, 2021; Candel & Biesbroek, 2016; Massey & Huitema, 2016; Meijers & Stead, 2004; O'Halloran, 2021; Parsons et al., 2021). Inter-sectoral coordination is a common theme across different studies.

There are different methods to achieve inter-sectoral policy integration, including coordination, harmonisation and prioritisation. Coordination aims to eliminate the contradictions in the policy goals between different sectors. Harmonisation aims to realise the co-benefits between different sectors. On the contrary, prioritisation aims to prioritise a particular sector over the others (Lafferty & Hovden, 2003; Sheng, 2021). Coordination and harmonisation can be used together in policy integration to achieve better cooperation between different sectors (Gao et al., 2021). This study also focused on coordination and harmonisation. For coordination, this study tried

to reverse the negative attitude towards population ageing. For example, by regarding older people as the consumers in age-friendly communities, they will not be seen as economic burdens in community development. For harmonisation, this study identified the critical contributions of age-friendly communities to the continuous development of old neighbourhoods.

1.1.5 Neighbourhood renovation: a new opportunity for policy integration of age-friendly community development

Community refurbishment is another central concept of this study. According to the Merriam-Webster Dictionary, “refurbish” means “to brighten or freshen up” (Merriam-Webster, 2022), and “refurbishment” is the noun form of “refurbish”. Thus, “community refurbishment” mainly means adapting the built environments of existing buildings and communities (Barnsley Community Build, 2018; Berneslai Homes, 2022). Thus, in this study, “community refurbishment” is used to indicate the focus on the physical conditions of existing community environments.

The terms used in policies to represent the micro change of community environments usually vary across regions. “Community refurbishment” is mainly used in some Western contexts, especially in the U.K. (Deputy Prime Minister's Office, 2011; Exeter City Council, 2021). Because English is the official language of the U.K., “refurbishment” has become one of the main terms officially used in the policies related to the physical adaptations of community

environments.

As most policies issued in China are written in Chinese, no official policies indicate the term used by the Chinese government to represent the physical adaptations of community environments. However, such community change processes tend to be translated as "neighbourhood renovation" by scholars and governmental media (Guo & Li, 2020; The State Council of the People's Republic of China, 2020a). **Thus, in the following text, to reflect Chinese policymaking, "neighbourhood renovation" is mainly used in the analysis and discussion of this study.** However, there is still a slight difference between "community refurbishment" and "neighbourhood renovation". "Neighbourhood renovation" is a very comprehensive concept in Chinese policies. It also covers community services and facilities. Although this study emphasises the adaptation of the built environments of neighbourhoods by using "community refurbishment", the relationship between the built and service aspects of community environments was also analysed to clarify the slight difference between the terms.

Currently, pushed by the Chinese central government, old neighbourhood renovation has caught great attention in urban development. It provides an opportunity to incorporate the concept of age-friendliness into community development processes. To achieve efficient and sustainable urban development, the Chinese government has controlled rapid urban sprawl and advocated renovating inventory built environments (Deng et al., 2020). In the past, old neighbourhoods tended to be demolished in urban renewal projects (Xu et al., 2019). Such redevelopment destroyed local social and cultural capital and relocated the older people with a deep attachment

to their original communities. In recent years, to maintain the continuity of social development, community redevelopment has transferred from a demolishing style to a micro-renovation style (Y. Yu et al., 2021). Pilot cases prove that such micro-renovation can also revitalise local streets, boost the regional economy and enhance residents' well-being (L. Liu et al., 2020). Based on the national pilot work, which started in 2017, The State Council of the People's Republic of China (2020b) issued the *Guideline for comprehensively pushing forward work in renovating old urban residential areas* on 10th July 2020. Using the term renovation means the central government stresses preserving culture, improving service functions and refurbishing the communal sections of buildings (The State Council of the People's Republic of China, 2020a). A central point of service function improvements is the emphasis on elderly care facilities. Thus, the policy integration between age-friendly community development and old neighbourhood renovation can benefit both continuous community development and older people's well-being (Cho & Kim, 2016; Fan et al., 2017).

Currently, scholars have begun paying attention to the interactions between age-friendly community development and old neighbourhood renovation (Zhang et al., 2020). Although the demographic ageing in old neighbourhoods is severe (Sun et al., 2020), considering age-friendly community development in old neighbourhood renovation projects is comparatively rare in previous studies. Compared with newly built communities, old communities tend to lack age-friendly characteristics. One main reason is that in earlier urban development, ageing issues were not considered in community building (Gan et al., 2020). Moreover, although there have

been broad advocates for age-friendly community development, more government financial support tends to be invested into newly built than old communities (Yu et al., 2019). Lastly, from the perspective of policy content, the current policies for neighbourhood renovation are still too general to improve the age-friendliness of communities (Gan et al., 2020).

Yu et al. (2019) gave a comprehensive list of the elements of age-friendly community development in old neighbourhoods. These elements are categorised into built and social environments: (1) the built environment contains spatial elements, including natural elements, built elements, and service facilities; (2) the social environment contains diversified services and activities. Other studies about the age-friend community development in neighbourhood renovation also reflect such a binary structure of age-friendly community elements. For instance, S. Liu et al. (2020) developed a model to indicate how the renovation of old neighbourhoods can improve the accessibility of community care facilities. Cheng et al. (2019) suggested that improving services and activity facilities through urban renewal can increase older people's active travel behaviour. Alves et al. (2020) identified some age-friendly built environment components that can facilitate older people's walking. They also suggested that urban planners pay attention to these components in urban renewal. Bozdağ et al. (2017) suggested that urban renewal should facilitate older people's accessibility to service facilities and green spaces to realise age-friendly community development. Although the previous literature is limited, improving service facilities through neighbourhood renovation has been a primary focus in such kind of age-friendly community studies.

Previous studies also give recommendations for facilitating age-friendly community development through neighbourhood renovation. For policy content, Gan et al. (2020) suggested that neighbourhood renovation policies should be written more detailedly. Thus, environmental features should be clearly regulated, and the ageing demographic structure should be considered carefully. Based on the successful experience of Jangsu's old neighbourhood renovation, Cho and Kim (2016) suggested that neighbourhood renovation policies should regard older people as a basis of urban development. However, seldomly a model was developed to indicate how to develop age-friendly communities in neighbourhood renovation. Therefore, policy integration has not been fully introduced into age-friendly community studies yet.

Overall, older people tend to concentrate in old neighbourhoods widely spread in China while the Chinese population is significantly ageing. The situation causes problems for both neighbourhood development and older people's well-being. Policymakers can refer to active ageing principles and develop age-friendly communities to facilitate older people's contributions to their communities. Among older people's potential contributor roles, the consumer role has just emerged in age-friendly community studies. However, how to facilitate the consumer role is yet to be investigated. Thus, facilitating older people's consumer role in their communities is one main topic of this study.

Meanwhile, age-friendly community development is still comparatively slow in China. Only two cities have been accredited as members of GNAFCC. Increasing policy support is believed

to push large-scale age-friendly community development. One method to increase policy support is integrating age-friendly community development with other mainstreamed urban policy agendas. Recently, the Chinese government has started pushing old neighbourhood renovation on a national scale. Therefore, it can be an opportunity to integrate age-friendly community development and old neighbourhood renovation in policymaking. Although there are some studies about age-friendly community development in old neighbourhood renovation projects, facilitating the policy integration is yet to be investigated. This study fills the research gap.

1.2 Research aim and objectives

Based on the background mentioned above, this study aims to develop a policy framework to guide the policy integration of age-friendly community development and old neighbourhood renovation to achieve age-friendly community refurbishment in China. This study defined a "framework" by following Candel and Biesbroek (2016) and O'Halloran (2021). A framework can facilitate policy integration by providing insights and solutions to identified problems. The problems include older people's liveability issues in deteriorated old neighbourhoods and the barriers to increasing the policy support for age-friendly community development. This study achieved three sub-tasks to develop the framework.

Firstly, this study developed a theoretical prototype of the policy framework. This theoretical prototype also contains structuralised hypotheses of this study. In this sub-task, a theory to

underpin the policy framework was identified. The theory can analyse older people's liveability problems in communities and the barriers to policymaking for age-friendly community development. The theoretical analysis also gave hypothetical solutions that form the policy framework's theoretical prototype.

Then, the study operationalised the theoretical prototype and produced a practical framework. The operationalisation also served to validate the structuralised hypotheses in the theoretical prototype. This study identified an example of age-friendly community development in China to operationalise the theoretical prototype. The theoretical prototype only considers age-friendly community development in general communities. This sub-task specified the model by considering how age-friendly community development can simultaneously facilitate continuous neighbourhood development, which is the main focus of old neighbourhood renovation. The analysis results were used to refine the theoretical prototype and make the practical framework.

Lastly, some policy improvement recommendations were raised based on the practical framework. This step is a case to apply the practical framework in the Chinese context. In this sub-task, a policy analysis tool was developed to evaluate the consideration of ageing issues in Chinese policies. First, the tool was used to analyse the Chinese central government's policies related to ageing issues. The strengths and weaknesses of the policies were discussed. Then, the tool was used to analyse the old neighbourhood renovation policy issued by the central government. This study gave some recommendations to integrate age-friendly community

development and old neighbourhood renovation to realise the co-benefits of these two policy agendas.

The first sub-task is the *theoretical development* part of this study. Meanwhile, the second and third sub-tasks compose the *practical development* part of this study. Overall, the policy framework was formed from abstract to concrete, showing a storyline of theory-strategy-practice.

1.3 Research methodology

This study was divided into three stages, responding to the three sub-tasks. Each stage adopted a specially designed methodology introduced in this section.

1.3.1 Establishing the theoretical foundation of the framework

A systematic literature review of *age-friendly community* studies was conducted to establish the theoretical prototype. The Web of Science database was the source for the review. Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) was used to filter the 305 papers returned from the search in September 2019. As a result, 182 age-friendly community studies were found. Among them, 72 studies were identified as containing specific theories. A mixed-method of qualitative and quantitative analysis was used to map the theoretical development of age-friendly community studies. The qualitative part resembled

conventional review methods. The theories were categorised into six groups, and their usage in age-friendly community studies was analysed. The quantitative part adopted scientometric methods to analyse the influence of the six theory groups on the knowledge structure of age-friendly community studies. Citation relations in the knowledge network reveal the influence of these theories. The citation relations were processed by two methods, namely core publications analysis and publication cluster. The two analysis tools used in the quantitative part were VOSviewer and CiteNetExplorer. The qualitative and quantitative results guided the development of the theoretical prototype of the policy framework.

1.3.2 Developing the practical form of the framework

In the operationalisation of the theoretical prototype, this study explored Hong Kong's case. A secondary dataset was retrieved from the published report of the Public Policy Research project named "Sustainable Planning Criteria (SPC) for Age-Friendly Precincts (AFP) in the New Development Areas (NDAs) of Hong Kong", funded by the Central Policy Unit of Hong Kong SAR government. 772 valid responses were collected from eight selected areas covering different built environment scenarios in Hong Kong. The questionnaire has two sections: the age-friendly and sustainability criteria sections. The age-friendly criteria section has seven parts: outdoor spaces, transportation, buildings and neighbourhood, social/civic participation, respect, communication and information, and community and health services. The sustainability criteria section has three parts: economic sustainability, environmental sustainability, and social sustainability. There are a total of 66 criteria in the questionnaire. Using exploratory factor

analysis, these 66 criteria were dimensionally reduced into 15 representative factors. The data was processed by IBM SPSS 23 statistical software, Chicago, IL, the United States. A correlation matrix of the representative factors was also produced. The correlations between these representative factors formed a correlation network, which is also the practical framework. The practical framework was also used to validate the structuralised hypotheses in the theoretical prototype.

1.3.3 Incorporating the framework in policymaking

In applying the framework to Chinese policies, this study developed a policy analysis tool to evaluate the consideration of ageing issues in the Chinese central government's related policies. The evaluation results were further analysed by referring to the practical policy framework to propose corresponding recommendations. The evaluation tool was developed by applying the term frequency-inverse document frequency (TF-IDF) method to the Chinese central government's policies related to ageing issues. TF-IDF learned the input policies, identified the important words related to ageing issues, and quantified the importance of the words. Firstly, a policy corpus was developed from the policy library of the State Council of the People's Republic of China. Until 17th April 2021, there were 12,607 policies in the database, while 12,104 were collectable. 103 policies were found related to ageing issues. The policies were tokenised using the Language Technology Platform (LTP), developed by the Research Center for Social Computing and Information Retrieval of Harbin Institute of Technology, with some adjustments to improve tokenisation accuracy. The TF-IDF processed the tokenised policies to

produce the policy evaluation tool. Applying the tool to the policies related to ageing issues indicated the characteristics of the current policymaking. The application of the tool to the old neighbourhood renovation policy indicated the potential ways to develop age-friendly communities through old neighbourhood renovation.

Above is a general summary of the methodology used in this study. A detailed description is given in each separated chapter. A research framework was established by combining the research sub-tasks and method framework, as shown in Figure 1.1.

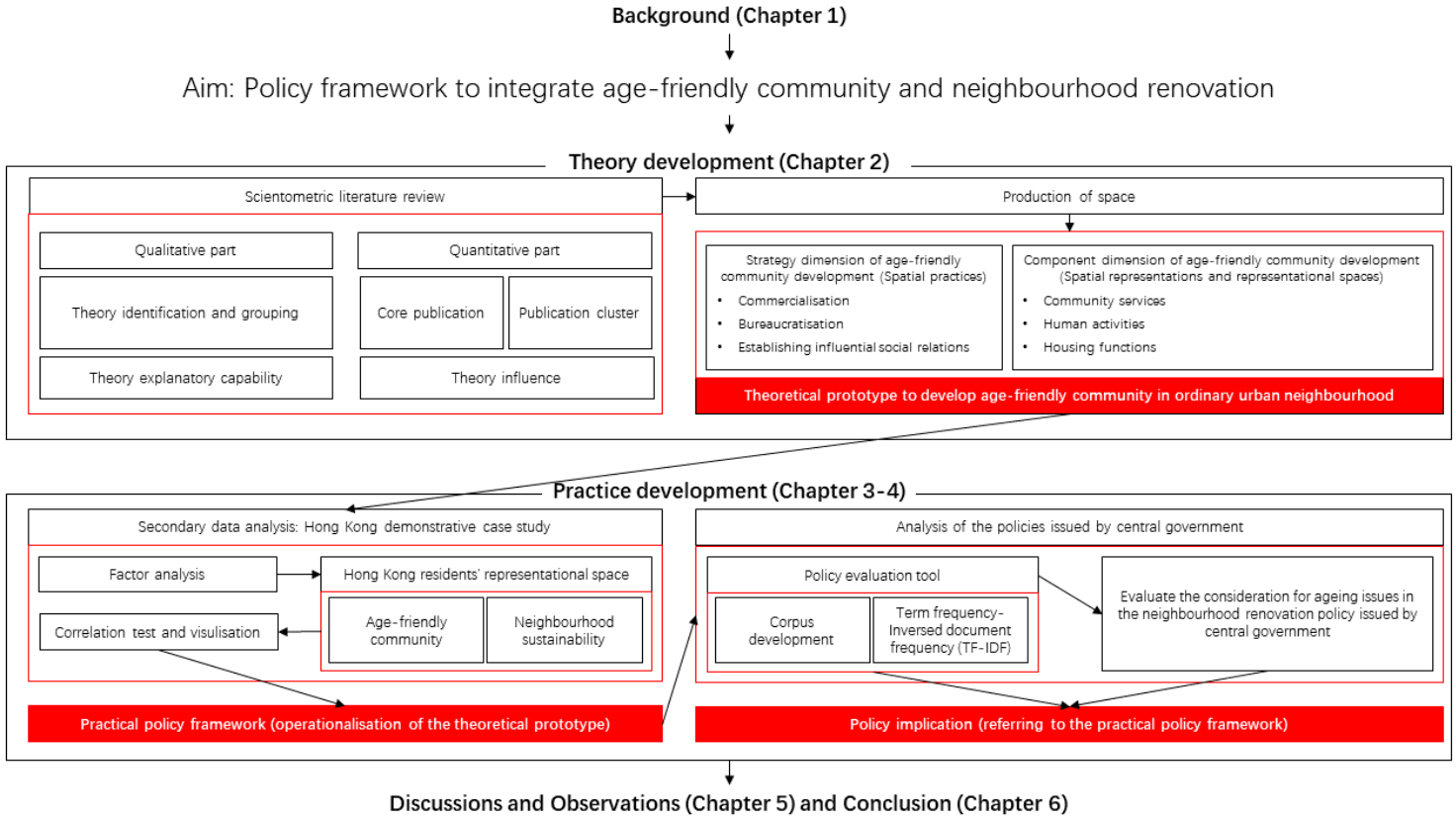

Figure 1.1 Research framework

The figure shows that the study started by reviewing older people's current liveability problems, especially those living in old urban neighbourhoods. Policymakers, including the Chinese government, have started their efforts to develop age-friendly communities. However, a lack of policy support hinders age-friendly community development nationally. Therefore, it is recommended that integrating age-friendly community development with other urban agendas of a higher policy priority can increase policy support. This study chose an emerging policy agenda, old neighbourhood renovation, which has been pushed nationally since 2020. Thus, the study aims to develop a policy framework to facilitate the policy integration of age-friendly community development and old neighbourhood renovation. The aim was achieved with the following three sub-tasks.

The first sub-task belongs to the theoretical development stage of the study. The task aims to develop the theoretical prototype of the policy framework. This stage found a theory capable of analysing the liveability problems of older people and the barriers to age-friendly community policymaking. Through a scientometric literature review, the production of space was found to be a suitable theory for framework development. The following stages of the study were conducted based on two components of the theory. Firstly, the core discourse of the theory is that social relations produce their embedded space. Secondly, the theory develops a triad model of space containing spatial practices, spatial representations, and representational spaces. This study produced strategic and component dimension of the policy framework. The strategic dimension contains commercialisation, bureaucratisation and expanding social relations. The

component dimension contains community services, human activities, and housing functions. These two dimensions compose the theoretical prototype of the framework.

The second and third sub-tasks compose the practical development part of the study. This part aims to produce a practical framework from the theoretical prototype and raise some corresponding policy recommendations. In the second sub-task, the operationalisation mainly serves two aims. Firstly, the operationalisation stressed continuous neighbourhood development, which is the main focus of old neighbourhood renovation. Secondly, the operationalisation took Hong Kong as an exemplar case of age-friendly community development in China. In this task, a secondary dataset was retrieved. The relationship between the age-friendly community and neighbourhood continuous development was evaluated using factor analysis and correlation tests. Referring to Hong Kong's related policies, this sub-task produced a practical policy framework to integrate age-friendly community development and old neighbourhood renovation policies in China.

Lastly, the practical framework was applied to Chinese policies to recommend further improvement work. Firstly, a policy analysis tool was developed to evaluate the consideration of ageing issues in Chinese policies. The related central government's policies were analysed because they are influential in China. First, the evaluation tool was applied to the policies related to ageing issues to find the strengths and weaknesses of the policy system. Then the tool was applied to the policy for old neighbourhood renovation. The policy recommendations were given about improving the policy support for age-friendly community development with the

help of old neighbourhood renovation.

Finally, the study gave a clear summary of the research outcomes.

1.4 Thesis structure

The theoretical and practical development shown in the research framework is expanded in the following three chapters.

Chapter 2 describes the first sub-task to develop the theoretical prototype of the policy framework. The chapter answers the question of what should be the theoretical foundation of the framework? In the background of the chapter, some influential models of the age-friendly community are reviewed. The ecology theory is currently dominant in age-friendly community studies. The reviewed models also have their limitations because of over-relying on only one theory. The methodology part describes the qualitative and quantitative literature review, and the literature analysis part shows the analysis results. In the discussion part, the theory of the production of space is identified as a suitable theory to develop the theoretical prototype. The theory is used to analyse older people's neighbourhood liveability and the age-friendly community policymaking. Lastly, the theoretical prototype of the policy framework is developed.

Chapter 3 fulfils the second sub-task to operationalise the theoretical prototype and produce the practical policy framework. The chapter answers the question of what should be the

practical formation of the framework? The chapter's background describes the detailed rationalities of choosing Hong Kong as an exemplar case. In the methodology part, the secondary dataset and the application of the factor analysis and correlation test are described. The analysis results are shown in the factor analysis results part. Finally, the practical framework is developed in the discussion part.

Chapter 4 describes the third sub-task to give some policy recommendations based on the analysis of the related policies issued by the Chinese central government. The chapter gives policy recommendations by applying the framework to actual policies. The background part introduces current Chinese age-friendly community policymaking and an opportunity to integrate age-friendly community development and old neighbourhood renovation. The methodology part describes a framework to develop a policy evaluation tool using the TF-IDF. The evaluation tool application part applies the tool to analyse the policies related to ageing issues and old neighbourhood renovation. Lastly, in the discussion part, some policy recommendations are given to increase the policy support for age-friendly community development and realise age-friendly community refurbishment in China.

The last two chapters recap the whole study. *Chapter 5, discussions and observations, focuses on the analysis of the study.* The chapter recaps each part's analysis logic and combines them in a clear and indicative summary. Meanwhile, the research contributions are also described in detail. Finally, *Chapter 6, the conclusion, focuses on the storyline of the study*. Besides recapping the whole research, this chapter reviews the limitation of the study and, accordingly,

proposes some future research directions.

Chapter 2 The theoretical development of the policy framework

2.1 Chapter background

At the initial stage of the policy framework development, this study established a theoretical foundation. The theoretical prototype can support the analysis in the following stages. It was developed with a scientometric literature review.

With more than ten years of disciplinary development, many theoretical models have been developed from age-friendly community studies. The following are some influential models. The first official and frequently cited model was given by the World Health Organization (2007). From an ecological perspective, the model indicates that community environment development should focus on eight aspects mentioned in Chapter 1 to facilitate older people's active ageing lifestyle and enhance their quality of life.

One of the earliest age-friendly community studies from Lui et al. (2009) gives another influential model indicating an ideal mode of age-friendly community development. The study also reveals the differences between age-friendly communities and some traditional environmental concepts regarding older people's liveability. It indicates that age-friendly community development should consider both physical and social environments. Moreover, there should be a combination of top-down and bottom-up processes regarding governance.

Still based on the ecological theory, Scharlach (2009a, 2017) explored the person-environment fit between older people and community environments to improve their well-being. In his 2009 study, Scharlach proposed a *Five C Model* indicating age-friendly community environments can benefit older people through *continuity*, *compensation*, *connection*, *contribution,* and *challenges*. In 2017, the model was improved to the Constructive Ageing Model by incorporating the element of *control*.

Menec et al. (2011) conceptualised age-friendly communities by referring to five basic assumptions of ecological theory. The study proposes an ecological model of age-friendly communities. In the model, older people's well-being is influenced by their micro-environment (family and friends), meso-environment (eight domains of the age-friendly community), and macro-environment (policies related to ageing issues). In addition, social connections play a vital role in age-friendly communities. Menec (2017) conducted a detailed investigation of the social connections' role in age-friendly communities in a later study. The model indicates that older people, organisations and communities can develop age-friendly communities through social connections in four methods: *creating connections*, *empowerment*, *social influence*, and *access to material resources and services*.

Recently, the academic interest to embed smart technologies into age-friendly communities has emerged. Marston and van Hoof (2019) proposed a framework called Smart Age-friendly Ecosystem (SAfE) to indicate that Information Communication Technologies (ICTs) can facilitate all the eight aspects of age-friendly communities. During the pandemic period,

Marston et al. (2020) improved the framework for a post-pandemic society by adding the consideration of virtual spaces.

Most of the above models indicate that age-friendly community studies tend to use the ecological theory to develop models. These models show the pursuit of the fit between environment and people. However, over-relying on the ecological theory to develop models still has its limitations. Pursuing the harmonisation between environments and only one age group, such as older people, can only be realised in some ideal scenarios. In most actual community practices, environment design needs to integrate the expectations of different stakeholders. As described later, the barriers to age-friendly community development often lie in these integration processes. Thus, to make theoretical models closer to reality, some other theories need to be introduced to supplement the limitation of the ecological theory. Therefore, this study identified another proper theory for policy framework development through a scientometric review of age-friendly community studies.

2.2 Methodology

2.2.1 Scientometrics method

Scientometrics does not have a unified definition (Hood & Wilson, 2001; Tague-Sutcliffe, 1992; Yang et al., 2020). However, many definitions stress *quantitative* as a core attribute, a distinctive characteristic and an advantage over traditional literature review (Brindha & Murugesapandian, 2016; Shiffrin & Börner, 2004). Furthermore, the recent development of

scholarly databases (e.g., Web of Science and Google Scholar), computer techniques, and analysis methods facilitated this study using a scientometric literature review to map the theoretical development trends of age-friendly community studies by visualisation and computer-aid quantitative analysis (Chen, 2017; Chen & Song, 2019; Gusenbauer & Haddaway, 2020; Jason & Bradely, 2010; LaRowe et al., 2009).

The rationalities of using scientometrics, instead of a traditional literature review, to map the theoretical development of age-friendly community studies lie in the following three points: (1) The theoretical development illustrated by scientometrics is more objective and more precise to inspire the future of the research area (Easterby-Smith et al., 2008; Snyder, 2019). It helps avoid over-relying on a single theory and limiting disciplinary development. (2) The method quantitatively shows the influence of the theories used in age-friendly community studies, and the results can be interpreted more scientifically and precisely (Tijssen et al., 2002). (3) It can systematically reveal a research area's knowledge structure and development, which can be hardly identified in the traditional literature review from a qualitative perspective (University of Southern California, 2021; Warner et al., 2004).

When conducting this study, scientometrics was still a new method in age-friendly community studies. There have been many studies using the traditional literature review (e.g. Frochen & Pynoos, 2017; Lehning & Greenfield, 2017; Lui et al., 2009; Neville et al., 2016; Neville, Wright-St Clair, et al., 2018; Purtle et al., 2019; Radford et al., 2018; Štaube et al., 2016; Steels, 2015; Syed et al., 2017). However, only two scientometric studies were found from age-friendly

community studies (de Oliveira et al., 2019; Xiang, Shen, et al., 2020). Moreover, there was still a research gap to review the theoretical development of age-friendly community studies. As innovative models need to be soundly supported by theories, this systematic review fills this research gap to benefit this study and many other future age-friendly community studies.

2.2.2 Data collection and analysis

The Web of Science was searched for previous age-friendly community studies. The search strategy was searching for the *topic* with the keywords "*age-friendly*" AND "*community*". The adoption of this search strategy was for two reasons: (1) "Age-friendly" was regarded as a specific term coined by the World Health Organization (Menec et al., 2011). The concept is a comprehensive collection of the eight related dimensions (World Health Organization, 2007). Thus, this review only contained the studies exactly using the term "age-friendly". Secondly, the strategy ensured that the geographic scope of all the reviewed studies was limited to a community scale. Although "age-friendly" and "community" separately appear in some studies, detailed scrutiny helped identify these studies for further analysis.

Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) (Moher et al., 2009) (Figure 2.1) was used to filter the 305 papers returned from the search in September 2019. According to their title, abstract, and keywords, 182 age-friendly community studies were found. From these 182 studies, 72 studies were identified as containing specific theories. Most of these 72 papers are from the global North, covering some European and American countries.

These 72 studies were identified using two criteria: (1) The papers should introduce some *new* theories into age-friendly community studies. Being new is emphasised because "age-friendly" itself is a theoretical concept. Another two highly frequently used theoretical concepts are "active ageing" and "age-in-place". These three concepts appear in almost all these 182 studies. Thus, these three concepts were regarded as three common terms for age-friendly community studies rather than specific theories. (2) These papers should conduct their discussion based on specific theories.

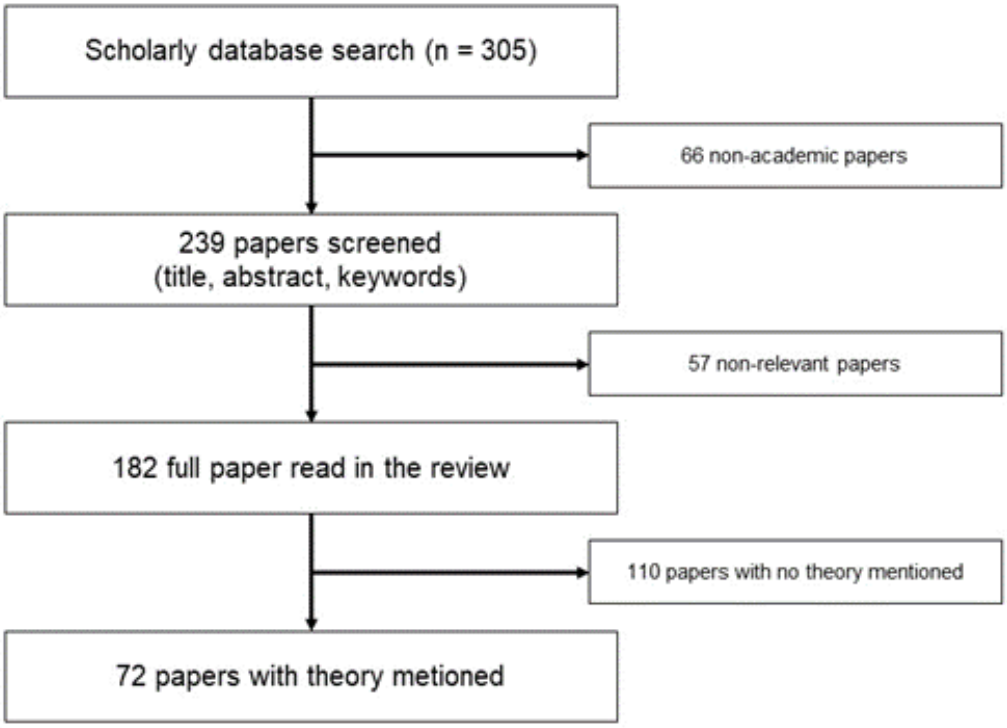

Figure 2.1 PRISMA process of literature filtering

Using a mixed-method, the literature review revealed the theoretical development of age-

friendly community studies and how theories influence and shape the knowledge structure differently. The qualitative part resembles conventional review methods. The theories were categorised into six groups, and their usage in age-friendly community studies was analysed. The quantitative part analysed the influence of the six groups of theories on the knowledge structure of age-friendly community studies. Thus, all the 182 age-friendly community studies were quantitatively analysed. Citation relations in the knowledge network reveal the influence of these theories (Zhou et al., 2018). In this review, the citation relations were quantitatively analysed by two methods, namely *core publications analysis* (van Eck & Waltman, 2014a) and *publication cluster* (van Eck & Waltman, 2014b). The two analysis tools used in the quantitative part were VOSviewer (Centre for Science and Technology Studies, Leiden University, Rapenburg, South Holland, Netherlands) and CiteNetExplorer (Centre for Science and Technology Studies, Leiden University, Rapenburg, South Holland, Netherlands). The two kinds of software are commonly used to construct citation networks and visualise them. The two kinds of software can further realise more advanced analysis of the knowledge structure. Because these two kinds of software have different functions, they supplemented each other in this literature review.

The core publication analysis is a function of CitNetExplorer to identify the core studies from a citation network. CitNetExplorer defines core publications as papers having more than a certain number of citation relations with other core publications in the network. The certain number (k) in the definition is a hyperparameter set by users according to their intention and

experience. The counted citation relations have no directions, either citing or being cited. Thus, the influence of core publications can be regarded as both integrating and disseminating knowledge in the knowledge network.

The publication cluster is a function of VOSviewer to cluster the papers into different groups according to their citation relations in the network. The papers are grouped based on their closeness formed by either direct or indirect citation relations. The citation relations analysed in the publication cluster also have no directions. Thus, a publication's influence is also defined as integrating and disseminating knowledge. The function can map the knowledge structure, and the influences between the publications within a cluster are more potent than those between different clusters. This review also identified a central publication from each cluster. A central publication is defined as the paper having the most citation relations in the whole citation network in each cluster. Thus, the central publications are influential both within and outside their cluster.

The detailed mathematical explanations of these two quantitative analysis methods can be found in the works of van Eck and Waltman (2014a, 2014b).

2.3 Literature analysis

2.3.1 Qualitative analysis – Theoretical development trend of age-friendly community studies

As described in the methods part, PRISMA found 182 age-friendly community studies, and 72 of them contain explicit theories. This qualitative part analyses these 72 papers to indicate the theoretical development trends of age-friendly community studies. The usage of the theories were summarised from a perspective of three processes of age-friendly community development.

The three processes of age-friendly community development were summarised from the 72 studies and the governance dimension of Lui et al.'s (2009) model, which includes both top-down and bottom-up processes. From a top-down perspective, community environments are shaped by policies, masterplans and administrative regulations. This top-down process was named *age-friendly community building* in this study. The studies about age-friendly community building can (1) identify environmental factors and (2) explore the methods to develop policies and projects. From a bottom-up perspective, residents use community facilities to get their wanted functions. This bottom-up process was named *age-friendly community using* in this study. The studies about age-friendly community using mainly focus on (1) the influences of community environments on residents and (2) the different environmental expectations between various residents. Between the top-down and bottom-up processes,

policymakers, community designers, and community administrators need to mediate the different environmental expectations of various residents and develop compromising policies, master plans, and administrative regulations. This intermediate process was named *age-friendly community negotiating* in this review, representing the interactions between community planners and community users. The studies about age-friendly community negotiating usually advocate engaging older people's opinions and contributions during community planning.

The most frequently used theory in age-friendly community studies is the *ecological theory*. For *age-friendly community building*, Menec et al.'s (2011) model indicates the essential environmental factors at the micro, meso, and macro levels. Scholars also advocated considering different local contexts and diverse older people in age-friendly community building to achieve person-environment fit (Cramm et al., 2018; John & Gunter, 2016; Keating et al., 2013; Novek & Menec, 2014; van Dijk et al., 2015). Other studies identify the neighbourhood environmental factors that are especially important for vulnerable older people (Krawchenko et al., 2016; Winterton, 2016). For *age-friendly community using*, Scharlach (2009a, 2017) used the constructive ageing model to reveal that age-friendly communities can benefit older people's psychological development in six aspects. Overall, the benefits brought by age-friendly communities include psychological well-being, life satisfaction, health status, mobility, and participation opportunities (Choi & DiNitto, 2016; Chong et al., 2015; Greenfield & Fedor, 2015; Greenfield & Mauldin, 2017; Lewinson et al., 2019; Menec & Nowicki, 2014; Menec et al., 2016; Neville, Adams, et al., 2018; Park & Lee, 2017; Toohey et al., 2018; Wang

et al., 2017; Winters et al., 2015; Xie, 2018; Yan et al., 2014; Zheng et al., 2019; Zheng & Yang, 2019).

The production of space is the second most frequently used theory in age-friendly community studies. For *age-friendly community building*, scholars identified various barriers to building processes (Buffel, McGarry, et al., 2014; Buffel & Phillipson, 2016; Lindenberg & Westendorp, 2015). At the same time, some solutions are also given to the identified barriers (Buffel, McGarry, et al., 2014; Buffel & Phillipson, 2018). For *age-friendly community negotiating*, some successful examples indicate the importance of older people's participation (Buffel et al., 2012; Cho & Kim, 2016; Moulaert & Wanka, 2019). For *age-friendly community using*, studies focus on the spatial using patterns in older people's daily life (Alidoust et al., 2019; Puhakka et al., 2015; Shirazi, 2019).

The other identified theories are less used in age-friendly community studies. Therefore, these theories were categorised into four theory groups based on their common characteristics. These four groups are *social-related theories*, *place-related theories*, *governance-related theories*, and *individual-centred theories*.

Social-related theories are used to investigate the social aspect of age-friendly community environments. For *age-friendly community building*, Menec's model indicates the importance of social connections in building processes (social connectivity: Menec, 2017). Theories are also used to explore the community atmosphere that respects older people (research-based art:

Black & Lipscomb, 2017; social capital: Scharlach & Lehning, 2013). Meanwhile, some inappropriate age-friendly community building measures strengthening the negative images of ageing are also identified (social constructivist: Fields et al., 2018). For *age-friendly community negotiating*, different expectations of age-friendly community development are found between developers and older people (social constructivist: van Hees et al., 2017, 2018). To facilitate the participatory role of older people, scholars advocated the investment in social resources and practices (co-production: Buffel, 2018; intergenerational practice: Buffel, de Backer, et al., 2014; co-design: Cinderby et al., 2018; social capital: Parekh et al., 2018; social connectivity: Rémillard-Boilard et al., 2017; cultural capital: To & Chong, 2017). For *age-friendly community using*, improved community environments can benefit older people's well-being (social exchange: Bell & Menec, 2015; broken window: de Donder et al., 2013; studentification: Lager & van Hoven, 2019; health equality: Levasseur et al., 2017; social production function: Nieboer & Cramm, 2018; social integration: Vitman et al., 2013). However, some age-friendly communities exacerbate the vulnerability of some deprived older people because of the ignorance of local contexts and individual heterogeneity (postcolonial theory: Brooks-Cleator et al., 2019; spatial inequality: Greenfield, 2018).

Compared with social-related theories, *place-related theories* focus more on the built environments of age-friendly communities. For *age-friendly community building*, scholars suggested that building practices should consider the macro environments where communities are located, especially for those communities with the higher hazards of natural disasters

(hazard of place: Manuel et al., 2015; place integration: Spina & Menec, 2015). For *age-friendly community using*, age-friendly communities can facilitate older people to reside in their original neighbourhoods (place attachment: Buffel, de Donder, et al., 2014; image of the city: Loukaitou-Sideris et al., 2019).

Governance-related theories are mainly used to explore governance practices, an important aspect of age-friendly communities (Lui et al., 2009). For *age-friendly community building*, these theories are used to evaluate the effectiveness and efficiency of actual policies and initiatives (local governance: Bárrios et al., 2018; power distance: Chao & Huang, 2016; sustainability: Greenfield & Frantz, 2016; natural and neutral organisational characteristics: Greenfield et al., 2016; knowledge production: Moulaert & Garon, 2015; agenda-setting: Neal et al., 2014; community change: Scharlach, 2009b). Other studies also focus on the policy content supporting age-friendly community building (logic of choice: Dalmer, 2019; post-structural theory: Joy, 2018).

Recently, some *individual-centred theories* have emerged to study the older people's bottom-up experiences in age-friendly communities. For *age-friendly community using*, these theories are used to explore how age-friendly communities enable the continuous social and psychological development of older people (identity theory: Marston & Samuels, 2019; Erikson psychological development model: Stanley et al., 2019).

Overall, the theories used in age-friendly community studies can be categorised into six groups,

the ecological theory, *the production of space*, *social-related theories*, *place-related theories*, *governance-related theories*, and *individual-centred theories*. The ecological theory is the most frequently used in age-friendly community studies to explore their building and using. The production of space is the second most frequently used theory, which is applied to analyse all three processes. Social-related theories are also applied to analyse all three processes of age-friendly community development. Place-related theories are mainly applied to analyse age-friendly community building and using. Governance-related theories are applied to analyse age-friendly community building. Individual-centred theories are applied to analyse age-friendly community using.

2.3.2 Quantitative analysis

2.3.2.1 Longitudinal analysis of the theoretical trend

The above qualitative analysis identifies six theory groups in age-friendly community studies. Table 2.1 shows the use trend of each theory group by year from 2009 to 2019. The table shows two significant characteristics of the theoretical development of age-friendly community studies: (1) After 2014, the theories used in age-friendly community studies have become more diversified. (2) After 2014, the number of studies containing explicit theories has increased significantly. Age-friendly community studies have increasingly relied on (new) theories.

Table 2.1 Theoretical development trend by year

Theory	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019
Ecological	1	-	1	-	1	3	4	6	3	5	3
Production of space	-	-	-	1	-	1	2	2	-	1	3
Social-related theories	-	-	-	-	2	2	1	1	5	6	3
Place-related theories	-	-	-	-	-	1	2	-	-	-	1
Governance-related theories	1	-	-	-	-	1	1	3	-	2	1
Individual-centred theories	-	-	-	-	-	-	-	-	-	-	2

2.3.2.2 Scientometrics analysis of theoretical trend

As theories have become increasingly important for age-friendly community studies, the influences of the six theory groups on the knowledge structure of age-friendly community studies were quantitatively analysed with the help of CitNetExplorer and VOSviewer, two professional scientometrics analysis tools. As indicated in the methodology part, core publication analysis and publication cluster functions were applied to all the 182 age-friendly community studies.

By using core publications analysis, four groups were formed: (1) *most-core publications* (Figure 2.2), (2) *more-core publications* (Figure 2.3), (3) *less-core publications*, and (4) *non-core publications*. The hyperparameter (*k*) of core publication analysis is set according to users' intention and experience. Thus, different values were assigned to different core publication groups. When k equalled eight, no core publications were returned by the function. Thus, when k equalled seven, the identified papers were grouped as most-core publications. According to the definition given by CitNetExplorer, the most-core publication means the paper with seven citation relations with other most-core publications. When k equalled five, the additionally identified papers were grouped as more-core publications. The more-core publication means

the papers with more than five citation relations with other more-core or most-core publications. While more-core publications have less than seven citation relations with most-core publications. When k equalled one, the additionally identified papers were grouped as less-core publications. The less-core publication means the paper with citation relations with other core publications. However, less-core publications have less than five citation relations with most-core and more-core publications. Non-core publications are those papers that were not identified by the function. The non-core publication means the paper with no citation relations with other core publications. Table 2.2 shows the detailed results of the core publications analysis.

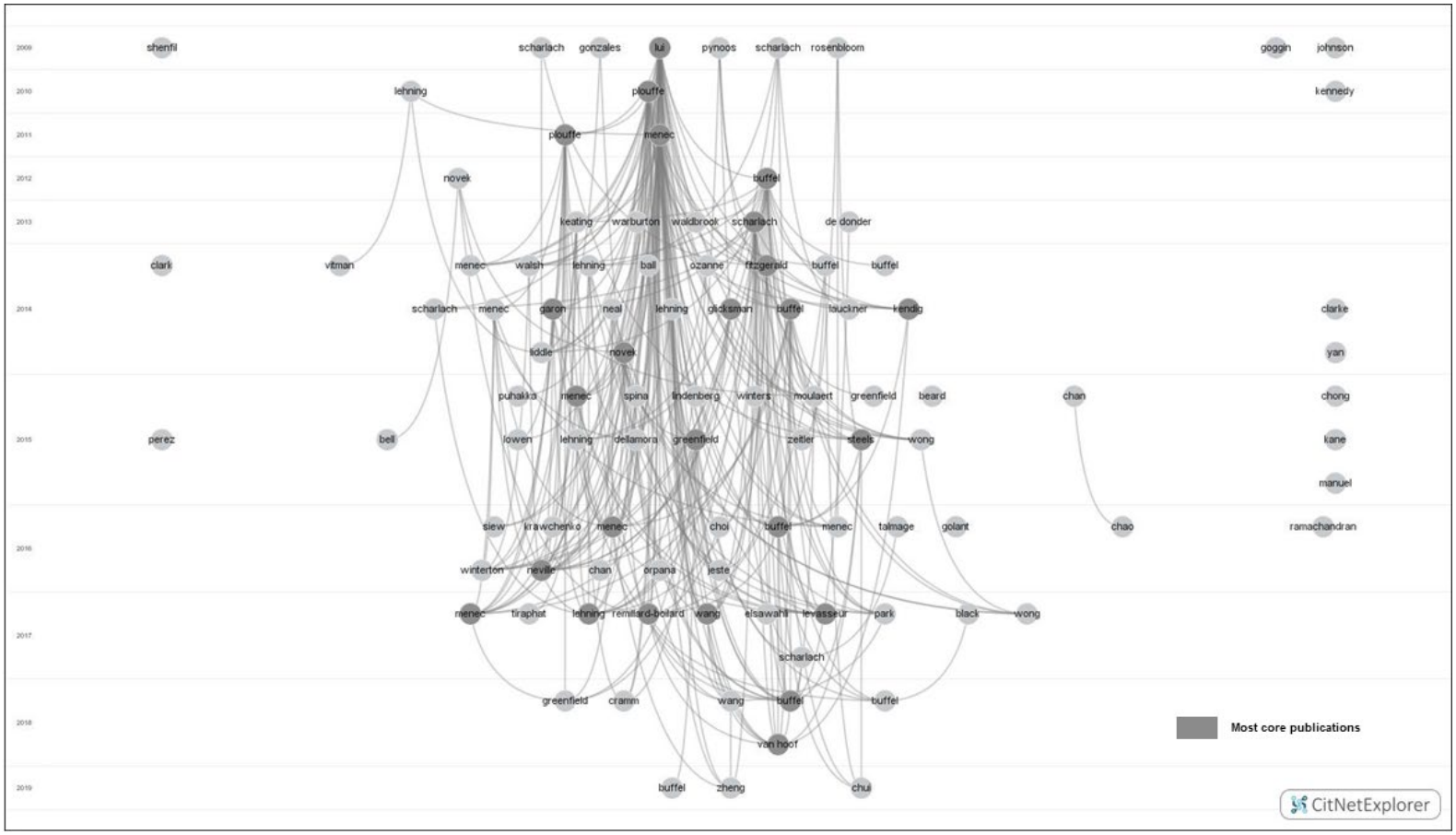

Figure 2.2 Most-core publications (darker nodes) of age-friendly community studies

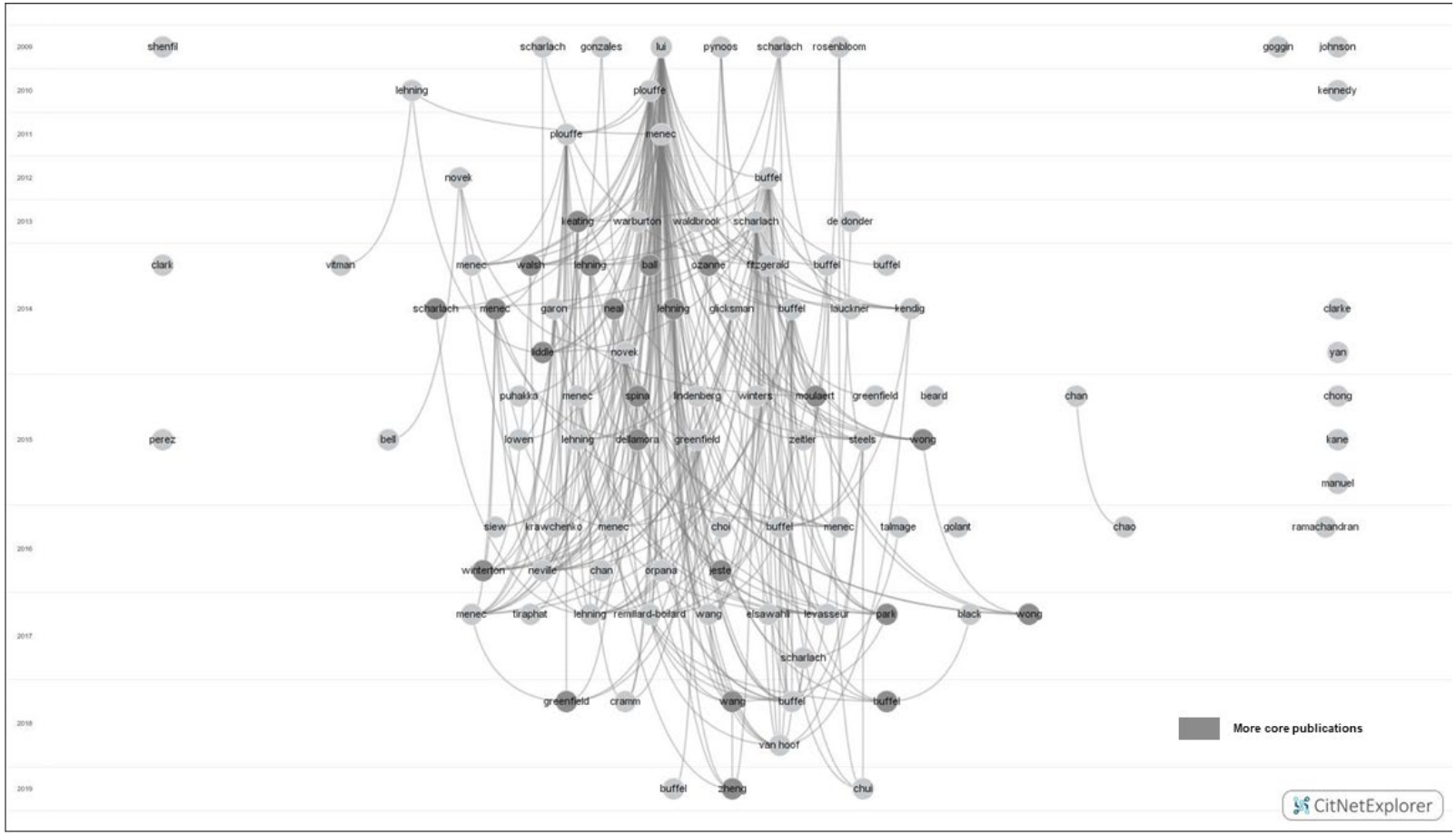

Figure 2.3 More-core publications (darker nodes) in age-friendly studies

Table 2.2 Result of core publication analysis

Category	K	Indeitified Publications	Net Value
Non-Core Publications	0 (assumed)	182	29
Less-Core Publications	1	153	28
	2	125	18
	3	107	22
	4	85	25
More-Core Publications	5	60	14
	6	46	16
Most-Core Publications	7	30	30

Among the identified core publications, 63 of them are studies with explicit theories. Table 2.3 shows the number of each kind of core publication from each theory group. Three theory groups have most-core publications: *the ecological theory*, *the production of space,* and *social-related theories*. Thus, these three theory groups have high explanatory abilities in age-friendly community studies by either citing or being cited by other studies. These most-core publications with explicit theories also focus on some common research topics, including *contextual and individual differences* (Levasseur et al., 2017; Novek & Menec, 2014), *social connections* (Menec, 2017; Rémillard-Boilard et al., 2017; Scharlach & Lehning, 2013), *participatory design* (Buffel et al., 2012; Rémillard-Boilard et al., 2017), and *barriers and facilitators of age-friendly communities* (Buffel & Phillipson, 2016, 2018).

Table 2.3 Core publications from each theory group

Theory	Most-Core	More-Core	Less-Core	Non-Core
Ecological theory	2	6	16	3
Production of space	3	0	6	1
Social-related theories	4	2	12	2
Place-related theories	0	1	1	2
Governance-related theories	0	3	6	0
Individual-centred theories	0	1	0	1

The publication cluster using VOSviewer gave more insights into the theoretical development of age-friendly community studies, as shown in Figure 2.4. Among the 182 studies, Lui et al.'s (2009) literature review is the most influential because it produces the abovementioned model. The second most influential study is Buffel et al.'s (2012) paper from "the production of space" group. Meanwhile, the third most influential study is Menec et al.'s (2011) work from the ecological theory group. The publication cluster function clustered the 182 papers into 18 groups. However, some groups contain very few papers. This study only analysed the clusters having more than ten papers to focus on the significant theoretical development trends. Thus, seven larger groups were further analysed. Based on the definition of the central publication mentioned above, seven central publications were found. Table 2.4 shows the details of the seven analysed groups. Among the seven central publications, five of them have explicit theories. The social-related theory group has one central publication located in the largest cluster. The ecological theory group has two central publications. The production of space group also has two central publications. The results of the publication cluster well echo the results of the core publication analysis indicating that the ecological theory, the production of space, and social-related theories are very influential in age-friendly community studies.

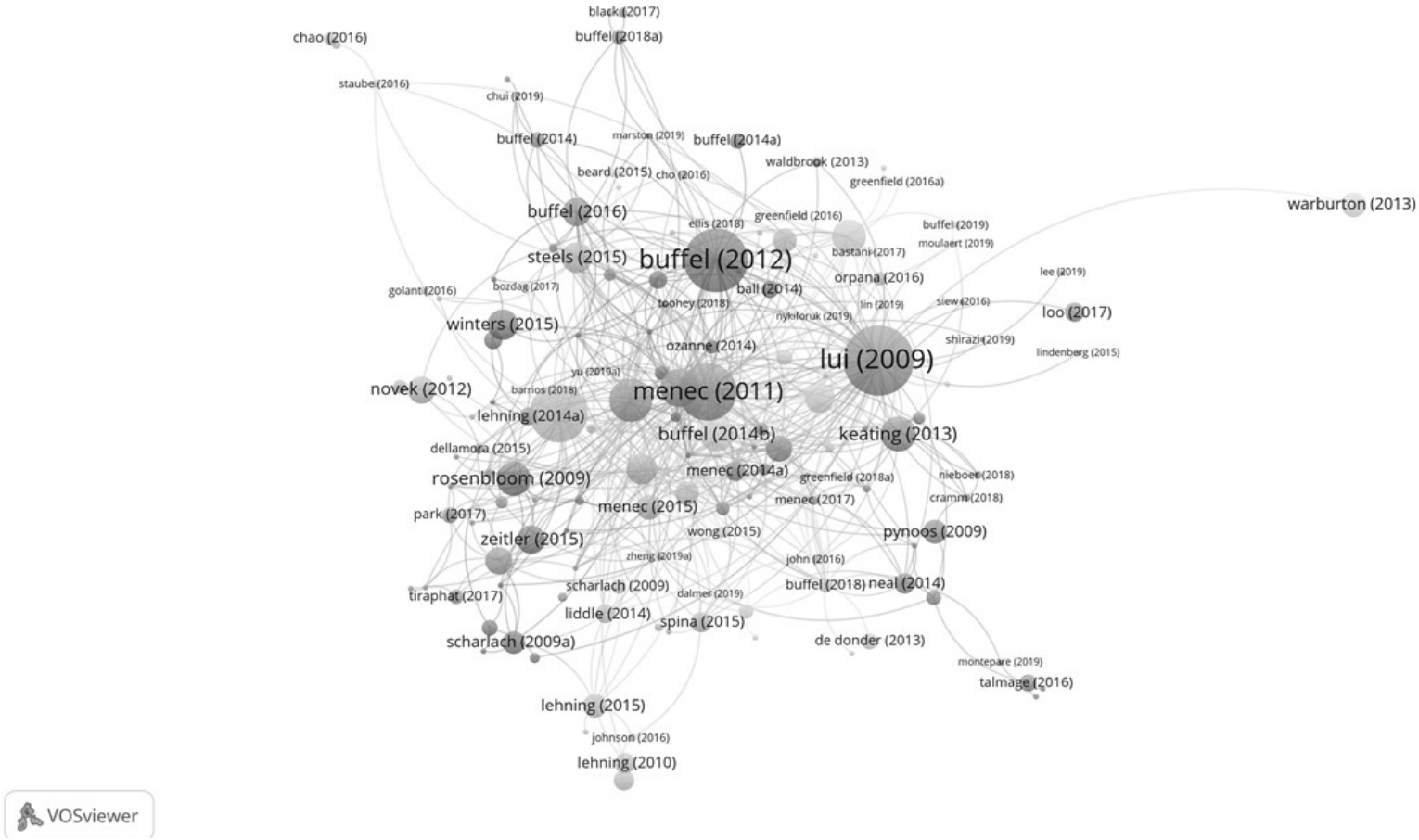

Figure 2.4 Publication cluster result

Table 2.4 Publication cluster result of seven larger clusters

Cluster	Size	Central publication	Theory group of the central publication
1	19	Scharlach and Lehning, 2013	Social-related
2	14	Rosenbloom, 2009	-
3	14	Keating, Eales and Phillips, 2013	Ecological
4	11	Buffel, Phillipson and Scharf, 2012	Production of Space
5	11	Novek and Menec, 2014	Ecological
6	10	Pynoos, Caraviello and Cicero, 2009	-
7	10	Buffel and Phillipson, 2016	Production of Space

2.4 Discussion

2.4.1 Theory comparison and selection for framework development

The above section shows the qualitative and quantitative analysis of the six theory groups used in age-friendly studies. The analysis guides a comparison between the six theory groups. Based on the comparison, a suitable theory was selected to develop the theoretical prototype of the policy framework. The theories were compared from two aspects, theory capability and theory influence. Firstly, the theory capability was compared by referring to the three processes of age-friendly community development. Then the theory influence was compared according to the above quantitative analysis.

The three processes of age-friendly community development mentioned above can form a life cycle of the age-friendly community. An official life cycle model has been given by the WHO to its members of the GNAFCC (Buffel, McGarry, et al., 2014). However, this official life cycle mainly serves for project management and lacks a deeper understanding of the daily scenarios

in real communities. Thus, the three processes were combined into a new age-friendly community life cycle to serve the purpose of this study, as shown in Figure 2.5. It helps evaluate the capability of each theory group from two aspects: (1) Whether the theory group can thoroughly analyse the age-friendly community life cycle? (2) What are the strengths and drawbacks of using the theory group to analyse the age-friendly community life cycle?

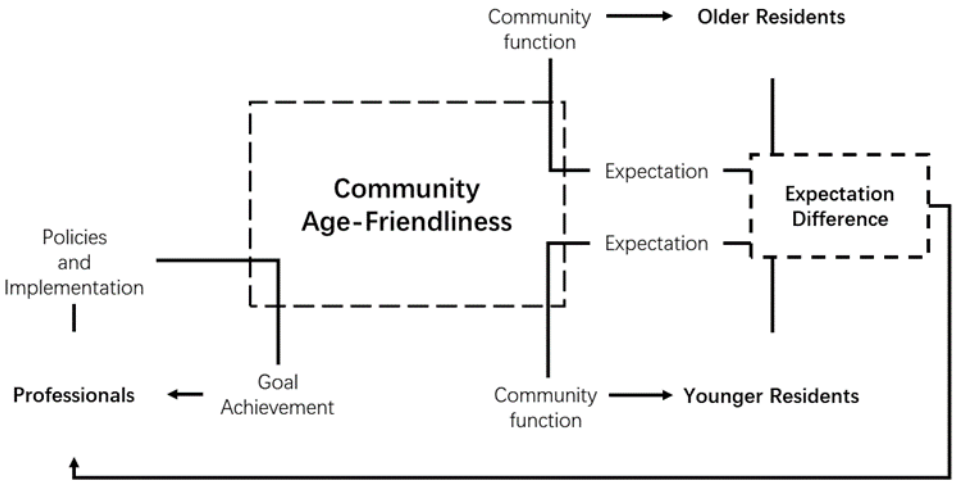

Figure 2.5 Age-friendly community development life cycle

From a person-environment fit perspective, the ecological theory holds that the environment can determine people's behaviour and well-being. The theory has been used to analyse age-friendly community building and using. However, the environmentalism perspective presumes that older people are the passive users of community environments. Thus, the theory has seldomly been used to study age-friendly community negotiating, in which older people actively participate in community environment design. The production of space holds that space

forms and social relations can interact and shape each other. The theory has been used to analyse all three processes. The social-related theories have been used to analyse all three processes, while the place-related theories have been used to analyse age-friendly community building and using. These two groups of theories are comparable because social-related theories focus on the social environments of communities and the place-related theories focus on the built environments of communities. These two theory groups can only study a part of the age-friendly community as the environment dimension contains both social and built aspects (Lui et al., 2009). Governance-related theories have been used to analyse age-friendly community building, while individual-centred theories have been used to analyse age-friendly community using. These two groups of theories are also comparable. Governance-related theories mainly focus on top-down issues by introducing management and political science theories. And individual-centred theories mainly focus on bottom-up issues from community users' perspectives by introducing theories from psychology. These two theory groups need to supplement each other because the governance dimension of the age-friendly community contains both top-down and bottom-up processes (Lui et al., 2009).

Overall, three gaps were found in the theoretical development of age-friendly community studies. (1) The ecological theory neglects the older people's active roles in shaping community environments because it assumes them to be passive users. (2) Social-related and place-related theories need to supplement each other to study the environmental dimension of age-friendly communities, which contains both social and built aspects. (3) Governance-related and

individual-centred theories need to supplement each other to study the governance dimension of age-friendly communities, which contains both top-down and bottom-up processes.

The production of space can be a suitable theory to address the three gaps. (1) In the production of space, residents actively shape community environments by giving them spatial meanings. (2) The theory can cover both built and social aspects by investigating their interactions. (3) The theory can cover both top-down and bottom-up community governance processes by investigating the interactions between community design policies and the residents' spatial meanings. A detailed explanation of the theory is given later in this chapter. As the second most frequently used theory in age-friendly community studies, the production of space is yet to be fully used. The theory has not been used to establish any theoretical models in age-friendly community studies to the author's knowledge. Filling this gap would be a promising direction for the disciplinary development of age-friendly community studies.

Core publication analysis and publication cluster identified three influential theory groups: ecological theory, the production of space, and social-related theories. The quantitative analysis results show the influence of each theory group on the knowledge structure of age-friendly community studies. According to the yearly trend of each theory group, the social-related theory group has had the most significant expansion, which indicates an emerging research interest in the social aspect of age-friendly communities. All the three theory groups reflect the research interests in the interactions between people and environments in age-friendly community studies, however, with slight differences. In the ecological theory and social-related theories,

the environment is just a container of individuals or social activities. In contrast, there is a dialectic influence between social relations and environments in the production of space. These influential publications also indicate some common topics around *the barriers* currently faced by age-friendly community development. The *residents' demands and the environments outside communities are dynamically changing*. One-size-fits-all design leaves older people passively using community environments, especially when communities tend to be designed for "average" working population to attract the labour forces for urban economic development. Thus, *participatory design* is advocated to consider individuals' living experiences in planning community environments. Improved *social connections* can facilitate the involvement of older people in community design decisions.

The production of space has four advantages in dealing with these influential research topics. (1) The barriers to age-friendly community development are identified by the production of space. Thus, it is also a suitable theory to give the solutions. (2) The theory focuses on spatial users' daily experiences by exploring their spatial using patterns and their spatial meanings given to community environments. (3) The theory focuses on the conflicts and compromises between design policies and residents' spatial meanings, which are the nature of participatory design. (4) The theory's core discourse reveals the interaction between social relations and spatial forms.

Thus, referring to both qualitative and quantitative analysis results, the production of space was chosen to develop the theoretical prototype. However, before the theoretical prototype

development, the theory's applicability in the Chinese context should also be analysed first.

The theory of the production of space has been influential in China, especially in urban development studies. According to a search in the database of CNKI, more than 2,200 Chinese papers have used the theory or studied related issues. The earliest journal publication is dated back to 1987, written by Zhou (1987). The paper is about how leisure zones in cities can be regarded as new productive urban areas. Although at that time, the exact theory of the production of space was not widely used in Chinese research, even in Zhou's article. Without sufficient theoretical support, urban space's social and economic value has been research interests in China long before Lefebvre's theory was introduced. Such research interest covers various topics, including urban leisure zone (Zhou, 1987), urban agriculture (Xie, 1996), culture production (Guo, 1997), and regional productivity (Lu, 1993).

In 2002, Cheng (2002) firstly introduced the production of space in Chinese urban studies. Since then, more than 2,000 studies have used the theory to study different aspects of Chinese urban development. The topics include cultural development (e.g. Wu, 2007), tourism (e.g. Wei & Xu, 2010), education (e.g. Shi, 2010), politics (e.g. Wang, 2002), regional and community studies (e.g. Cheng, 2002), etc. Thus, the theory significantly impacts the Chinese academy, like in many other regions.

What is more, previous studies also prove that the production of space is influential in the urban development policymaking in China (e.g. He, 2004). Moreover, studies find that the theory can

well explain some successful urban development policymaking (e.g. Luo, 2007). There are also some exemplar projects of community renovation studied using the theory (e.g. Wang & Deng, 2009).

2.4.2 Policy framework development based on the production of space

The production of space is a theory about the interaction between social relations and space forms (Lefebvre, 1991). As the core discourse, the socio-spatial dialectic indicates that space and the social relations in the space can shape each other (Alidoust et al., 2019). The theory indicates that the spatial forms embody social institutions (Zieleniec, 2018). Thus, the physical forms of space can also be reshaped by intervening in social relations. From the theory, Lefebvre (1991) gave a spatial triad as the model to analyse spaces. The triad includes three parts: spatial practices, spatial representations, and representational spaces (Goonewardena, 2008; McCann, 1999). The model shows how the stakeholders in a space actively shape the space. From a top-down perspective, community designers and administrators shape spaces with their representations of space, which are their professional knowledge about spaces. Commercialisation to achieve exchange values and bureaucratisation to enhance administration are two spatial practices of these hegemonic community development actors (Barron, 2017; Buffel & Phillipson, 2016). These practices shape the abstract spaces of bourgeoisie and capitalism into the living spaces of community residents. From a bottom-up perspective, spaces provide use-value for their residents. Residents live in the spaces with spatial meanings called

representational spaces (Lindenberg & Westendorp, 2015). The users of spaces conduct their daily routine in their representational spaces, and the daily routine is their spatial practices (Shirazi, 2019).

Different groups of people usually have different spatial meanings given to the same space (Parliana & Salura, 2017). In their spatial practice, hegemonic actors of the community environment need to reconcile the demands of different user groups (Buffel & Phillipson, 2018). Thus, rooted in Marxism, the theory holds that space is built upon the conflicts between different social groups (Moulaert & Wanka, 2019). These intergroup conflicts can lead to spatial practice conflicts, and segregation and inequality would influence some vulnerable groups (Buffel & Phillipson, 2016; Puhakka et al., 2015). According to the theory, such segregation and inequality are the performance of a loss of the rights to spaces, which is the ability to determine the shapes and uses of spaces (Buffel, de Backer, et al., 2014; Buffel et al., 2012). Negotiation usually plays an essential role in mediating conflicts (O'Kelly, 2007). Such negotiation usually performs as participatory design. However, deprived social groups may lose their opportunities to participate in the negotiation because they lack the rights to spaces (Li et al., 2016).

As mentioned above, age-friendly community development is still slow because of a lack of policy support. From the perspective of the production of space, the lack of policy support can be interpreted as that the hegemonic actors of community development are reluctant to integrate age-friendliness factors into their spatial representations of community development (Handler,

2014; van Hoof et al., 2021). Three main barriers are discussed below from the perspective of the production of space: (1) *societal and institutional ageism*, (2) *resistance from developers and administrators*, and (3) *the loss of human rights*.

The first barrier to age-friendly community policymaking is institutional ageism (Davey, 2017). From the perspective of the production of space, Buffel and Phillipson (2018) found an intergenerational inequality to determine urban environmental forms. In a neoliberalism atmosphere, urban development prefers the measures of capital accumulation and economic development. Consequently, the design of community environments considers more about the younger adults who are the participants in urban productive activities. However, the spatial expectations and practices are apparent conflicting between younger and older generations (Bouzarovski, 2016). Moreover, this institutional ageism in policymaking echoes wide societal ageism that regards older people as economic burdens (Ostafiński, 2012).

The second barrier is the developers' and administrators' resistance to improving community environments for older people due to its adverse effect on communities' capital accumulation brought by extra costs with low profits (Handler, 2014). The specialised design and facilities for older people usually require additional investment into community development (Planning Department, 2016b). The costs continuously increase in the operational stage because of the extra energy used by the elevator, lighting, temperature control, and some 24-hour services (Estiri & Zagheni, 2019). Another additional expenditure is to pay for the workforce essential for community elderly services. The specialised services in age-friendly communities usually

need extra devotion and skills. Thus, there is a need to invest in workers' salaries and training and development (Gospel, 2015). The adverse situations for service providers may be exacerbated because of a shortage of the qualified labour to serve older people (Croll, 2018). Lastly, age-friendliness is a concept linked closely with social welfare provision. It is taken for granted that these facilities and services should be provided with low profits considering older people's economic condition (Arends, 2020). Thus, in chasing capital accumulation by community development, age-friendly community development seems not the best pathway for developers and administrators.

The third barrier is the older people's unsecured human rights in their communities. Older people's rights to community spaces are widely regarded as a human right and have been put into the human rights protection law (Du & Xie, 2015; Global Platform for the Right to the City, 2018). However, the low priority of older people's rights in the national law system often leads to the low enforceability of this kind of law (Dong, 2016). As mentioned above, the loss of the rights to community spaces can lead to the spatial segregation of older people and deprive them of social and civic participation opportunities.

According to the analysed barriers, some solutions can also be given from the theory. This study proposed three solutions composing the strategic dimension of the theoretical prototype of the policy framework. This dimension provides three strategic pathways to help age-friendly community policymaking. (1) To serve the development preference of capital accumulation, age-friendly communities should be commercialised. The commercialisation of age-friendly

communities should involve and boost various stakeholders who can produce profits from the communities. Thus, age-friendly communities become a new method of capital accumulation for cities. (2) To ensure older people's rights to community spaces, age-friendly communities should be bureaucratised. The bureaucratisation should eliminate the inequality of spatial resources between different generations and reduce the ageism in communities through administration. (3) To facilitate community environmental change, older people's social relations in their communities should be expanded. Social relations should increase the participatory opportunities for older people to negotiate in community design and operation.

The theoretical prototype also has a component dimension to indicate what components should be developed in communities to improve their age-friendliness. Some communities intentionally built for older people can indicate the developers' spatial representations of age-friendly communities, such as continuing care retirement communities (CCRC). The revenues of these communities are derived from older people, who are the main purchase power. In addition, the community administration of these communities is specially designed for older people's daily life. Thus, the community environments should also reflect the older people's representational spaces. The components of these communities were retrieved from a national information platform (www.yanglao.com.cn) and supplemented with some field visits to some exemplar communities in four Chinese cities Dalian, Shanghai, Shenzhen, and Guangzhou. The components of age-friendly communities were summarised into three aspects: community services, human activities, and housing functions. These three aspects compose the component

dimension of the theoretical prototype.

The strategies and the components should interact to facilitate age-friendly community development. The theoretical prototype of the policy framework, which combines the strategic and component dimensions, is shown in Figure 2.6. In the last part of this chapter, some policy recommendations from this theoretical prototype are given in detail.

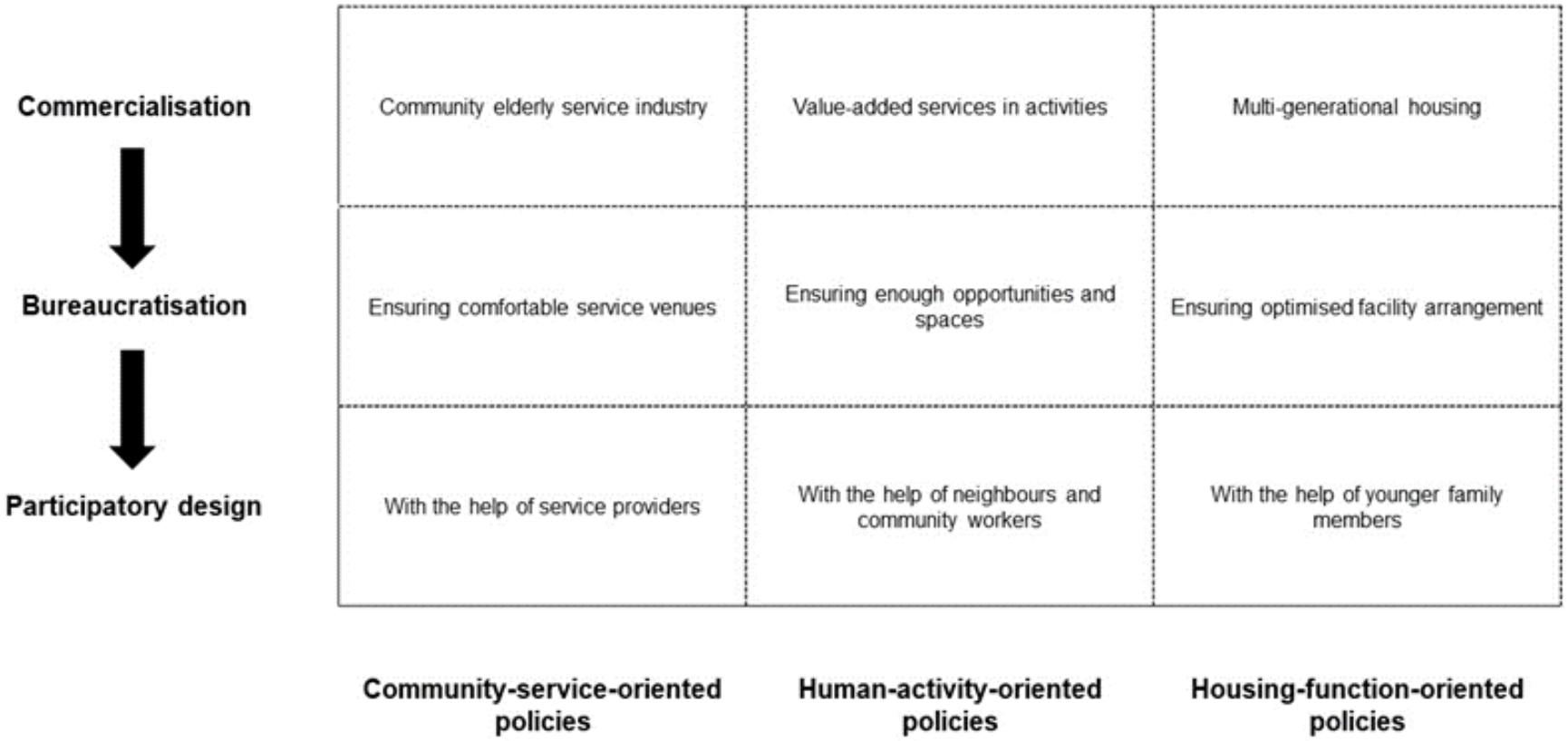

Figure 2.6 Theoretical prototype of the policy framework

2.4.3 The implications of the theoretical framework

Community-service-oriented policies support the diversified elderly services in communities. In commercialisation, this kind of policy can encourage the development of the elderly service industry within communities. Thus, regional economic activities can be triggered by age-friendly community development. Older people can be regarded as consumers instead of welfare recipients and get more considered in community development in a neoliberal atmosphere. In bureaucratisation, elderly service providers should be given the convenience to conduct services in communities, especially when they need access to proper venues. Although communities usually leave enough space for resident services, the conditions of these venues may not satisfy the requirements of elderly services (Yung et al., 2016). Therefore, community administrators should allow service providers to coordinate with community designers in community building or refurbishment to ensure spaces are suitable for elderly services. Lastly, community services can expand the social support networks between older people and various service providers. Older people can express their spatial demands with the help of service providers.

Human-activity-oriented policies support participation opportunities for older people in communities. In commercialisation, this kind of policy should support the introduction of commercial factors into the activities for older people. Commercial service providers can organise some activities to help them outreach potential customers. There should also be some value-added services in the activities. In bureaucratisation, some community activities for older

people should be officially regulated to ensure these activities can be carried out at proper times and spaces. Such formalisation can also mitigate the conflicting spatial practices between older and younger people when using community spaces for their activities. Lastly, community activities can expand older people's social networks within their neighbourhood. These activities can also encourage intergenerational interactions and mutual understandings. Thus, older people's community spatial expectations can be expressed with the help of their neighbours and community administrators.

Housing-function-oriented policies support housing issues for older people in communities. Housing in age-friendly communities is a broad topic covering many built environment issues, including interior and surrounding environments, living arrangements, and housing provision (Luciano et al., 2020). To mitigate the intergenerational inequality in community spatial resources, this framework focuses on the concept of multi-generational housing. Currently, living with their parents to take care of them becomes the main reason for younger people to live with or nearby older people (Hanes, 2020). Thus, multi-generational housing provides a conceptual guide to developing intergenerational mixed communities. In commercialisation, policies should encourage the supply of multi-generational housing. Meanwhile, the housing design and surrounding facilities should compose work-life-caregiving-balance environments for younger people. Such environments can become value-added components for community development. Furthermore, some space arrangement strategies and technologies should be applied to intergenerational mixed communities in bureaucratisation. Thus, these strategies and

technologies can optimise community spatial resources to ensure the efficiency demanded by younger working generations and the accessibility demanded by older generations. Lastly, multi-generational housing can expand older people's closest social relations with their family members. The family members can express older people's spatial expectations.

2.5 Chapter summary

According to the research aim and the first research question, this study established the theoretical prototype of a policy framework to support age-friendly community development.

Firstly, a scientometric literature review of age-friendly community studies was conducted, focusing on the theoretical development. Six theory groups were found: the ecological theory, the production of space, social-related theories, place-related theories, governance-related theories, and individual-centred theories. A combination of the qualitative and quantitative analysis indicated that the production of space is an influential theory in age-friendly community studies but has not been fully used yet. Especially, the theory has not been used to develop models in age-friendly community studies. On the other hand, the ecological theory has been used to develop most of the current influential models in the research area. However, these models also inherit the limitations of the theory, which is very idealistic and regards older people as the passive users of community environments. Thus, this study chose the production of space to develop the theoretical prototype.

From the perspective of the production of space, this study focused on three barriers to age-

friendly community development: *societal and institutional ageism*, *resistance from developers and administrators*, and *the loss of human rights*. From the analysis of the barriers, three solutions were also given from the theory's perspective: *commercialisation*, *bureaucratisation*, and *expanding social relations*. These three solutions compose the strategic dimension of the theoretical prototype. Meanwhile, a component dimension of the theoretical prototype was formed by extracting the components of age-friendly communities by referring to the actual practices of some communities intentionally designed for older people. The three extracted components are *community services*, *human activities*, and *housing functions*. The interactions between the strategic and component dimensions finally form the theoretical prototype.

Overall, the implication of the theoretical prototype is to guide age-friendly community development from the perspective of the production of space. (1) Guided by spaces are built for capital accumulation (Shen & Wu, 2017), commercialisation can transform age-friendly communities into a measure of urban capital accumulation. (2) Guided by different groups' rights to spaces should be ensured (Purcell, 2014), the bureaucratisation can redistribute community spatial resources to optimise the utility of these resources by both older and younger people. (3) Guided by the socio-spatial dialectic (Alidoust et al., 2019), the framework can support the expansion and use of older people's social relations to strengthen their expressions about the environmental expectations of their communities.

Besides compensating for the limitation of the ecological theory, the theoretical prototype also has another advantage making it deserve to be further studied. Compared with other models,

this prototype summarised the age-friendly community components based on realised practices. Thus, the model is more suitable to be directly used by community development practitioners. The following chapters focus on the practical development of the theoretical prototype by specifying the strategic and component dimensions.

Chapter 3 Development of the practical formation of the policy framework

3.1 Chapter background

This study used Hong Kong as a case to operationalise the theoretical prototype. In this background part, firstly, the rationales for choosing Hong Kong are explained. Secondly, the age-friendly community policymaking in Hong Kong is described.

3.1.1 Rationale for choosing Hong Kong as a case

This study aims to develop a policy framework for age-friendly community refurbishment. Many policies, especially those related to ageing issues, are made bottom-up in China. The meaning of this "bottom-up" is different from that given by Lui et al. (2009) for age-friendly community development. The bottom-up here means the central government supports some pilot projects and improves the policies based on the experience from the pilot projects. Such bottom-up examples include the endowment insurance, age-liveable communities, home-based and community-based elderly care services, and the renovation of old urban neighbourhoods.

Although age-liveable communities are widely regarded as the localised concept of age-friendly communities in China, policymakers recently have paid specific attention to the exact concept of age-friendly communities. On 9th December 2020, the China National Committee of Ageing (2020) issued a notice to launch the national pilot projects for age-friendly

community development. Thus, this study selected an accredited member of age-friendly community development from the GNAFCC instead of age-liveable community development pilot cities. Currently, China has two cities in the GNAFCC: Hong Kong and Qiqihar. Hong Kong was chosen as the studied case for three reasons.

Firstly, Hong Kong is a pioneering city in China in the aspect of social policies related to ageing issues. Although Hong Kong is a special administrative region in China, which means it has different social institutions from the Mainland cities and a high autonomy in policymaking, many policy strategies related to ageing issues in Hong Kong also appear in the policies issued by the central government. For instance, the underpinning principle of Hong Kong's ageing policy is "*ageing-in-place as the core, institutional care as the backup*" (The Government of the Hong Kong Special Administrative Region, 2017c). At the same time, the five-year plan issued by the central government also has the statement that "*home-based services as the foundation, community-based services as the support, and institutional services as the supplement*". Another example is that Hong Kong aims to respond to population ageing with the help of silver hair markets, while expanding the diversity of elderly services depending on commercial actors is also a currently emerging strategy proposed by the central government. Thus, an exploration of Hong Kong's experience can inspire the policymaking of the age-friendly community development of the whole nation.

Secondly, it has been widely recommended by professionals that Mainland age-friendly community development should learn from Hong Kong's experience (e.g. Chen, 2015; Chen,

2012; Ding, 2007; Li, 2013; Liu, 2020; Liu & Tian, 2008; Ma, 2013; Qin et al., 2011; Wang & Liang, 2014; Q. Xu, 2015; Y. Xu, 2015; Zhang & Zhao, 2018; Zhu & Chen, 2009). Especially, Kang (2014) deeply investigated Hong Kong's experience in developing age-friendly communities and gave four suggestions for Mainland practices: (1) encouraging participation of diversified stakeholders, (2) operationalising action plans, (3) value non-government actors, and (4) involving older people in design and plan processes. Therefore, this study focused on Hong Kong's age-friendly community development policies and summarised the referential experience of this pioneering city in China.

Thirdly, Hong Kong is an exemplar city of age-friendly community development in China and worldwide. An international comparison was made between Hong Kong, London, New York, and Singapore to reveal Hong Kong's outstanding performance in age-friendly community development. The cities for comparison were selected because of (1) being global metropolitans (Buffel & Phillipson, 2016), (2) being accredited by the Global Network for Age-friendly Cities and Communities (GNAFCC), and (3) their policies are mainly written in English and Chinese (for Hong Kong's public documents). The first two common characteristics are proved to be influential for age-friendly community development. While the reason for the third characteristic is that the study was conducted in English, and the context of the study was located in China.

Age-friendly communities are one of London's development agendas, Inclusive London (Greater London Authority, 2021a). London seldom uses the exact term "age-friendly

community" in its policies, including Inclusive London. However, the policy quotes some inactive lifestyles of old people stated in "An Age-Friendly City: How far has London come?", an influential progress report on London's age-friendly community development (Mayor of London, 2018; Tinker & Ginn, 2015). In addition, the authority released a readers' guide to highlight the content concerning older people in Inclusive London (Greater London Authority, n.d.). The guide covers all the eight domains of age-friendly communities. As the city's long-term development strategy, The London Plan also indirectly includes the concept of age-friendly communities by mentioning Inclusive London (Greater London Authority, 2021b). Without mentioning precisely the term "age-friendly community", the London government incorporates considerations of ageing issues in various city policies and programmes.

In New York, there is a city-wide initiative for age-friendly community development, Age-Friendly NYC (Department for the Aging, 2017). It contains many New York's age-friendly community development programmes. In addition, New York's government incorporates age-friendly community development in the city's development strategy, OneNYC, as a component of Health Neighborhood, Active Living (Boufford, 2017; City of New York, 2015). Overall, New York's age-friendly community development has three characteristics. (1) The municipal government sets the Department for the Aging (DFTA) as a particular agency to tackle ageing issues. The Department is the governmental leader in administrating age-friendly community development. (2) Age-friendly community development collects contributions from a broad sectoral collaboration in New York. The collaboration is in a double direction. On the one hand,

different government agencies participate in age-friendly community development. On the other hand, the commissioner of the DFTA also participates in different policymaking and administrative boards of other governmental sectors. (3) In New York, the American Association of Retired Persons (AARP) is a professional and non-government organisation that intensively participates in age-friendly community development.

The guideline for Singapore's age-friendly community development is the Action Plan for Successful Ageing issued by the Ministry of Health (2016). The Ministerial Committee on Ageing is the governmental agency in charge of age-friendly community development. The Action Plan covers three levels: individual, community, and city. The individual-level stresses "longevity is opportunity" and has four components: lifelong employability, health and wellness, senior learning, and senior volunteerism. The community-level stresses "cohesive home with intergenerational harmony" and has two components: community befriending and inter-generational harmony. The city-level stresses "live well and age confidently in place" and has four components: aged care, active ageing and assisted living, transport and research. The long-term development strategy of Singapore, the Master Plan, does not contain the exact word of age-friendly communities. However, a chapter in the plan, Liveable and Inclusive Communities in the Action Plan, indicates the consideration of ageing issues (Urban Redevelopment Authority, 2021b). The Urban Redevelopment Authority also invites citizens to participate in age-friendly community development through "Plan our Future SG". The programme contains six dimensions of age-friendly communities: safety, walkable, inclusive

public transport, engaging and inclusive, a therapeutic environment, and innovative design typologies of nursing homes (Urban Redevelopment Authority, 2021a). The government of Singapore also stresses older people's employability. Singapore has a very high employment rate among people aged 60 and above.

The unit to join the GNAFCC in Hong Kong is the city's electoral districts instead of the city. Currently, all the 18 electoral districts have been accredited by the WHO. District councils developed the commitments to join the Network under the support of the government and the Hong Kong Jockey Club Charities Trust. These district councils are established to provide regional advice on residents' well-being to the government (The Government of the Hong Kong Special Administrative Region, 2021). In addition, all the districts have their baseline assessments and action plans developed in coordination with the Hong Kong Jockey Club Charities Trust and four local universities (Jockey Club Age-friendly City Project, 2021). The development goals are detailedly written in these action plans and can be evaluated by systematic observation.

Overall, the commitments of Hong Kong to join the Network has the following three characteristics: (1) the high accountability of action plans, (2) the bottom-up pathway that is close to the genuine demands of residents, (3) a wide range of benefitted older people no matter where they live. Thus, summarising Hong Kong's successful experience can benefit other Mainland cities by providing a template to increase their coverage and scale of age-friendly community development.

3.1.2 Hong Kong age-friendly community policy development situation

Besides the characteristics mentioned above, the Hong Kong government has also developed various policy support for age-friendly community development. Age-friendly community development has become a component of the city's general and long-term development strategy in the 2016 Policy Address and Hong Kong 2030+ (Planning Department, 2016b; The Government of the Hong Kong Special Administrative Region, 2016). In these two policies, the government stresses the built environment aspect of age-friendly communities, including barrier-free environments, outdoor spaces, and liveable home environments (Au et al., 2017; Sun et al., 2017). The only component of the social environment aspect is digital inclusion stressed in the 2016 Policy Address (The Government of the Hong Kong Special Administrative Region, 2016). Although Hong Kong's current policy support for age-friendly community development pays more attention to built environments, social environments have already been well supported by the policies developed under active ageing principles (Social Welfare Department, 2021). Broad social support networks for older people has been established with the participation of diversified stakeholders (Kwan & Tam, 2021). However, the built environments in some old districts where older people concentrate are severely distorted (Qian et al., 2019; Sun et al., 2020). Thus, the policy support for age-friendly community development can be regarded as an improvement of Hong Kong's active ageing policies from the built environment aspect.

Previous studies identify some important policies for age-friendly community development in Hong Kong. Because of a lack of a traditional social security system, the government has launched three assistance schemes: Comprehensive Social Security Assistance (CSSA), Old Age Allowance (OAA), and Old Age Living Allowance (OALA). These schemes aim to mitigate the prevalent poverty faced by older people. However, Bai (2019) found these schemes insufficient to alleviate older people's poverty problem. Besides the financial assistance schemes, there are also subsidy schemes to satisfy older people's demands. For example, for transportation, the Government Public Transport Fare Concession Scheme for the Elderly and Eligible Persons with Disabilities encourages older people to join more social activities by providing a discounted fare of HK$ 2 per trip (Yang, 2018). For housing, the main occupants of the subsidised scheme of Public Rental Housing (PRH) are older people (Jayantha et al., 2018; Wadu Mesthrige & Cheung, 2020). In addition, there is a Health Care Voucher scheme for elderly health services (Bai, 2019). Although positive effects exist, the above schemes still take a traditional mindset regarding older people as passive welfare recipients.

Another non-financial example is an initiative to facilitate inclusive public transportation services, Transportation for All. However, the initiative mainly considers people with disability problems (Szeto et al., 2017). Thus, it may reinforce the stereotype of ageing that older people prevalently have low mobility.

Meanwhile, some other policies take the new mindsets of active ageing, benefiting age-friendly community development in Hong Kong. The concept of active ageing was introduced into

Hong Kong's policy by the 1997's Policy Address of the Hong Kong Government. The Elderly Commission gave a policy framework for active ageing in 2006. The framework has seven sub-factors to support the three pillars of active ageing: security, participation, and health. The subfactors of the *physical environment* and *financial* support the pillar of security; the subfactors of *retirement and part-time employment*, *elder learning* and *volunteering* support the pillar of participation; and the subfactors of *individual health maintenance* and *ensuring a basic medical system* support the pillar of health maintenance (Chan & Cao, 2015). Some exemplar policies developed from this framework include the Elder Academy Scheme (Chan & Cao, 2015), the Hong Kong Employment Program for Middle-Aged Workers (Yeung et al., 2021), and the Reference Frameworks in Primary Care Setting (Food and Health Bureau, 2021; Woo et al., 2013).

Scholars also tried to reinvestigate the actual image of older people in Hong Kong. For instance, Woo et al. (2020) found that government subsidy schemes could play the same role as traditional social security systems. Thus, the poverty of older people tends to be a social stereotype that may harm the images of ageing in Hong Kong.

3.2 Methodology

3.2.1 Analysed dataset

The analysed dataset in this stage was retrieved from the published report of a Public Policy Research project named "Sustainable Planning Criteria (SPC) for Age-Friendly Precincts (AFP)

in the New Development Areas (NDAs) of Hong Kong", funded by the Central Policy Unit of Hong Kong SAR government (Chan et al., 2015). The project was initially designed to identify the sustainable development criteria for age-friendly precincts. In this study, it was found that the analysis of the dataset could indicate how age-friendly community development can sustain communities' life cycle, which is a major goal of old urban neighbourhood renovation. The questionnaire survey was designed by a comprehensive literature review and expert interviews. The details of the questionnaire development can be found in previous studies (Chan et al., 2015; Qian et al., 2019). The survey was conducted in 2014 in eight selected areas of Hong Kong. These areas covered different scenarios. *Sha Tin*, *Fan Lin,* and *Sheung Shui* are three new development areas. *Central* is the well-developed central business district. *Kwun Tong* and *Sham Shui Po* are two urban renewal districts. At the time of the survey, *West Kowloon* was still a planned cultural zone. *Hung Hom* is a highly dense old area.

The survey responses were collected by a street-intercept method, and 100 respondents were found from each of the eight areas. Thus, the dataset sample has advantages in sample coverage, response rate, completion rate, yield rate, and interference rate (Miller et al., 1997). 772 cases out of the 800 were valid responses. 39% of the valid cases were respondents aged 60 and above. This portion is higher than the overall situation of Hong Kong in 2014 (Census and Statistics Department Hong Kong Special Administrative Region, 2015). However, a higher portion of older respondents is reasonable because age-friendly communities are mainly developed to facilitate older people's active life in their neighbourhoods. The incorporation of younger

respondents is also reasonable for the following three reasons: First, to prevent age-segmentation, age-friendly communities should consider the liveability of all ages (Tang et al., 2021). Secondly, the younger and working population are a determinant social group in urban planning (Buffel & Phillipson, 2016). Lastly, younger generations are the major caregivers to their parents. Thus, their environmental perceptions can reflect the environmental demands of their parents on the one hand and of caregivers on the other hand (Chan et al., 2015; Kwok, 2006). Other demographic characteristics of the sample are summarised in Table 3.1.

Table 3.1 Demographic characteristics of the dataset (summarised from: Chan et al., 2015)

Category		Portion
Gender	Male	50.46%
	Female	49.54%
Age	Below 30	19.43%
	31–40	9.97%
	41–50	11.01%
	51–60	20.06%
	61–70	26.17%
	71–80	9.07%
	Above 80	3.76%
Education attainment	Primary education	19.92%
	Secondary education	36.36%
	Tertiary education	28.61%
	Above tertiary education	10.92%
Occupation	Commercial sector	19.49%
	Professional sector	14.65%
	Academic	8.33%
	Government	6.72%
	Private sector/NGO	6.18%
	Planning and development sector	2.82%
	Other (unemployed/retired/not want to say)	41.80%
Residing district	Kwun Tong	16.25%
	Sham Shui Po	13.00%
	Sha Tin	13.00%
	Sheung Shui	12.50%
	Fan Ling	9.00%
	Central	6.88%
	West Kowloon	6.13%
	Hung Hom	5.50%
Income	Below HKD 5000	36.61%
	HKD 5001–HKD 10,000	8.01%
	HKD 10,001–HKD 15,000	16.80%
	HKD 15,001–HKD 20,000	13.25%
	HKD 20,001–HKD 25,000	9.58%
	HKD 25,001–HKD 30,000	6.69%
	HKD 30,001–HKD 35,000	1.71%
	HKD 35,001–HKD 40,000	2.23%
	HKD 40,001–HKD 45,000	2.23%
	HKD 45,001–HKD 50,000	1.84%
	Above HKD 50,001	1.05%

The questionnaire has two sections: age-friendly criteria and sustainability criteria sections. The age-friendly criteria section has seven parts: outdoor spaces, transportation, buildings and neighbourhood, social/civic participation, respect, communication and information, and

community and health services. The sustainability criteria section has three parts: economic sustainability, environmental sustainability, and social sustainability. There are a total of 66 criteria in the questionnaire. The respondents were asked to rate their perceived importance of each criterion on a five-point scale, where one indicates “not important at all” and five indicates “very important”.

3.2.2 Factor analysis

Fewer factors can represent these 66 criteria because some may have the same meanings. Therefore, the long list of criteria was dimensionally reduced into fewer representative factors to develop a simplified practical framework. Referring to the previous comparable age-friendly community studies (Lai et al., 2016; Smith et al., 2013), factor analysis was used to find the representative factors of these 66 criteria. There are two kinds of factor analysis: exploratory factor analysis (EFA) and confirmatory factor analysis (CFA). Due to a lack of presumption about the representative age-friendly and sustainability factors perceived by Hong Kong citizens, EFA was used referring to the method of previous studies (Smith et al., 2013).

The data was processed by IBM SPSS 23 statistical software, Chicago, IL, the United States. The extraction method was principal axis factoring (PAF). The rotation method was direct Oblimin. The KMO and Bartlett’s test shown in Table 3.2 indicates the dataset is satisfactory to conduct PAF. SPSS can produce a correlation matrix of the extracted representative factors. The correlations between these representative factors form a correlation network, which is the

practical framework established in this study. As indicated by previous studies, if the absolute value of a correlation coefficient is above 0.3, the two factors have a meaningful correlation (Field, 2013; Olsson et al., 2020). The correlation network visualised these meaningful correlations. According to Hong Kong's age-friendly community policies, the practical implications of the correlation network were discussed.

Table 3.2 KMO and Bartlett's test

Index		Value
Kaiser–Meyer–Olkin Measure of Sampling Adequacy.		0.936
Bartlett's Test of Sphericity	Approx. Chi-Square	23104.359
	df	2145
	Sig.	0.000

3.3 Factor analysis results

3.3.1 Factor extraction result

As shown in Table 3.3, the 15 extracted factors account for 61.573% of the variation. The factor loadings matrix is shown in Table 3.4. Each factor was named according to its most related criteria. The name of each factor is shown in Table 3.5.

Table 3.3 Total variance explained

Component	Initial Eigen Values			Extraction Sums of Squared Loadings			Rotation Sums of Squared Loadings
	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %	Total
1	16.989	25.741	25.741	16.505	25.008	25.008	6627
2	3510	5318	31.058	3009	4559	29.567	4026
3	3199	4846	35.905	2743	4156	33.723	6919
4	2040	3091	38.996	1581	2395	36.118	2383
5	1902	2881	41.877	1431	2168	38.286	7744
6	1772	2684	44.561	1269	1922	40.208	5703
7	1599	2423	46.985	1139	1725	41.934	2547
8	1480	2243	49.228	0.988	1497	43.430	4451
9	1377	2086	51.314	0.847	1284	44.714	7677
10	1306	1979	53.293	0.825	1250	45.964	4496
11	1227	1860	55.153	0.761	1153	47.117	4963
12	1130	1711	56.864	0.633	0.959	48.077	4042
13	1081	1638	58.503	0.604	0.916	48.992	4365
14	1026	1555	60.058	0.565	0.856	49.848	5495
15	1000	1515	61.573	0.507	0.768	50.615	7322

Table 3.4 Pattern matrix (factor loading table)

	Component														
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
q10_2	**0.586**	−0.035	0.020	−0.094	−0.036	0.074	0.050	−0.047	0.058	−0.110	−0.081	−0.003	0.094	0.063	−0.044
q10_3	**0.534**	−0.068	0.015	−0.035	−0.082	0.053	0.098	−0.008	0.106	0.016	−0.120	−0.011	0.135	−0.080	−0.075
q10_1	**0.483**	−0.078	0.078	−0.229	−0.022	0.162	0.058	−0.087	−0.062	−0.057	0.146	−0.154	0.116	0.028	0.001
q10_7	**0.425**	−0.048	0.089	0.153	−0.049	0.061	0.098	0.000	0.024	0.002	0.177	0.128	0.022	−0.048	−0.054
q10_4	**0.419**	0.079	0.065	−0.023	−0.152	−0.085	−0.136	0.009	0.010	0.024	0.032	0.147	−0.012	−0.113	−0.035
q10_5	**0.413**	0.160	0.092	0.015	−0.048	−0.081	−0.181	0.056	0.043	0.101	0.157	0.124	0.047	−0.211	−0.040
q10_6	**0.374**	0.021	0.182	0.157	−0.069	−0.043	−0.042	0.026	−0.042	0.044	0.215	0.152	0.083	−0.031	−0.116
q1_2	0.024	**0.561**	0.097	0.007	0.020	0.025	0.146	−0.083	0.074	0.026	−0.056	0.108	−0.037	0.032	−0.104
q1_1	−0.079	**0.457**	0.025	−0.222	−0.041	0.086	0.022	−0.095	−0.065	0.021	0.107	−0.035	0.086	−0.027	0.100
q3_4	0.053	**0.351**	0.006	.029	−0.068	−0.081	0.020	0.001	0.084	−0.195	−0.084	0.075	0.043	−0.161	−0.112
q3_3	0.035	**0.343**	−0.078	−0.097	−0.057	−0.014	−0.088	−0.067	0.069	−0.238	−0.044	0.068	0.082	−0.182	−0.066
q1_4	0.061	**0.323**	−0.053	−0.063	−0.091	0.019	0.233	0.000	0.023	0.082	0.033	0.068	0.124	−0.154	−0.067
q2_8	0.045	**0.218**	0.057	0.143	0.014	0.015	0.040	−0.172	−0.126	−0.142	0.189	0.114	0.045	−0.171	−0.058
q9_2	−0.025	0.017	**0.788**	−0.002	−0.004	−0.016	−0.012	0.003	−0.045	0.004	−0.009	0.057	0.040	−0.027	−0.023
q9_1	0.079	−0.014	**0.708**	−0.071	−0.009	0.036	−0.023	−0.051	−0.011	0.080	0.112	−0.066	0.040	0.037	0.013
q9_3	0.010	−0.002	**0.691**	0.018	−0.015	−0.038	0.011	0.037	0.038	−0.020	−0.058	0.036	0.087	−0.058	−0.018
q9_4	0.010	−0.027	**0.351**	−0.020	−0.225	0.042	−0.014	0.080	0.036	−0.153	−0.107	0.002	0.075	0.011	−0.011
q7_1	0.054	0.017	0.041	**−0.663**	0.024	−0.016	0.011	0.056	−0.008	0.041	0.035	0.074	−0.031	−0.108	−0.182
q7_2	0.091	0.098	0.118	**−0.522**	0.022	−0.144	0.022	0.046	0.035	−0.102	−0.006	0.199	−0.021	0.053	−0.195
q2_1	0.002	0.138	0.079	**−0.236**	−0.093	−0.052	0.036	−0.216	−0.033	−0.004	0.050	−0.068	−0.116	−0.139	−0.006
q8_5	−0.049	−0.011	0.024	0.074	**−0.663**	0.039	0.004	0.039	−0.031	0.064	0.089	0.033	0.051	−0.044	−0.080
q8_1	0.025	0.114	0.086	−0.156	**−0.614**	0.025	−0.028	−0.039	−0.003	0.016	0.052	−0.033	−0.094	0.085	0.114
q8_7	0.008	−0.004	0.030	0.023	**−0.612**	−0.036	−0.008	0.089	0.020	−0.100	0.019	−0.011	0.137	−0.090	0.035
q8_6	0.005	−0.025	0.040	0.093	**−0.609**	−0.025	0.035	0.063	0.002	−0.063	0.050	0.036	0.127	−0.076	−0.018
q8_2	0.107	−0.030	−0.007	−0.022	**−0.596**	−0.005	0.073	−0.068	0.079	−0.078	−0.049	−0.033	−0.081	0.072	−0.049
q8_3	0.059	0.037	0.017	−0.027	**−0.590**	0.046	−0.071	−0.080	0.064	0.099	−0.052	0.082	−0.017	0.006	−0.102

q8_4	0.049	−0.095	−0.002	0.076	**−0.559**	0.080	0.032	−0.116	0.031	0.023	−0.035	0.043	0.085	0.020	−0.161
q5_2	0.087	0.010	0.013	0.105	−0.040	**0.752**	0.017	−0.009	0.069	0.065	−0.063	−0.031	0.012	−0.052	−0.119
q5_3	0.037	0.017	−0.045	−0.027	0.016	**0.710**	−0.001	0.081	0.005	−0.028	0.124	0.053	0.060	−0.019	−0.081
q5_4	0.001	−0.011	−0.046	0.102	−0.017	**0.580**	0.147	0.021	0.025	−0.155	0.012	0.043	0.058	−0.007	0.009
q5_1	−0.047	0.020	0.106	−0.067	−0.067	**0.557**	−0.071	−0.028	0.154	0.031	0.044	0.077	0.005	−0.008	0.016
q5_5	−0.024	0.040	0.096	−0.099	−0.046	**0.315**	−0.131	−0.005	0.015	−0.022	0.078	0.206	0.055	−0.090	0.038
q1_5	0.030	0.149	−0.013	0.005	−0.017	0.073	**0.483**	−0.096	0.093	−0.045	0.010	0.098	0.018	−0.144	0.063
q1_6	0.046	0.170	−0.032	−0.043	−0.038	0.086	**0.476**	−0.004	−0.053	−0.142	0.052	0.092	0.110	−0.092	−0.019
q1_3	−0.024	0.315	0.122	−0.059	−0.013	−0.051	**0.334**	−0.057	0.055	0.041	0.026	−0.101	0.080	−0.026	−0.172
q2_3	0.008	0.059	−0.006	0.095	−0.007	−0.043	−0.038	**−0.714**	0.025	−0.034	0.042	0.048	0.133	−0.014	−0.022
q2_4	−0.075	−0.050	−0.001	−0.107	−0.048	−0.029	−0.010	**−0.502**	0.007	0.005	0.033	0.040	0.074	−0.241	−0.021
q2_2	0.158	0.053	0.018	0.076	−0.003	0.022	0.225	**−0.440**	0.016	−0.082	0.019	0.008	−0.117	0.025	−0.051
q4_4	0.031	−0.016	0.018	0.013	−0.048	0.056	0.047	0.011	**0.694**	0.043	−0.009	0.006	0.054	−0.075	−0.029
q4_5	0.027	0.078	−0.043	0.004	−0.011	−0.066	−0.091	0.044	**0.582**	−0.078	0.122	0.113	0.106	−0.075	0.039
q4_2	0.066	−0.092	0.113	0.027	−0.001	0.139	0.107	−0.161	**0.540**	−0.056	−0.046	0.025	−0.089	0.051	−0.110
q4_3	−0.025	0.050	0.015	−0.007	−0.010	0.030	−0.076	−0.081	**0.538**	0.000	0.044	0.056	0.035	−0.055	−0.133
q4_6	−0.012	0.052	−0.044	−0.011	−0.067	0.119	0.049	0.181	**0.513**	0.024	0.260	−0.005	0.090	−0.034	−0.021
q4_7	0.026	−0.106	−0.024	0.046	−0.087	0.103	0.202	0.036	**0.436**	−0.045	0.330	−0.018	0.018	0.047	−0.002
q4_1	0.038	−0.008	0.094	−0.099	−0.082	0.163	−0.015	−0.212	**0.407**	−0.016	0.099	−0.055	−0.105	0.008	−0.026
q3_7	−0.033	−0.151	−0.008	0.011	−0.112	0.014	0.166	0.014	0.060	**−0.515**	0.041	0.024	0.086	−0.134	−0.093
q3_8	−0.010	−0.075	0.031	−0.028	−0.019	−0.019	0.078	−0.082	−0.008	**−0.500**	0.122	0.163	0.081	−0.066	−0.054
q3_1	0.138	0.169	0.060	0.014	0.017	0.177	−0.072	−0.110	0.059	**−0.497**	0.054	−0.135	−0.103	0.027	0.031
q3_2	0.030	0.251	0.050	−0.048	−0.015	0.119	−0.230	−0.094	0.087	**−0.320**	−0.027	−0.010	−0.060	−0.052	−0.025
q4_8	0.008	−0.064	0.035	−0.091	0.012	0.015	0.054	−0.061	0.186	−0.074	**0.629**	−0.036	0.009	0.009	−0.024
q4_9	0.016	0.008	−0.020	0.028	−0.066	0.059	−0.054	−0.042	0.092	−0.011	**0.623**	0.018	−0.014	0.012	−0.106
q6_2	0.040	0.018	0.042	−0.101	−0.001	0.037	0.006	−0.058	0.072	0.060	−0.038	**0.593**	−0.013	0.030	−0.064
q6_3	−0.014	−0.036	−0.004	0.004	−0.106	0.250	0.146	−0.005	0.024	−0.186	0.050	**0.451**	0.036	0.090	−0.008
q6_1	0.105	−0.014	0.171	−0.057	0.004	0.202	0.132	−0.128	0.050	−0.031	0.098	**0.235**	−0.057	0.026	0.031
q9_6	0.048	0.042	0.150	0.017	0.035	0.058	0.033	−0.095	0.086	0.057	−0.034	−0.031	**0.711**	0.045	−0.046
q9_7	0.149	0.058	0.048	−0.020	−0.089	0.035	−0.004	−0.050	0.012	−0.043	0.025	0.004	**0.596**	0.075	−0.016
q9_5	0.022	−0.055	0.281	0.088	−0.107	0.042	0.025	−0.023	0.036	−0.054	0.019	0.029	**0.453**	−0.018	−0.035
q2_6	0.053	0.005	0.125	0.015	−0.016	0.069	0.117	−0.041	0.059	0.010	0.023	−0.040	−0.093	**−0.586**	−0.066
q2_5	0.041	−0.038	−0.009	−0.204	−0.045	0.036	−0.068	−0.183	0.094	−0.026	−0.029	0.034	0.066	**−0.555**	0.078
q2_7	0.081	0.141	0.020	0.099	0.071	0.086	0.031	−0.118	0.074	−0.073	0.007	0.051	−0.016	**−0.434**	−0.095
q3_6	0.038	−0.013	0.051	−0.029	0.020	0.012	0.107	0.009	0.064	−0.219	0.063	−0.071	−0.014	**−0.423**	−0.144
q3_5	−0.020	0.142	0.129	0.051	−0.067	−0.152	0.105	−0.079	0.098	−0.162	0.082	−0.049	−0.037	**−0.178**	−0.131
q7_5	−0.045	−0.029	0.058	−0.057	−0.011	0.114	−0.035	−0.052	0.014	0.046	0.048	−0.017	0.067	−0.038	**−0.733**
q7_4	0.103	−0.053	−0.054	−0.025	−0.063	−0.051	0.057	−0.074	0.109	−0.030	−0.013	0.044	0.027	0.061	**−0.644**
q7_6	0.031	0.046	0.114	−0.016	0.006	0.060	−0.011	0.068	0.012	−0.059	0.070	0.039	−0.022	−0.051	**−0.577**
q7_3	0.028	0.096	−0.053	−0.211	−0.138	0.038	−0.076	0.016	−0.025	−0.021	0.047	0.050	0.023	−0.018	**−0.500**

Table 3.5 Factor summary

	Factor and Criteria	Factor Loading
	Factor 1 Social Sustainability	
Q10–2	Mixed housing types for intergeneration and ageing in place	0.586
Q10–3	Social mix in community (cultural/age/gender/income) to foster city liveability	0.534
Q10–1	Community focus and community delivery (enhancing sense of place)	0.483
Q10–7	Public participation for community building and public policy consultation	0.425
Q10–4	Efficient public transportation system (easy access to work and public facilities)	0.419
Q10–5	Age-friendly features, universal design and barrier-free access	0.413
Q10–6	Low carbon communities living program	0.374
	Factor 2 Environmental Safety	
Q1–2	Appropriate public facilities (toilets/seats along long corridors to the public transport/venues)	0.561
Q1–1	Universal accessibility (pedestrian crossings/pathways/cycle paths/parks/open spaces)	0.457

Q3–4	Safe and comfortable facilities/environment (interior design/handrail/non-slip flooring)	0.351
Q3–3	Universal access (buildings: doors/elevators; neighbourhood: ramps for wheelchair users)	0.343
Q1–4	Safe and secure public spaces (hotlines for emergency rescue/well maintained sidewalks)	0.323
Q2–8	Safety of transportation facilities and services	0.218
	Factor 3 Low-Energy-Consumption Development	
Q9–2	Zero-waste management (greater adoption of renewable energy/resource/recycling)	0.788
Q9–1	Smart growth and green infrastructures	0.708
Q9–3	Urban greeneries and vegetation	0.691
Q9–4	Transit-Oriented Development (TOD)	0.351
	Factor 4 Subsidised Services	
Q7–1	Affordable public health care services	−0.663
Q7–2	Accessibility and availability of public health care services	−0.522
Q2–1	Affordability (user-friendly programs: HKD 2 fare using Octopus card)	−0.236
	Factor 5 Economic Sustainability	
Q8–5	Appropriate use of resource: land and labour, etc.	−0.663
Q8–1	Economic growth and employment opportunities	−0.614
Q8–7	Diversity of economies	−0.612
Q8–6	Promoting fair market system, financial and social equity at the workplace	−0.609
Q8–2	Compact mixed-use development (residential/commercial/retail)	−0.596
Q8–3	High-quality and efficient public transportation system/networks	−0.590
Q8–4	Building positive city image (landmarks/visual impacts/landscape/people)	−0.559
	Factor 6 Respect	
Q5–2	History/cultural heritage	0.752
Q5–3	Socializing skills/personal empowerment	0.710
Q5–4	Fashion/beauty/styling	0.580
Q5–1	Computer classes (video chat/SMS/internet)	0.557
Q5–5	Personal health care including elderly friendly exercises/sports	0.315
	Factor 7 Outdoor Space Operation	
Q1–5	Special customer services (special queue for elderly/care kiosk for elderly and children)	0.483
Q1–6	Management and maintenance (of outdoor space)	0.476
Q1–3	Quality of green environment (fresh air/nature)	0.334
	Factor 8 Public Transportation Accessibility	
Q2–3	Travel connectivity to destinations	−0.714
Q2–4	Proximity to the bus stops on foot	−0.502
Q2–2	Public transport frequency and reliability	−0.440
	Factor 9 Isolation Prevention	
Q4–4	Recognition of elderly contributions (certificates/banquets, etc.)	0.694
Q4–5	Podium for socializing near to marketplaces (outdoor coffee shops/garden)	0.582
Q4–2	Lifelong learning programs for elderly	0.540
Q4–3	Addressing isolation and intergenerational programs	0.538
Q4–6	Working and volunteering opportunities after retirement	0.513
Q4–7	Elderly participation for community planning and political leadership	0.436
Q4–1	Affordability, choices and accessibility of events	0.407
	Factor 10 Senior Housing	
Q3–7	Enough housing availability for younger people in the neighbourhood	−0.515
Q3–8	Management and maintenance (of housing)	−0.500
Q3–1	Housing options (availability and types)	−0.497
Q3–2	Affordability of housing	−0.320
	Factor 11 Discrimination Prevention	
Q4–8	Addressing elderly discrimination in the workplace	0.629
Q4–9	Age-friendly and progressive public policy (integrated networks/minority groups support)	0.623
	Factor 12 Communication and Information	
Q6–2	Hearing/understanding service staff over the phone or in person	0.593
Q6–3	Technological aids and equipment (voice activation/motion detection/learning computer)	0.451
Q6–1	Printed material (brochures/menus) in legible size and format	0.235
	Factor 13 Conservative Development	
Q9–6	Cultural heritage/preservation	0.711

Q9–7	Redevelopment of brownfield sites and reuse of existing buildings/sites for development	0.596
Q9–5	Biodiversity (maritime/wetland/natural parks)	0.453
	Factor 14 Age-Friendly Facilities	
Q2–6	Pedestrian and bus stop signages (sufficient/legible)	−0.586
Q2–5	Universal access in public transportations: wheelchair user and cyclist- friendly	−0.555
Q2–7	Age-friendly features (seats/bus stop shelters/toilets inside stations, etc.)	−0.434
Q3–6	Signages (sufficient/legible/voice activation: elevator buttons/placement of housing names)	−0.423
Q3–5	Fresh clean air in the buildings/rooms/neighbourhood	−0.178
	Factor 15 Diversified Care Services	
Q7–5	Psychological needs for addressing isolation issue (talking/consultation)	−0.733
Q7–4	Promoting personal health care (wellness programs/workshops/arts/recreations/parks)	−0.644
Q7–6	Image grooming is good to build up elderly self-esteem	−0.577
Q7–3	Need for in-home assistance for independent living elderly	−0.500

The 15 factors extracted from EFA show that the factor structure perceived by Hong Kong citizens is significantly different from the original questionnaire developed from the literature review and validated by professionals. These differences echo Chapter Two's discussion that the professionals' spatial representations are often divergent from spatial users' expectations. These differences are shown in the nine points below.

(1) A new factor comprises six criteria from *outdoor spaces*, *transportation*, and *buildings and neighbourhoods*. These six criteria are (1) Appropriate public facilities (toilets/seats along long corridors to the public transport/venues); (2) Universal accessibility (pedestrian crossings/pathways/cycle paths/parks/open spaces); (3) Safe and comfortable facilities/environment (interior design/handrail/non-slip flooring); (4) Universal access (buildings: doors/elevators; neighbourhood: ramps for wheel-chair users); (5) Safe and secure public spaces (hotlines for emergency rescue/well-maintained sidewalks); (6) Safety of transportation facilities and services. These criteria show that safety is a concern in age-friendly communities for Hong Kong residents. Another common characteristic of these six criteria is that they are all related to built environments. Thus, the factor was named *environmental safety*. The underpinning criteria indicate that the environmental safety of age-friendly communities

can be realised from three aspects. (1) Environmental comfortability can enhance older people's perceived safety. (2) Universal design can reduce the harmful risks during older people moving around in community environments. (3) Other security design and services should be embedded into built environments to reduce insecurity factors for older people.

(2) *Environmental sustainability* is divided into two factors. The first factor contains four criteria: (1) Zero-waste management (greater adoption of renewable energy/resource/recycling); (2) Smart growth and green infrastructures; (3) Urban greeneries and vegetation; and (4) Transit-Oriented Development (TOD). The criteria (1), (2), and (3) can be found in some net-zero-energy building projects (Cumo et al., 2017). Meanwhile, the main aim of TOD is to reduce urban energy consumption by building efficient transportation systems (Hasibuan et al., 2014). Thus, the factor was named *low-energy-consumption development*.

The second factor contains three criteria: (1) Cultural heritage/preservation; (2) Redevelopment of brownfield sites and reuse of existing buildings/sites for development; and (3) Biodiversity (maritime/wetland/natural parks). These criteria require the protection of local culture and nature from being destroyed by community development. Especially, large-scale demolishment is not advocated by this factor. Thus, the factor was named *conservative development*.

Thus, there are two kinds of community environmental sustainability for Hong Kong residents: low-energy-consumption development and conservative development.

(3) A new factor comprises three criteria from *transportation* and *community and health*

services. These three criteria are (1) Affordable public health care services; (2) Accessibility and availability of public health care services; and (3) Affordability (user-friendly programs: $2 fare using Octopus card). This factor well reflects the Hong Kong situation described in the background of this chapter. Currently, subsidised public health care and transportation are two main subsidy schemes in Hong Kong. Meanwhile, subsidised public health care services usually have a long waiting list. Therefore, it makes accessibility also very important for subsidised health care services. Thus, the factor was named *subsidised public services*.

(4) Three criteria of *outdoor spaces* compose a new factor. These three criteria are (1) Special customer services (special queue for elderly/care kiosk for elderly and children); (2) Management and maintenance (of outdoor space); and (3) Quality of green environment (fresh air/nature). These criteria mainly concern the daily operation of outdoor community spaces. Thus, the factor was named *outdoor space operation*.

(5) Three criteria of *transportation* compose a new factor. These three criteria are: (1) Travel connectivity to destinations; (2) Proximity to the bus stops on foot; and (3) Public transport frequency and reliability. These criteria are related to the connections between older people and their surrounding public transportation. Thus, the factor was named *public transportation accessibility*.

(6) *Social/civic participation* is divided into two factors. The first factor contains seven criteria: (1) Recognition of elderly contributions (certificates/banquets etc.); (2) Podium for socializing

near to marketplaces (outdoor coffee shops/garden); (3) Lifelong learning programs for elderly; (4) Addressing isolation and intergenerational programs; (5) Working and volunteering opportunities after retirement; (6) Elderly participation for community planning and political leadership; and (7) Affordability, choices, and accessibility of events. These criteria are various events to address older people's loneliness and isolation. Thus, the factor was named *isolation prevention*.

The second factor contains two criteria: (1) Addressing elderly discrimination in the workplace; and (2) Age-friendly and progressive public policy (integrated networks/minority groups support). These criteria can reduce ageism and other discrimination towards older people. However, a lack of anti-discrimination laws for older people in Hong Kong makes it challenging to prevent deprivation in many aspects of their social life (Equal Opportunities Commission, 2016). It echoes the discussion in Chapter Two that the legal protection of older people's rights still needs to be strengthened. Thus, the factor was named *discrimination prevention*.

Thus, Hong Kong residents have two measures to ensure their social and civic participation: isolation prevention and discrimination prevention.

(7) Four criteria of *housing* compose a new factor. These four criteria are: (1) Enough housing availability for younger people in the neighbourhood; (2) Management and maintenance (of housing); (3) Housing options (availability and types); and (4) Affordability of housing. Unlike

the regular housing provision, these four criteria are related to public rental housing (PRH). PRH should take in more younger residents in neighbourhoods to increase social integration. The schemes such as the Comprehensive Structural Investigation Programme (Wadu Mesthrige & Cheung, 2020) are also needed to make provided houses more age-friendly. Lastly, options and affordability are also important and need further consideration by the government and providers. Thus, the factor was named *senior housing provision*.

(8) A new factor comprises five criteria from *transportation* and *housing*. These five criteria are (1) Pedestrian and bus stop signages (sufficient/legible); (2) Universal access in public transportations: wheelchair users and cyclists friendly; (3) Age-friendly features (seats/bus stop shelters/toilets inside stations etc.); (4) Signages (sufficient/legible/voice activation: elevator buttons/placement of housing names); and (5) Fresh air in the buildings/rooms/neighbourhood. The criteria (1) to (4) are the facilities included in the 2016 Policy Address (The Government of the Hong Kong Special Administrative Region, 2016) and the Hong Kong 2030+ (Planning Department, 2016a). In addition, fresh air should also be enhanced by related building service facilities (City of New York, n.d.; Cumo et al., 2017). Thus, the factor was named *age-friendly facilities*.

(9) Four *community and health services* criteria compose a new factor. These four criteria are: (1) Psychological needs for addressing isolation issues (talking/consultation); (2) Promoting personal health care (wellness programs/workshops/arts/recreations/parks); (3) Image grooming is good to build up elderly self-esteem; and (4) Need for in-home assistance for

independent elderly living. Compared with the subsidised services mentioned above, these are diversified new forms of services that emphasise personal development and active images of older people. Thus, the factor was named *diversified care services*.

Some factors were perceived contingently by residents and professionals. These factors include *social sustainability*, *economic sustainability*, *respect*, and *communication and information*. Thus, these factors used their original names given and validated by the experts.

According to Table 3.4, six factors have negative factor loadings: *subsidised public services*, *economic sustainability*, *public transportation accessibility*, *public senior housing provision*, *age-friendly facilities*, and *diversified care services*. These factors have opposite meanings to their most related criteria and original names (de Vaus, 2002). To simplify the practical framework, this study kept the original names of these six factors and categorised them as *negative factors*. As a result, the correlation direction is reversed between a negative and a non-negative factor. Otherwise, the correlation direction will not change.

Overall, the 15 factors are (1) social sustainability, (2) environmental safety, (3) low-energy-consumption development, (4) subsidised public services, (5) economic sustainability, (6) respect, (7) outdoor space operation, (8) public transportation accessibility, (9) isolation prevention, (10) public senior housing provision, (11) discrimination prevention, (12) communication and information, (13) conservative development, (14) age-friendly facilities, and (15) diversified care services.

3.3.2. Correlation test result

According to the methods section, the correlation is meaningful if the absolute value of the coefficient is above 0.3. The correlations matrix of the fifteen factors is shown in Table 3.6. The significant correlations were also visualised in a correlation network shown in Figure 3.1, which is also the practical framework.

Table 3.6 Component correlation matrix

Component	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
1	1														
2	0.123	1													
3	**0.390**	0.200	1												
4	−0.101	−0.270	−0.190	1											
5	**−0.345**	−0.130	**−0.402**	0.137	1										
6	0.219	0.043	0.196	−0.043	−0.228	1									
7	0.114	0.118	0.061	0.068	−0.082	0.157	1								
8	−0.216	**−0.305**	−0.221	0.174	0.146	−0.164	−0.192	1							
9	0.255	0.098	0.198	−0.054	**−0.322**	**0.401**	0.153	−0.207	1						
10	−0.180	−0.202	−0.163	0.025	0.210	−0.239	−0.179	0.246	−0.257	1					
11	0.222	0.139	0.205	−0.93	−0.212	0.299	0.117	−0.160	**0.361**	−0.168	1				
12	0.236	0.167	0.210	−0.091	−0.223	0.231	0.056	−0.093	0.215	−0.135	0.179	1			
13	0.241	0.066	**0.327**	0.051	**−0.324**	0.177	0.132	−0.014	0.172	−0.105	0.162	0.217	1		
14	−0.183	**−0.359**	0.217	0.135	0.179	−0.039	−0.115	**0.317**	−0.255	0.295	−0.233	−0.198	−0.188	1	
15	**−0.367**	0.192	**−0.305**	0.174	**0.324**	−0.146	−0.205	0.185	**−0.375**	0.202	−0.205	**−0.311**	−0.207	**0.304**	1

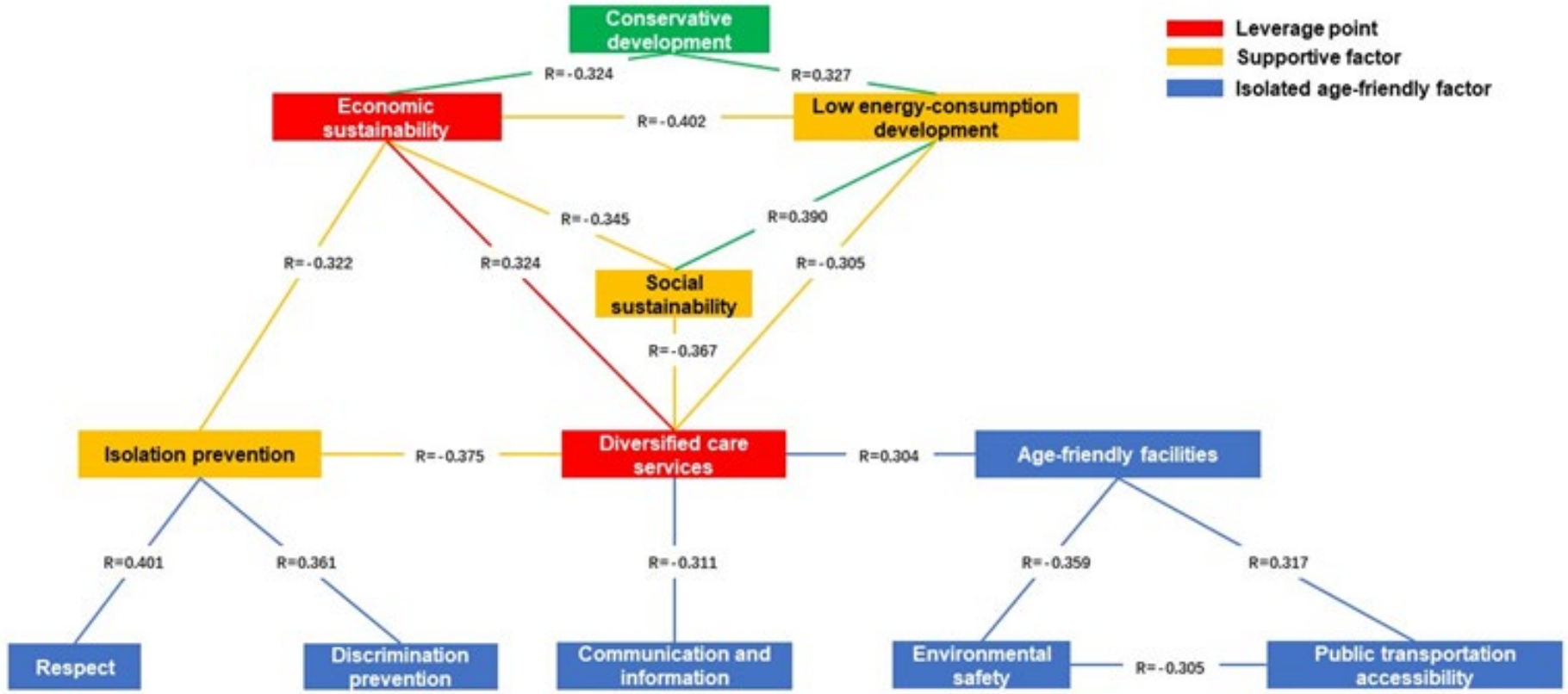

Figure 3.1 Practical policy framework

Figure 3.1 shows three significant points. (1) *Economic sustainability* and *diversified care services* are most linked with other factors. (2) Some other factors correlate with both economic sustainability and diversified care services, including *social sustainability*, *low energy-consumption development,* and *insolation prevention*. (3) Some age-friendly community factors are more peripheral in the network, including *respect*, *discrimination prevention, communication and information*, *age-friendly facilities*, *public transportation accessibility*, and *environmental safety*.

3.4 Discussion

This section discusses the different parts of the practical framework.

3.4.1 Central part: building the commercial core

Economic sustainability and diversified care services have the most linkages indicating their central roles in the network. A correlation (r=0.324) exists between these two policy factors, which means their interaction can boost the whole correlation network. According to the theoretical prototype, commercialised community services can integrate economic sustainability and diversified care services. Commercialised community services can be realised by developing community silver hair markets.

Developing community silver hair markets has caught academic interests and been found beneficial, as shown in the background part of Chapter One. Transforming elderly services from

subsidised to commercialised goods can create new consumers and enhance community commercial environments. Meanwhile, commercial elderly services can supplement their subsidised counterparts by providing more diversified and high-end options. Currently, elderly services are increasingly provided through commercial markets (Schwiter et al., 2018). In Hong Kong, more citizens seek elderly services from private providers (Leung et al., 2020). Commercial elderly services can also revitalise meso community environments. In Hong Kong, it has been found that incorporating high-end elderly care facilities can benefit property owners, service providers and customers and form a cycle of increasing benefit (Kwok, 2020). Community silver markets can also benefit urban economic development at the macro level. In Hong Kong, public administration, social and personal services contributed to the second largest Gross Domestic Product (GDP) while continuously increasing from 2015 to 2019 (Census and Statistics Department Hong Kong Special Administrative Region, 2021).

In Hong Kong, developing silver hair markets is one of the policy strategies to address population ageing and was raised in the Chief Executives' 2017 Policy Address (The Government of the Hong Kong Special Administrative Region, 2017a). Overall, community silver markets can be an entry point for age-friendly community development to facilitate continuous community economic development.

3.4.2 Supportive part: developing the institutional support

As shown in Figure 3.1, policymakers can issue some administrative measures to support

community silver markets, the commercial core of age-friendly community development facilitating continuous community development. These support measures include a built environment factor (low-energy-consumption development) and two social factors (social sustainability and isolation prevention).

Low-energy-consumption development correlates with economic sustainability (r=0.402) and diversified care services (r=0.305), which means low-energy-consumption development can support community silver hair markets. Low-energy-consumption development realises age-friendly community development by providing more greenery (Cumo et al., 2017). Greenery can attract older people to use the care services in community public spaces (Liu et al., 2015). Besides expanding the customer base, greenery can also improve the effectiveness of care services (Carver et al., 2020; Kopp et al., 2021). An interaction between greenery and care service is horticultural therapy which uses greenery as an instrument of health and medical services (Jarrott et al., 2002). The low-energy-consumption development can also enhance the age-friendliness of interior environments (Ivan et al., 2020). The green building measures can improve care facilities' thermal comfortability (Mendes et al., 2015). Both pleasant outdoor environments and green buildings can also reduce the energy consumption cost for service provision. Nowadays, it is difficult to find the policy interactions between low-energy-consumption development and age-friendly community development in Hong Kong. However, some examples can be found in Singapore's therapeutic environment policy and New York's cool neighbourhood programme (City of New York, n.d.; Urban Redevelopment Authority,

2021a).

Isolation prevention correlates with both economic sustainability (r=0.322) and diversified care services (r=0.375), which means isolation prevention can enhance the development of community silver hair markets. Social isolation is the main obstacle for older people to care services (Askelson et al., 2011). The decreasing customer base may discourage private services providers (Jordahl & Persson, 2021). However, well-organised activities and services can keep older people using the services (Greenfield & Fedor, 2015). For a wealthier older population, the commercialised care services can reduce their reluctance to use the services by giving them a reciprocal feeling (Bell & Menec, 2015). Community outreach services for older people can realise isolation prevention. The outreach services in Hong Kong are well developed and participated by the stakeholders from both government and non-government sectors. Government outreach services mainly focus on medical and digital services (Office of the Government Chief Information Officer, 2021; Yang et al., 2021). Non-government actors conduct more outreach activities to find isolated older customers (Open Access Government, 2019; Prince of Wales Hospital; Senior Citizen Home Safety Association, 2019).

Social sustainability correlates to economic sustainability (r=0.345) and diversified care services (r=0.367), which means community social sustainability can facilitate the development of community silver hair markets. The social sustainability for age-friendly communities means (1) needs satisfaction and well-being and (2) social justice and equity (Liu et al., 2017). It requires policies should ensure the inclusiveness of elderly care facilities in community design

and plan. Under a not-in-my-back-yard mentality, elderly care facilities are often resisted by the neighbourhood residents (Hoffman & Landon, 2012). The developers' reluctance to age-friendly community development was also explained in Chapter Two. Thus, improving neighbourhood social sustainability can ensure the acceptance of these elderly care facilities (Buffel, de Backer, et al., 2014). Meanwhile, the sense of community improved by social sustainability can encourage residents' participation in age-friendly community development (McCrillis et al., 2021). Nowadays, under the land using strategy of *single site multiple uses*, the Hong Kong government tries to reserve the lower floor of buildings for some elderly care facilities (The Government of the Hong Kong Special Administrative Region, 2018a). Meanwhile, multi-generational housing has been planned in a few newly developed areas (Li, 2021; Planning Department, 2021).

3.4.3 Additional part: expanding to More age-friendly community factors

As shown in Figure 3.1, the central and supportive parts compose a policy system in which age-friendly community development can sustain the community life cycle. As some more age-friendly community factors also connect to the policy system, this section discusses how the system can further facilitate age-friendly community development.

Isolation prevention correlates with both discrimination prevention (r=0.361) and respect (r=0.401), meaning older people's participation should be facilitated by countering ageism and

establishing respectful social environments. As discussed in Chapter Two, ageism is the main barrier to age-friendly community development and may cause social segments for older people (Neal et al., 2014). In workplaces, Hong Kong has made various efforts to ensure the employability of older (potential) employees. Nowadays, tapping the talent of older people is one of Hong Kong's strategies to solve the negative impacts brought by population ageing (The Government of the Hong Kong Special Administrative Region, 2020). Some financial incentives have been set for employers through Employment Programme for the Elderly and Middle-aged from the Labour Department (Chan & Yip, 2019). In communities, the Opportunities for the Elderly Project conducted by the Social Welfare Department engages older people in community building affairs (Elderly Commission, 2015).

On the other hand, older people frequently suffer the accusations of improperly using spaces that belong to younger generations (Zhu & Li, 2021). Impolite treatment discourages older people's community engagement (Brooks-Cleator et al., 2019). The Hong Kong government has made various efforts to improve the awareness of older people among younger citizens. Supported by the Leisure and Cultural Services Department, Hong Kong Public Library invites older people as volunteers of the sharing workshops for children (Leisure and Cultural Services Department, 2018). The Education Bureau also introduces population ageing and age-friendly community in Secondary school courses (Education Bureau, n.d.-a, n.d.-b).

Diversified care services correlate with communication and information ($r=0.311$) and age-friendly facilities ($r=0.304$), which means information dissemination and suitable facilities can

benefit community care services. Currently, the information channel to advertise health services heavily relies on multimedia technologies which set high thresholds for older people's computer skills (Vukelic et al., 2020). Therefore, service providers should balance the efficiency and coverage in their communication with older people. The Hong Kong government helps service information delivery by funding a website adopting age-friendly principles called eElderly (https://www.e123.hk/). Information communication technology can also improve care services, with wearable applications and the sensors embedded in care facilitates. Thus, older people can get more responsive services from smart services (Tun et al., 2021). The Social Welfare Department in Hong Kong has set up an Innovation and Technology Fund for Application in Elderly and Rehabilitation Care to promote the application of gerontechnology in care services (The Government of the Hong Kong Special Administrative Region, 2019). Service providers also need age-friendly facilities to stimulate older people to use available care services. Thus, the Labour and Welfare Bureau in Hong Kong conducted Improvement Programme of Elderly Centres to improve the built environments of community centres to enhance their service quality (The Government of the Hong Kong Special Administrative Region, 2017b).

Age-friendly facilities, public transportation accessibility, and environmental safety correlate to each other (age-friendly facilities-public transportation accessibility: r=0.371; age-friendly facilities-environmental safety: r=0.359; public transportation accessibility-environmental safety: r=0.305). These three components comprise a built-environment triangle of age-friendly community development. Public transportation and a safe environment can increase older

people's access to the services outside their communities. Public transportation is the main travel method for older people (Rosenbloom, 2009). In Hong Kong, under the subsidised scheme, the average daily trip made by older people reached 1,130,000 in 2018 (The Government of the Hong Kong Special Administrative Region, 2018b). The public transportation system connects older people to the resources above their walking distance (Loukaitou-Sideris et al., 2019). The government also proposed to provide cover for pedestrians connecting to public transport in their 2016 Policy Address and Policy Agenda (Transport and Housing Bureau, 2016). Finally, the whole city should make the "last few steps towards care facilities" safe and accessible, especially for some public transportation and remote service facilities in the complex environments outside communities. Thus, the Transport and Housing Bureau has launched "Walk in HK" to ensure comfortable walking environments for older people (Transport and Housing Bureau, 2017).

3.5 Chapter summary

This study used Hong Kong as a case to operationalise the theoretical prototype. Besides the operationalisation of the theoretical prototype, the analysis and discussion also validate the theoretical hypotheses in Chapter Two.

The practical framework well reflected the discourse and models in previous age-friendly community studies from two points: (1) The practical framework echoes that the age-friendly community concept was developed from active ageing. The three pillars of active ageing,

participation, security, and health are contained in the practical framework. The factor of isolation prevention reflects participation; security is reflected by environmental safety; and the factor of diversified care services reflects health. The practical framework highlights that age-friendly communities mainly enhance older people's safety by built environment design. (2) The practical framework echoes Lui et al.'s (2009) model that both the top-down and bottom-up perceptions about age-friendly communities should be considered in development processes. With exploratory factor analysis, the results indicated that Hong Kong citizens have nine divergences from the local experts regarding the components of age-friendly communities. It also highlights the necessity of age-friendly community negotiating mentioned in Chapter Two to build environments that reflect residents' actual demands.

A comparison between the theoretical and practical forms of the policy framework indicated that the theoretical prototype is not entirely applicable in actual practices. The practical framework improves the theoretical prototype and partially validates its nine theoretical solutions. The following are the details of the comparison. (1) The strategic dimension of the theoretical prototype is validated by the practical framework. The commercialisation of age-friendly communities is reflected by improving the economic sustainability of age-friendly community factors. The bureaucratisation of the age-friendly community is reflected by improving social sustainability, discrimination prevention, and respect. And the social relations expanded in diversified care services are influential for the built environment forms of communities.

(2) The component dimension of the theoretical prototype is validated by the practical model. The factor of diversified care services reflects community-service-oriented policies. The factor of isolation prevention reflects human-activity-oriented policies. Housing-function-oriented policies are reflected by the factors of age-friendly facilities, public transportation accessibility, environmental safety, and low-energy-consumption development. Two points should be highlighted. Firstly, subsidised services and senior housing provision are not contained in the practical framework. The common characteristic of these two factors is that they rely on a traditional welfare provision mode. This traditional mode may not be capable of boosting older people's resources to continuously contribute to communities and cannot sustain the life cycle of community development. Secondly, the housing-function-oriented policies mainly focus on the building services and neighbouring facilities instead of housing provision. It indicates that Hong Kong citizens are more concerned about improving the existing living spaces than displacement through improved housing provision.

(3) The practical framework partially validates the interactions between the theoretical prototype's strategic and component dimensions. Thus, the practical framework can be regarded as an operationalised improvement of the theoretical prototype. The central positions of the economic sustainability and diversified care services in the network indicate that commercialisation and community-service-oriented policies are two central items in the strategic and component dimensions. Moreover, the correlation between economic sustainability and diversified care services indicates that the interaction between

commercialisation and community-service-oriented policies is a core interaction among all the nine interactions between the strategic and component dimensions. In reality, the commercialisation of community elderly services can be achieved by developing community silver hair markets. Community silver hair markets can realise some other interactions between the strategic and component dimensions. The triangle of economic sustainability, diversified care services, and isolation prevention indicates that commercialised human activities can support commercialised community services through outreach activities. The triangle composed of isolation prevention, discrimination prevention, and respect indicates that human activities should be bureaucratised by preventing discrimination and improving the respect for older people in communities. Another support for commercialised community services is to bureaucratise community services by increasing the social inclusiveness for care services in community administration. In the practical framework, the housing functions are not validated to be developed by either commercialisation or bureaucratisation. However, the demands of the housing functions can be raised by well-developed community silver hair markets. Thus, the housing function can be facilitated by the expanded social relations between older people and service providers built in diversified care services.

Chapter 4 Policy framework implications for Chinese age-friendly community refurbishment

4.1 Chapter background

Chapter Three develops a practical framework to sustain the community life cycle through age-friendly community development. Because it is developed by referring to the pioneering example set by Hong Kong, the framework is also believed to imply the central government's policies by diffusing Hong Kong's successful experience. Therefore, this chapter explores how the neighbourhood renovation policy can incorporate the components of age-friendly communities to achieve the sustainable development of old neighbourhoods under the guidance of the practical framework.

To integrate age-friendly community development into old neighbourhood renovation policies, this study developed an evaluation tool to evaluate the consideration of ageing issues in neighbourhood renovation policies. The tool can identify important components for ageing issues from neighbourhood renovation policies. These components can be the entry points for age-friendly community development in old neighbourhood renovation projects. Thus, the related policies can be issued surrounding these entry points under the guidance of the practical framework established in Chapter Three.

To develop the evaluation tool, the components related to ageing issues should be identified, and the importance of these components should be calculated. With the development of natural

language processing techniques, the tool development can be realised by TF-IDF. The input should be a corpus that contains some target documents of a particular topic, such as policies related to ageing issues in this study. Through processing the corpus, the keywords related to the topic and the weights indicating their relatedness to the topic will be the output. In this study, the corpus was all the policies from the policy library of the State Council of China (http://www.gov.cn/zhengce/zhengcewenjianku/index.htm). And the target documents were the policies related to ageing issues.

Using the search function provided by the policy library, the keyword "old" (in Chinese: 老, Lao) was used to find all the policies that contain the word "old" in their title and main body. The search returned 1,593 policies. As the content of policies can be directly judged from their titles, a detailed check of the titles was conducted to find the policies related to ageing issues. As a result, 103 policies were put into the target group.

The state council and other 30 departments have issued the policies related to ageing issues at the central government level. Table 4.1 shows the publication of the policies by the departments each year. The State Council takes the leading role in issuing the policies related to ageing issues. Meanwhile, the Ministry of Civil Affairs is the main department to publish the policies. 2006 and 2015 were two odd years that saw more departments' participation in the policymaking for ageing issues. The participation was realised by issuing two policies to plan and regulate elderly services. Since 2017, there has been continuous multi-departmental participation in policymaking for ageing issues. Ministry of Civil Affairs, Ministry of Finance,

National Health Commission, Ministry of Human Resources and Social Security, and National Development and Reform Commission are five departments that have issued more than ten policies related to ageing issues.

Table 4.1 Trend of Chinese policies related to older people by department and year[1]

	1985	1986	1990	2001	2003	2005	2006	2009	2011	2013	2014	2015	2016	2017	2018	2019	2020	2021	Total
The State Council (SC)	1	1	1	1	1	1	9	3	3	1	1	3	2	3	2	2	3		38
Ministry of Civil Affairs (MoCA)							1					1		1	4	15	15	1	38
Ministry of Finance (MoF)							1	1				1		1	8	5	8	1	26
National Health Commission (NHC)							1					1		1	1	11	6	1	22
Ministry of Human Resources and Social Security (MoHRSS)							1	1				1			4	5	4	1	17
National Development and Reform Commission (NDRC)							1					1		1		3	3	1	10
Ministry of Housing and Urban-Rural Development (MoHURD)							1					1		1		2	3		8
China National Committee on Ageing (CNCA)							1					1		1		2	3		8
China Banking and Insurance Regulatory Commission (CBIRC)														1	4		1	1	7
National Administration of Traditional Chinese Medicine (NAoTCM)												1				5	1		7
State Taxation Administration (STA)							1								4	1			6
State Administration for Market Regulation (SAMR)														1		4	1		6
Ministry of Natural Resources (MoNR)												1		1		2			4
Ministry of Education (MoE)							1								1	1			3
National Healthcare Security Administration (NHSA)																1	2		3
Ministry of Industry and Information Technology (MoIIT)															1	1		1	3
Ministry of Emergency Management (MoEM)																1	1		2
The People's Bank of China (PBC)														1			1		2
Ministry of Transport (MoT)																	1	1	2
National Forestry and Grassland Administration (NFGA)																2			2

[1] The table was summarised from the policies in the policy library of the State Council of the People's Republic of China.

Ministry of Public Security (MoPS)														**1**					**1**
Ministry of Ecology and Environment (MoEE)														**1**					**1**
National Medical Products Administration (NMPA)														**1**					**1**
Ministry of Culture and Tourism (MoCT)																	**1**		**1**
National Cultural Heritage Administration (NCHA)																	**1**		**1**
China Securities Regulatory Commission (CSRC)															**1**				**1**
Ministry of Commerce (MoC)																	**1**		**1**
National Railway Administration (NRA)																	**1**		**1**
Civil Aviation Administration of China (CAAoC)																	**1**		**1**
Ministry of Veterans Affairs (MoVA)																	**1**		**1**

There has already been some coordination between departments in the policymaking for ageing issues. Coordination exists when different departments issue a policy together. Thus, this study counted the coordination times between every two departments in the 103 policies and regarded the counted number as the coordination weight of these two departments. Figure 4.1 shows the coordination between the State Council and its different departments. The software of Gephi produced the figure. The node's size indicates the coordination times with other departments, while the edge's thickness indicates the coordination frequency between two departments.

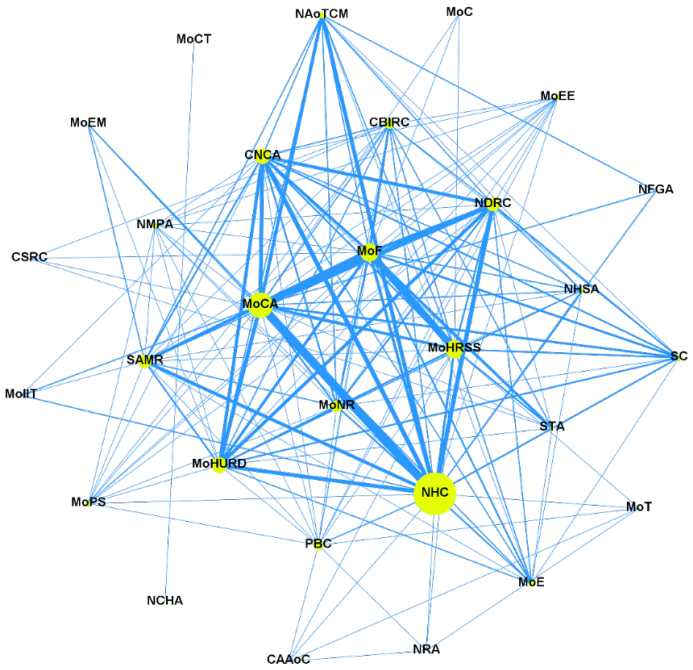

Figure 4.1 Collaborations in policymaking for older people[2]

The topic trends of the policies related to ageing issues is summarised in Table 4.2. Generally,

[2] The full names of the abbreviations of the departments can be retrieved from Table 4.1.

the policies were categorised into eight groups. In the sequence of their first appearing time, these eight topics were *administration and organisation*, *financial support*, *overall policy plans*, *elderly services*, *activities*, *intelligent technologies*, *health*, and *environments*.

The administration and organisation group shows the governance structure to react to population ageing in China. It shows that the affiliation of the China National Commission of Ageing and its antecedent organisation has transferred from the Labour Department (the antecedent organisation of the Ministry of Human Resource and Social Security) to the Ministry of Civil Affairs and, lastly, to the National Commission of Health. The government also sets up specialised governance structures for the pilot projects related to ageing issues. Nowadays, as the central government stresses more on the empowerment of its departments and local governments, a mechanism has been established to facilitate inter-department and inter-city coordination.

For financial support, the older people were firstly supported by salary. Then, from 2005 to 2019, the country established its endowment insurance system. In the current two years, the regulations of financial support have been concentrated on pensions.

To echo national five-year plans, the central government also issues its overall policy plans for ageing issues. In 2017, the elderly service structure was stressed by the plan.

Among the policies related to elderly services, there is a transferred focus from general services to more specialised services. With the popularity of the discussion about public-private

partnership (PPP), in 2019, the coordination between municipal governments and local companies was also put into the policies.

The central government policy library has comparatively limited specialised policies for older people's activities. The main focus is on the education and employment of older people. While the only policy related to the employment of older people is for re-employing retired older teachers.

Nowadays, the intelligent technologies embedded in peoples' lives have been booming in China. The central government has tried to develop information communication technologies (ICTs) in elderly care services. Meanwhile, to eliminate the high technology skill thresholds for older people, different departments have issued policies for adapting intelligent technologies for older people under the lead of the State Council.

With the increasing awareness of the importance of geriatric health service development, there have been two specialised policies related to Alzheimer's and disability respectfully in recent years. The government has also made efforts to eliminate regional health inequality.

The environmental issues appeared very recently in central government policies. Nowadays, the environmental topics cover environmental adaptation for older people, real estate facility management services for older people, and age-friendly communities.

Table 4.2 Trend of Chinese policies related to older people by topic and year[3]

Issue	1985	1986	1990	2001	2003	2005	2006	2009	2011	2013	2014	2015	2016	2017	2018	2019	2020	2021	Total by topic
1. Administration and organisation																			
China National Commission of Ageing	1	1			1										1				4
Endowment insurance pilot management								1											1
Department coordination of service for older people																1			1
Inter-city coordination for population ageing																		1	1
2. Financial support																			
Salary			1																1
Endowment insurance						1	8	2	1		1	2		1	9	3			28
Pension																	1	1	2
3. Overall policy plan																			
Overall policy plan for older population				1					1										2
Overall policy plan for older population and structure of services for older people														1					1
4. Elderly services																			
Industry of elderly services							1			1			1	1		2			6
Structure of elderly services									1								1		2
Integration of care and medical services												1				3	1		5
Care services														1		1			2
Home and community elderly services															2	1	3		6
Overall elderly services															1	3	1		5
Products for older people																1			1

[3] The table was summarised from the policies in the policy library of the State Council of the People's Republic of China.

Coordination between municipal government and companies																2			2
Care services in natural resort (forest)																2			2
Elderly care service institutions																3	7		10
Services for older people in poverty																	1		1
Health care																	1		1
Long-term care services																	1		1
Taxi services																		1	1
5. Activities																			
Education													1						1
Employment															1				1
6. Intelligentisation																			
Smart care															2				2
Adaptation of smart technologies for older people																	5	2	7
7. Health																			
Alzheimer																1			1
Disability																1			1
Health promotion																1			1
8. Environment																			
Real estate facility management																	1		1
Environment adaptation for older people																	1		1
Age-friendly community																	1		1
Total by year	1	1	1	1	1	1	9	3	3	1	1	3	2	4	16	25	25	5	103

4.2 Methodology

4.2.1 Corpus development

As stated above, TF-IDF learns the patterns of the articles of a specific theme, identifies the important words related to the theme, and quantifies the importance of the words (Lin et al., 2016; Peng et al., 2020). Thus, it is vital to develop a corpus of enough articles to train models. As the type of the articles analysed in this study is the policy, the national policy database of the State Council of the People's Republic of China was retrieved. The database contains all the publicly published policies issued by the State Council and its subordinate departments. Until 17th April 2021, there were 12,607 policies in the database. Because it is difficult to download all these policies into the research corpus manually, a python programme was used to download all the collectable policies. Collectable in this research means the policies published in the text format on the webpages, instead of image formats and attached pdf files. Filtering the uncollectable policies can reduce the risk to introduce errors and typos during manually transforming images and pdf files into text. Thus, the data quality can be secured. While the collectable policies, which were counted at 12,104, are already sufficient for this study.

The collected policies from the policy library were categorised into two groups, a target group of policies related to ageing issues and a comparing group of policies not related to ageing issues. Firstly, this study searched for the policies in the target group. As the policy database of

the State Council provides a search function, the keyword “old” (in Chinese: 老, Lao) was used to find all the policies that contain the word “old” in their title and main body. The search returned 1,593 policies. As the content of policies can be directly judged from their titles, the scrutiny of the title was conducted to find the policies related to ageing issue. As a result, 103 policies were put into the target group. By excluding these 103 policies, the other 12,001 policies were downloaded from the policy database and put into the comparing group.

4.2.2 Data processing

As the analysis unit of the TF-IDF is a word, policy text should be tokenised. In the Chinese language, there are no spaces between words. Thus, NLP scientists have developed many professional tools to tokenise Chinese sentences (Peng et al., 2020). This study conducted a pilot test to compare three commonly used tokenisation tools for the Chinese language. Finally, the Language Technology Platform (LTP) developed by the Research Center for Social Computing and Information Retrieval of Harbin Institute of Technology was chosen for this study because the tool was found to identify more specialised words in the policies related to ageing issues. Python was used to invoke LTP.

Under a default setting without any customised change, the tokenisation results were not ideal for the TF-IDF. Two problems were found in the detailed scrutiny of the results. First, some tokenised chunks were still combined with two or three smaller words. Secondly, some words had the unmeaningful suffix. For example, in Chinese, some adjective words often end with a

suffix like "-ised" (Chinese: 化, Hua) in English, such as intelligent (Chinese: 智能, Zhineng and 智能化, Zhinenghua) equipment. These two problems reduced the appearance frequency of some critical words and would finally reduce their TF-IDF values. Three measures were adopted to solve these two problems. (1) As most Chinese words are composed of two or three characters, all the words longer than three characters were reviewed. The words that failed to be tokenised were put into a user dictionary to increase their possibility to be identified and tokenised by the NLP tool. This user dictionary was configured into the NLP tool when it was run. (2) When there were still some long chunks composed of two or more words, a syntagm was put into the programme to tokenise these long chunks using a forward matching method. The forward matching method means matching the first few characters of a chunk with the user dictionary and identifying the words existing in the dictionary (Bai et al., 2017). (3) A syntagm was put into the invoking programme to eliminate all the unmeaningful suffixes of adjective words.

4.2.3 TF-IDF

For each word, its importance to the policies related to ageing issues can be calculated using the TF-IDF. TF-IDF values are the multiplied TF values and IDF values (Ali & Mohamed, 2017). TF means the appearance frequency of a word in the articles of a particular theme. The **theme** in this study means ageing issues, and the **articles** mean policies. Thus, TF in this study means the appearance frequency of a word in the policies related to ageing issues. For a word w, $TF_w = \frac{count_w}{count_{all}}$ (Ali & Mohamed, 2017). $count_w$ is the count of w in all the policies

related to ageing issues; $count_{all}$ is the count of all the words in all the policies related to ageing issues. IDF means the inversed frequency of the documents containing a specific word in the whole corpus. Thus, for a word w appearing in the policies related to ageing issues, $IDF_w = \log \frac{N}{DocumentCount_w}$ (Ali & Mohamed, 2017). $DocumentCount_w$ is the number of the policies in the whole corpus containing the word w; N is the number of all the policies in the whole corpus. Thus, the TF-IDF value of the word w can be calculated as $TF - IDF_w = TF_w \times IDF_w$. In this study, a python programme also realised the algorithm to calculate TF-IDF values.

4.2.4 Application of evaluation tool

For each word that appears in the policies related to ageing issues, it has a TF-IDF value. Each pair of the word and its TF-IDF value was saved in the following form: $\{"a": TF - IDF_a, "b": TF - IDF_b, \cdots\}$. With this data structure, the TF-IDF value of a word can be quickly retrieved. In python, this data structure is called dictionaries. Thus, the data structure to save the TF-IDF values was called the TF-IDF dictionary in this study. For a policy sentence tokenised into m words, the TF-IDF dictionary can transform the sentence into a score vector with m dimensions s. If the j^{th} word of the policy sentence is in the TF-IDF dictionary, then the j^{th} factor of the score vector s will be the word's TF-IDF value; otherwise, the j^{th} factor of the vector s will be 0. The score vectors of policy sentences can be used for further analysis.

Overall, this research method also represents a framework for developing a kind of policy

analysis tool, the foundation of an intelligent system for policymaking, as shown in Figure 4.2. The framework can be divided into three parts: the corpus part, the modelling part, and the analysis part. The corpus part collects and stores policies. With proper application programming interfaces (APIs) provided by policy databases, the framework can continuously track the development of the policy systems and incorporate the most updated policies. Furthermore, the modelling part can instantly update the evaluation tool and reflect the recent policy focus on ageing issues in the continuously updated policy corpus. Lastly, with the proper design, policymakers can conveniently evaluate the consideration of ageing issues in some other policies and realise the integration between age-friendly community development and different policy agendas.

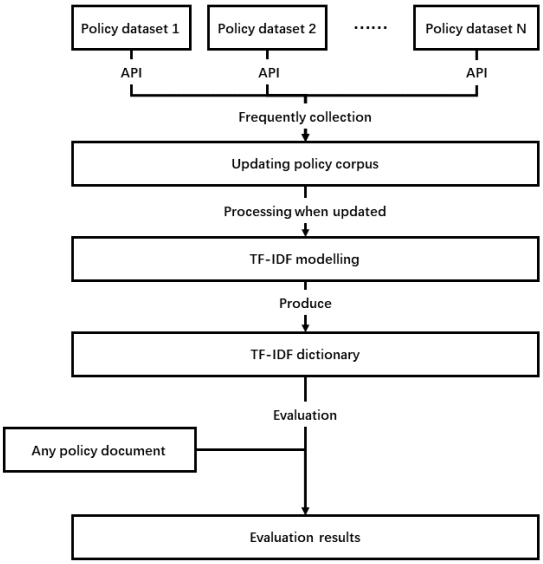

Figure 4.2 Framework for policy evaluation tool (continuous) development

4.3 Evaluation tool application

4.3.1 A deep investigation of Chinese policies for ageing issues

Table 4.3 shows the top ten words with the highest TF-IDF values in the policies related to ageing issues. The meanings of these ten words were explored by investigating their context in the policies. These words indicate what are regarded as important by the Chinese policy system for ageing issues. These ten words are closer to the service end in the dualistic structure of service and built environments. Thus, it indicates that the Chinese policy system for ageing issues is service-oriented. Moreover, the elderly care service (appearing 1317 times in all policies) is at the core of all services. Referring to the detailed policy text, the Chinese policies related to ageing issues cover all the eight domains of age-friendly communities. Thus, the high TF-IDF values of the words related to services were not caused by any missing consideration of built environments.

Table 4.3 Most important words in Chinese policies related to older people[4]

Rank	English	Chinese	TF-IDF value	TF value	IDF value
1	Elderly care	养老	0.1720	0.0584	2.9457
2	Older people	老年（人）	0.1390	0.0379	3.6657
3	Insurance	保险	0.0490	0.0252	1.9419
4	Services	服务	0.0386	0.0490	0.7884
5	Ageing	老龄	0.0279	0.0063	4.4320
6	Community	社区	0.0237	0.0091	2.6209
7	Home-based	居家	0.0184	0.0042	4.3588
8	Fund	基金	0.0180	0.0088	2.0448
9	Tax deferral	税延	0.0169	0.0023	7.3293
10	Integrated elder care services with medical care	医养	0.0165	0.0032	5.2040

4.3.1.1 Elderly care, older people, and services

Among the eight domains of age-friendly community, services mainly belong to *community support and health services*. However, the Chinese service system (97 times) for older people also expands into the other seven domains of age-friendly communities. A deep investigation of the use of "elderly care", "older people", and "services" can illustrate such expansion.

From the built environment perspective, the expansion of the elderly service system is reflected in two aspects. Firstly, the development and improvement of built environments are guided by the demands of services. In such a process, the sufficiency of service facilities (224 times) and the condition of service places (14 times) play important roles. Secondly, the policies also regulate related elderly services in different aspects of age-friendly community built

[4] The table was summarised from the policies in the policy library of the State Council of the People's Republic of China with the processing of the evaluation tool.

environments. These services include property services (35 times) in the aspects of *outdoor space and buildings* and *housing*, travel (5 times) and assistive travel services (1 time) in the aspect of *transportation*.

In the aspect of *social participation*, the policies regulate culture (3 times), education (5 times), entertainment (8 times), and tourism services (2 times) to ensure older people have enough activity opportunities. For *civil participation and employment*, the government provides older people with more convenient government services (14 times). Meanwhile, policies also ensure older people have enough opportunities to participate in volunteer services (10 times). Lastly, the policies also support mutual elderly care services (4 times). In this service mode, older people with enough capability can take care of their neighbours while also receiving help from their neighbours.

For *respect and social inclusion*, the service-oriented policies related to ageing issues have three characteristics. (1) Due to historical reasons, China has an urban-rural dual differentiation structure in social resource distribution. Rural older people tend to be more vulnerable in enjoying elderly care resources. Thus, in policies, rural elderly care service (17 times) is frequently mentioned in the hope of eliminating the unequal distribution of elderly care resources between urban and rural areas. (2) There are some vulnerable subgroups in the older population. The policies identify these subgroups, which include the older people with disability (51 times), dementia (7 times), poverty problems (6 times), empty-nested families (5 times), and the oldest ages (5 times). The policies also regulate the special service arrangements

for these subgroups of older people to ensure they are not excluded from the service system. (3) Overemphasising vulnerable subgroups may cause positive discrimination making other groups of older people's demands ignored. As current Chinese older people have a higher socioeconomic status than past, the *guaranteeing basic principles* to provide elderly service will no longer satisfy the diverse and high-end service demands (59 times). Responding to such issues, the Chinese policies have made some innovations by proposing inclusive elderly care (15 times). In this elderly care mode, municipal governments actively coordinate with enterprises to create a more diversified elderly care service industry mode (6 times) and fill the high-end service gaps caused by the guaranteeing basic principles.

Communication and information are also reflected in elderly service policies in three aspects. Firstly, the policies emphasise making the service information (23 times) public. Thus, older people can have a more precise grasp of their available service choices. Secondly, the policies also emphasise that communication methods should be adapted to the skills and manners of older people. In China, a significant situation is the deep application of intelligent technologies in various services. However, the limited skills of these technologies makes it inconvenient for older people to use these services. Thus, in 2020, led by the State Council, many subordinate departments made policies for their supervised institutions to regulate the communication with older people in services. On the one hand, the regulations advocate the remaining traditional manual services (6 times) for older people. On the other hand, the applications on smart elderly care service terminals (9 times) should be simplified, and adequate audio-visual aids should be

added. Lastly, as intelligent technologies are rapidly embedded in society, more policies should support intelligent elderly care services (10 times).

4.3.1.2 Insurance, fund, and tax deferral

In the aspect of *community support and health services*, the Chinese policy system for ageing issues covers various services, including medical (21 times), nursing (57 times), household (16 times), legal (18 times), and financial services (15 times). Meanwhile, the insurance service is an important element of the Chinese policy system for ageing issues. Currently, older people have a comprehensive set of insurance products (111 times). Therefore, this part makes a summary of the insurance policies for older people by referring to the policy content using the words “insurance”, “fund”, and “tax deferral”.

Except for elderly care insurance (783 times), which is also called endowment insurance, Chinese older people also have medical insurance (46 times), disability insurance (10 times), accident insurance (32 times) and nursing care insurance (45 times) to cover some of their expenditure in daily life. With a long development period, the endowment insurance has been developed well with 29 specialised policies from the Chinese central government. The well-established endowment insurance realises older people’s income reform, transforming from enterprise retiree salary to social security pension. At the macro level, the central government regulates the funds of the endowment insurance (251 times) to ensure the balanced development of the mechanism. At the micro-level, the tax deferral insurance (129 times) has become an

advocated form of Chinese endowment insurance provision, and the central government detailedly regulates its insurance business (37 times). Because the details of the insurances are not in the research scope of this study, the study did not go into detail to describe these kinds of insurances. However, the development of the endowment insurance policies proves that the central government can make detailed policies for elderly services. Therefore, the promoting roles of the central government are essential to sustain detailed policymaking. It also provides an exemplar routine to make detailed policies related to other ageing issues.

4.3.1.3 Ageing

Comparing the TF of “ageing” and “older people”, “ageing” is not as widely used as “older people” in the policies. It indicates that even though the words have close meanings, they may be differently used in policies because of their slight differences. The policies of the same kind often have a preference to use fixed expressions. In the policies, ageing is more likely to represent a changing demographic trend and a macro issue. China sets “actively responding to population ageing” (26 times) as a national strategy in the fourteenth five-year plan. However, in policies, ageing is used with “problem” (23 times) and “challenge” (9 times) several times, while active ageing is used seven times. Along with actively responding to population ageing, the policy attitude towards ageing is still mainly positive but needs to be cautious in future policymaking. The policy attitude is decisive to the future policymaking for ageing issues, while it is also important to shape positive social values towards ageing and older people.

4.3.1.4 Community, home-based, and integrated elder care services with medical care

It is interesting that “community”, “home-based”, and “integrated elder care services with medical care” all appear in the top ten important words of the Chinese policy system for ageing issues. According to the five-year plan on elderly care, the Chinese elderly care system sees home-based care (189 times) as the foundation, community care (185 times) as the support, and institutional care (58 times) as the supplement. The plan also advocates integrating elderly care services with medical care (193 times). This system aims to realise age-in-place, which is world-widely acknowledged as a beneficial elderly care mode. Currently, the Chinese government and academics widely accept a “90-7-3” elderly care mode. It means 90 per cent of older people will be looked after by home-based care, seven per cent of older people will be looked after by the professional elderly care facilities in their original living neighbourhoods, and only three per cent of older people need to rely on the professional elderly care institutions outside their original living neighbourhoods. However, the current policy system for ageing issues does not sufficiently reflect such stratification. The “home-based care” and “community care” have almost the same appearance frequency in the policies.

According to the policy content, some kinds of services are conducted in both home-based and community scenarios. These services include elderly care visits (2 times for community; 1 time for home-based), nursing (2 times for community; 1 time for home-based), and integration of elderly care services with medical care (3 times for community; 2 times for home-based). In

terms of the built environment, the environmental adaptation for older people is also advocated in both home-based (33 times) and community (3 times) scenarios. The home has some unique services, such as rehabilitation services (1 time), Internet installation (1 time), and door-to-door services (1 time). The community has more unique services, activities (6 times), and built environment (4 times) elements. For instance, the services include day-care services (12 times) and medical services (8 times), activities include education (4 times), and built environment elements include roads (5 times). Home-based care needs more attention in future policymaking to match the elderly care system development goals. Some services and activities in communities can be supported in home-based scenarios by policies. Moreover, the detailed built environment elements in home-based scenarios should be specified to guide environmental adaptation. These development measures will benefit the older people with limited mobility and isolation problems.

However, it is worth mentioning that home-based care does not mean limiting the service space scope of older people. On the contrary, communities are responsible for attracting older people into communal spaces by providing diversified services and activities. From this perspective, communities also bear some functions for home-based care. Thus, the current appearance frequency of community and home-based is reasonable. What is more, if strictly defining community care as the services provided by the professional institutions embedded in communities, community institutions only appear 12 times in the policies. From this perspective, the current Chinese policy system for ageing issues is generally accordant with

Chinese elderly care system development goals.

Integrating elderly care services with medical care is an innovative elderly care mode in China. Currently, the mode is gradually gaining a central status in the policy system for ageing issues. This mode can provide comprehensive and one-stop-style services for older people. On the one hand, this mode makes up for the shortcoming ability of traditional elderly care institutions to take care of older people with different self-care statuses. On the other hand, such a mode reduces the transfer demands between elderly care and health care institutions for older people with limited mobility. Currently, the integration is regulated by policies in some detailed aspects. Such mode also triggers the interests of the participation from both public and private sectors. However, the low TF value indicates its appearance frequency is still comparatively low, and the concept deserves more policy support in the future.

4.3.2 Finding the entry point for age-friendly community development by evaluating the neighbourhood renovation policy

In 2020, the Chinese central government issued a guideline for pushing the work of neighbourhood renovation. Taking this guideline as an example, this study applied the policy evaluation tool to illustrate how the neighbourhood renovation policies can help Chinese age-friendly community development. In the guideline for neighbourhood renovation, 117 words were found to be the elements related to the age-friendly community. Among the top ten

important words for ageing issues, three appear in the renovation guideline. These words are “elderly care”, “services”, and “community”. This section discusses the detailed application of these three words in the renovation guideline.

Elderly care is mentioned five times in the renovation guideline. The guideline regulates and supports the community elderly service from different aspects. (1) Elderly care is regarded as a public service in communities. Therefore, the guideline stipulates that neighbourhood renovation projects should improve the quality of community elderly care services. (2) The guideline regulates the installation of the service facilities for community elderly care. The community elderly care service facilities are defined as special service facilities in communities. The guideline supports installing these facilities through affiliating, adding, renovating, and intelligent transformation in renovation work. (3) Elderly care is regarded as a new industry mode to be introduced into communities by renovation work. (4) The guideline also regulates some administrative and taxation support for elderly care service providers in communities.

Elderly care is a specialised community service. Besides that, the guideline also regulates the general service facility construction in communities. In the guideline, community service facilities are given a very high status. It is regarded as a dimension to define which old neighbourhoods should be renovated. The guideline also regulates two methods of adding service facilities, including redeveloping the community inventory spaces and complementing facilities with neighbouring communities.

What is more, the guideline hopes to move public social services downwards to the community level. This empowerment would help to create a comprehensive community service system. The guideline gives critical roles to financial and property services in old neighbourhood renovation work. Property service providers should innovate their services according to neighbourhood renovation projects, while finance services should provide stable socialised financial support for the projects.

In the policy content related to the community, the community service accounts for a significant portion. Besides that, community governance, which appears two times in Chinese policies for ageing issues, is also an important content for neighbourhood renovation. What is more, the guideline emphasises the importance of coordination mechanisms in community renovation projects. In coordination, a community can work as a whole to communicate with the departments at different government levels to ensure the implementation of community renovation projects. Meanwhile, coordination mechanisms should also be developed within communities to ensure residents, government and enterprise actors, and professional experts outside communities can participate in renovation projects. Lastly, the guideline pays attention to the built environment domain of communities. It requires building environment-friendly communities through renovation projects.

Each guideline sentence was transformed into a score vector using the TF-IDF dictionary. The length of the vector is the number of words tokenised from the sentence using the LTP. If a tokenised word has its TF-IDF value in the dictionary, the factor of the same position in the

vector will be this TF-IDF value. The other factors in the vectors will be zeros. As a preliminary application of this evaluation tool, this study stratified the evaluated sentences into four levels according to the vector's maximum value. If the maximum value is larger than or equal to 0.1, the sentence belongs to the first level; if the maximum value is smaller than 0.1 but larger than or equal to 0.01, the sentence belongs to the second level; if the maximum value is smaller than 0.01 but larger than or equal to 0.001, the sentence belongs to the third level; if the maximum value smaller than 0.001, the sentence belongs to the fourth level.

In the guideline, five sentences belonged to the first level. These sentences contain the word "elderly care". There were 18 sentences at the second level. 17 of them are related to community governance and services. The rest is related to the environmental adaptation for older people. There were 69 sentences at the third level. These sentences have four themes. (1) Some sentences are related to community renovation projects. (2) Some sentences are related to community residents. (3) Some sentences are related to community built environments. (4) The rest sentences are related to the communication and information in communities. The sentences at the third level are closer to the material and real-life in communities. Finally, there were two sentences at the fourth level. These two sentences are related to community history and inventory spaces respectfully. Overall, these two sentences are related to the cultural context of communities.

The score vectors of policy sentences can be displayed using line charts. The horizontal axis represents the positions of the words tokenised from each sentence. The vertical axis represents

the value of the position in the score vector. Three kinds of policy sentences were identified from the charts, as shown in Figure 4.3, including single-peak type, multi-peak type, and mixed-peak type. To further analyse the three types of policy sentences, this study defined two concepts: the policy element and the importance of the policy element.

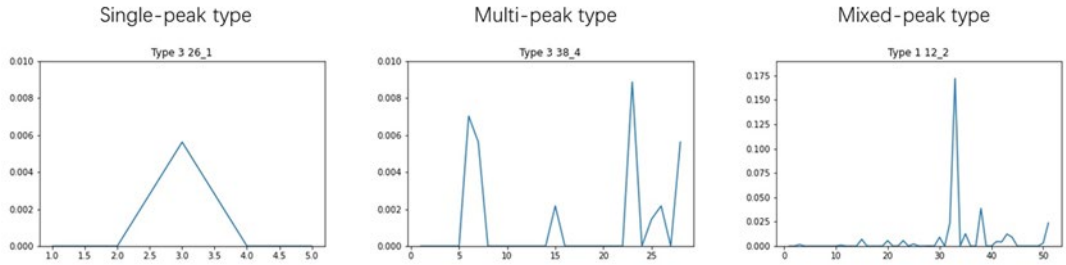

Figure 4.3 Three types of policy sentences

In this study, policy elements have two meanings. Firstly, they are the words directly related to ageing issues, such as ageing, older people, and retirement. Secondly, they are the word expressions related to services, activities, and built environment elements provided for older people. Using LTP, the policy sentences were tokenised into high-fine-grit words. Most policy elements comprise only one tokenised word. At the same time, some of these policy elements can be combined into a new policy element, such as “service facility”, composed of “service” and “facility”.

For the policy elements containing only one tokenised word, their importance values are their corresponding TF-IDF values, which also means their importance in the policy system for ageing issues. For the policy elements composed of more than one tokenised words, this study

used the highest TF-IDF value within the policy element to represent its importance. Compared with using the mean of the TF-IDF values, the maximum TF-IDF values can highlight the effect of high-importance policy elements. Still taking “property services” as an example, the policy element of “property” has low importance because the word has a low TF-IDF value. However, when using the term “property services” to highlight its service attribute, the property becomes more important in the service-oriented policy system for ageing issues. Thus a peak can represent a policy element in the sentence score vectors.

Single-peak type sentences are comparatively simple because they only contain one policy element. They are mainly the regulation of particular policy elements. For multi-peak type sentences, all the policy elements’ importance is at the same level. This kind of sentence shows the interactions between the policy elements of the same importance level. While the mixed-peak type sentences indicate the interactions between the policy elements of different importance levels. This study identified 33 single-peak type sentences, 20 multi-peak type sentences, and 41 mixed-peak type sentences. Mixed-peak sentences have two significances for policymaking. Firstly, they help to shape a more straightforward structure of policies. The policy elements with lower importance tend to be diversified. In the mixed-peak type sentences, the policy elements with high importance can cluster these diversified low-importance elements and give them the same important policy topics. Secondly, with the help of mixed-peak type sentences, many policy elements belonging to lower-level policy sentences are upgraded to higher-level policy sentences. To improve the policy attention to built environments, mixed-

peak sentences are the focus of this study.

4.4 Discussions

4.4.1 Developing built environment policies in the service-oriented policy system for ageing issue

As mentioned above, the Chinese policy system for ageing issues is service-oriented. Providing built environments for older people also concerns services in such a policy system. According to the above analysis, built environment policy elements have two significant characteristics. Firstly, they focus on the provision of service facilities. Secondly, the policy elements mainly support built environment services, including property, travel, and assistive travel services. It is coincident that the current Chinese old neighbourhood renovation policy also contains outstanding attention to services. The definition of old neighbourhoods no longer contains material ageing of built environments but emphasises the absence of proper service facilities. Thus, the Chinese old neighbourhood renovation policy provides a suitable platform for further age-friendly community policymaking.

Using services to guide built environment provision is similar to Lefebvre's theory of "the production of space". According to the theory, spaces are shaped by social relations within them. In the service-oriented policy system for ageing issues, older people's social relations are expanded services. The stable and supportive relations for older people can trigger the demands for service spaces and facilities. The relationship between supportive relations and spatial

demands becomes more evident in built environment services. For instance, property services need community property facilities, and travel and assistive travel services need transportation facilities.

Built environment policy elements tend to have lower importance in policies related to ageing issues. From the perspective of the production of space mentioned above, this study gave the following suggestions for policymaking to improve the built environment provision for older people. (1) More exploration is needed for built environment services. Compared with medical, nursing, and social services well supported by policies, the policy support for built environment services for older people is still insufficient in quantity and quality to make the public aware. (2) The demands for service facilities should be specified. China has made many national, industrial, and regional standards to regulate the provision of service facilities. To ensure service providers and facility producers obey these standards, policies are still needed to provide support and incentives. (3) Because social relations produce spaces, the supportive relations for older people can be used to provide suitable built environments. Policies should guide the use of these supportive relations in improving built environments. On the one hand, policies should guarantee the stable and supportive relations for older people in services and encourage service providers to propose more practical suggestions for built environment improvement. On the other hand, policies should encourage older people to express their expectations for built environments through their supportive social relations.

4.4.2 The specification of the environmental space policies for older people

The example of Chinese endowment insurance policymaking indicates that the specification of policies can improve the importance of the related policy elements. Thus, this part summarises the characteristics of Chinese endowment insurance policymaking. Based on the summary, some suggestions for the built environment aspects of age-friendly community policymaking are given.

The policy database of the State Council has 29 Chinese endowment insurance policies spanning 14 years from 2005 to 2019. According to their content, Chinese endowment insurance policymaking has seven characteristics. (1) The policymaking was led by the central government. In December of 2005, based on the experience from different cities, the State Council issued the decision document to improve Chinese endowment insurance institutions. (2) There was a broad pilot work. The State Council reviewed and approved the pilot schemes from seven provinces and two cities at the initial stage. (3) There was scientific pilot site selection. Due to the resource inequality between urban and rural areas, two different pilot plans were conducted in these two different contexts. (4) There was direct supervision from the central government. A specialised project team was formed composed of the leaders from the central government. (5) The central government issued diversified policies. The policies issued by the central government include decisions, reviews and approval, forwarded policies, guidelines, regulations, and standards. These policies form comprehensive Chinese endowment

insurance policy support. (6) There were participations from subordinate expertise departments of the State Council. Many departments related to financial issues participated in the policymaking for Chinese endowment insurance. (7) There was a combination of macro and micro-level regulations. Among the policies, there is the control of macro resources. At the same time, there are also the regulations for the supply and demand sides at the micro-level.

The Chinese policy for age-friendly community development was issued by the central government in 2020. Although the liveable communities for older people is regarded as a localised concept for age-friendly communities, no related policies were found in the State Council's database. Thus, for the just emerging age-friendly community policies, this study gives the following suggestions according to the example of endowment insurance policymaking. As the age-friendly community and endowment insurance belong to different policy areas, it is not easy to fully copy the successful experience of endowment insurance policymaking. However, the suggestions below attempt to adapt the successful experience. (1) There should be exhaustive and scientific pilot work. China has a large number of communities with various situations. Especially, there are some special kinds of old neighbourhoods such as urban villages, enterprise-run (also known as danwei) communities, and traditional neighbourhoods (also known as lilong and hutong). Thus, more subdivisions are needed for age-friendly community pilot works, especially for old neighbourhoods. (2) There should be deeper participation of the central government in age-friendly community policymaking. Like the endowment insurance policymaking, the central government can help promote the

implementation of existing standards for age-friendly community development. Lastly, the age-friendly community development's macro resource allocation and micro practices can be detailedly regulated at the central government level. (3) There should be more professional coordination in age-friendly community policymaking. Although the Chinese central government has a comparatively well-developed coordination network in the policymaking for ageing issues, the coordination between the departments specialising in built environments is not strong enough for age-friendly community policymaking. According to the coordination network, the Ministry of Housing and Urban-Rural Development seems not to have close coordination with the Ministry of Transportation and the Ministry of Ecology and Environment. These coordination relations need to be strengthened in future age-friendly community policymaking.

4.4.3 Commercialisation and bureaucratisation

Institutional ageism makes older people unable to get the policy support for their well-being. Meanwhile, the policy attitude toward older people and population ageing also influences social values. As mentioned above, ageing is used with problems and challenges in policies several times, which becomes a risk for shaping the negative images of older people in society. Therefore, the social and economic nature of active ageing should be emphasised more in the policies related to ageing issues.

Meanwhile, there are some vulnerable subgroups in the older population. The policy system for

ageing issues has already identified these subgroups. These subgroups include the older people with the problems of disability, dementia, poverty, empty-nested families, and the oldest ages. However, the special consideration for these subgroups does not exist in the guideline for neighbourhood renovation. In the future, the improvement of community built environments for these vulnerable subgroups should be secured by bureaucratisation.

However, overemphasis on the vulnerable subgroups in older people may reinforce the social stereotypes of ageing. Meanwhile, positive discrimination may emerge because the guaranteeing basic principles cannot cater to the demands of the older people outside these subgroups. Thus, the Chinese government has innovated the elderly care service mode and proposed the inclusive elderly care mode. The mode completes the development of the elderly care service system on the high-end side. It is also reflected in the community renovation guideline, in which elderly care services are regarded as a new service industry mode in the communities. The guideline also actively supports service providers settling down their businesses in communities through renovation projects.

Overall, the community renovation guideline does well in commercialising elderly care services. It can help shape the positive images of older people that they can still contribute to social and economic development. However, the bureaucratised built environments for older people to ensure their accessibility still need reinforcement in future policymaking.

4.4.4 Age-friendly community policymaking suggestion for policy content

According to the above discussion, the current policymaking task for age-friendly communities should be incorporating more built environment policy elements into the service-oriented policy system for ageing issues. What is more, efforts also should be made to improve the importance of built environment policy elements. The above discussion focuses on policymaking processes and logic. This discussion part focuses on policy content.

According to the above analysis, among three kinds of policy sentences, mixed-peak policy sentences can increase the attention to lower-importance policy elements through the interactions with higher-importance policy elements. Through a deep investigation of these mixed-peak policy sentences, the interactions between higher-importance and lower-importance policy elements can be categorised into three types.

4.4.4.1 Containment relationship

Higher-importance policy elements and lower-importance policy elements can contain each other. For example, in the neighbourhood renovation guideline, elderly care, as a higher-importance policy element, is contained in the community public service system. Thus, as a policy element should appear in the second-level policy sentences, the community public service appears in some first-level policy sentences. History as a lower-importance policy element should appear in the fourth-level policy sentences. However, history is regarded as a

dimension of the architecture attributes in the renovation guideline. Therefore, it makes history appear in some third-level policy sentences. Similarly, repairing has lower importance in the policy system for ageing issues and should appear in the fourth-level policy sentences. However, it is regarded as an act of neighbourhood renovation and put into some third-level policy sentences.

4.4.4.2 Realisation relationship

Higher-importance policy elements and lower-importance policy elements can realise each other. For example, in the policy system for ageing issues, old neighbourhood renovation has lower importance than community governance. However, in the guideline, older neighbourhood renovation facilitates community governance. Thus, old neighbourhood renovation, which belongs to the third-level policy sentences, is put into some second-level policy sentences. Moreover, old neighbourhood renovation also upgrades some lower-importance built environment policy elements, which should appear in the fourth-level policy sentences, including roads, stairways, elevators, and energy-saving.

4.4.4.3 Constellation relationship

The constellation relationship used in mixed-peak policy sentences can be seen in two examples in the guideline. Firstly, the guideline parallels municipal facilities and service felicities. Thus, as a lower-importance policy element that should appear in the third-level policy sentences, municipal facilities are upgraded into some second-level policy sentences. Meanwhile, elderly

care as a community service is paralleled with many other lower-importance service policy elements, including medical, household, post, education, catering, and activities. The constellation relationship significantly improves the sentence level of these lower-importance policy elements.

Overall, the mixed-peak sentences improve the attention to lower-importance policy elements through policy specification. Containment and constellation relationships specify the general concept, such as service, into detailed elements, such as elderly care and medical services. Meanwhile, the realisation relationship is to specify policy implementation processes. Thus, future studies and policymaking should focus on the details of policy concepts and implementation processes.

Lastly, this study indicated the importance of policy integration in age-friendly community policymaking. Although the Chinese policy system for ageing issues is comparatively well developed, importance differences exist between different policy elements. According to the analysis of this study, the importance differences between some policy elements can reach several orders of magnitude. Moreover, built environment policy elements are less important in such a service-oriented policy system. Thus, it is necessary to make policies for these lower-importance policy elements through policy integration.

4.5 Chapter summary

In this chapter, some policy recommendations are given by analysing the policies related to

ageing issues and neighbourhood renovation using the practical framework.

Some analysis results echo previous chapters. The policies related to ageing issues are service-oriented, reflecting the central position of services in the practical framework. However, endowment insurance is a central component among these services, while other services have comparatively low importance. Echoing the practical framework, the Chinese central government has started realising that commercialisation can increase the diversity of elderly services. Thus, universal elderly care has been raised by the central government. As a newly started initiative, the central government can review the successful experience of Hong Kong. Another significant point that can reflect the previous chapter is that the housing functions of communities can be facilitated by the social relations expanded in elderly services. More examples can also be retrieved from Hong Kong's experience to develop supportive built environments for both elderly services and older people. Service spaces are also bureaucratised by the neighbourhood renovation policy to ensure the inclusiveness of elderly care facilities. Service and related facilities are used to define old urban neighbourhoods. One of the policy goals is to ensure enough services and facilities in communities. Thus, the bureaucratisation of services is an outstanding point of the neighbourhood renovation policy.

Some other points in the practical framework remain the problems and need further policymaking and interventions. First, according to Hong Kong's case, the bureaucratisation of older people's human activities contains both discrimination prevention and respect. In Chinese policies related to ageing issues, discrimination prevention has already been well supported.

Various vulnerable subgroups of older people have been considered in the policies. However, the bureaucratisation of the respect aspect still demands more policy support. The “improper” spatial practices of older people are usually complained about by the public, especially the younger generations. The conflicts become more intense in public open spaces and public transportation. Some newly set regulations even force older people to change their daily routine to ensure the public resources for younger people. Thus, respect and ageism prevention still need to be reinforced with more policy support. Secondly, the community outreach to older people conducted by commercial service providers is a complex problem in Mainland. Although older people tend to be interested in and benefit from such activities, their families usually worry that they may spend too much money on the products with unrealistic advertisements. Governments and community administrators tend to restrict commercial actors from conducting community activities for older people. The concern about the vulnerability of older people in the face of frauds further reduces private service providers’ chance to conduct outreach activities in communities. However, as mentioned in the previous chapters, more policy support should be developed to boost community silver hair markets in the future. Lastly, the built environment regulations for neighbourhood renovation are still general and vague. It is difficult to get clear guidance about the built environment development to meet the requirements of community elderly care services or even the general services. Nevertheless, the practical policy framework developed from Hong Kong’s case gives some built environment factors worthy of further concern, including low energy-consumption development, age-friendly facilities, public transportation accessibility, and environmental safety.

Chapter 5 Discussions and Observations

5.1 Overall summary of research findings

Nowadays, the old urban neighbourhoods in China also concentrate a large number of older people. Thus, this study explored revitalising old neighbourhoods by giving older people a new role as consumers. Under such intention, a policy framework was developed to facilitate age-friendly community development through old neighbourhood regeneration. To develop the policy framework, three research questions were answered in this study.

5.1.1 What should be the theoretical foundation of the framework?

According to a systematic review of age-friendly community studies, the production of space is a potentially influential theory that has not been fully used in the research area. Especially, no models have been developed by the theory. Thus, this study filled the gap by using the production of space to develop the theoretical prototype of the policy framework.

Three main barriers to age-friendly community policymaking were analysed from the perspective of the production of space. These three barriers are (1) ageism, (2) developers' reluctance to install universal design components in community development, and (3) a loss of the human rights of older people in community development. Correspondingly, three strategies were raised to overcome the barriers, including commercialisation, bureaucratisation and

expanding social relations to facilitate environmental changes. These three strategies compose the strategic dimension of the policy framework. According to a search on the Internet about the description of the communities intentionally built for older people, supplemented some field visits in four cities, three components were identified as the developers' spatial representations and older people's representational spaces of age-friendly communities. These three components are community services, human activities, and housing functions. These three components compose the component dimension of the policy framework.

5.1.2 What should be a practical formation of the framework?

This study operationalised the theoretical prototype into a practical framework by taking Hong Kong as a pioneering case of China's age-friendly community development. A secondary dataset was used to explore how Hong Kong's age-friendly community development can facilitate the continuous development of communities, which is the main aim of neighbourhood renovation.

The practical framework is divided into three levels. At the core is the interaction between community economic sustainability and diversified care services, indicating the commercialisation of community services. To fulfil this core part of the model, community silver hair markets are suggested to be developed. Three factors can support the commercial core: isolation prevention, social sustainability, and low-energy-consumption development. The interaction between isolation prevention and community silver hair markets indicates the

commercialisation of older people's human activities. This can be achieved by the outreach to isolated older people conducted by commercial service providers. The interaction between social sustainability and community silver hair markets indicates the bureaucratisation of community services. It needs the governments' inventions to improve the inclusiveness of community elderly services. The interaction between low-energy-consumption development and community silver hair markets indicates that the social relations expanded by community services can determine community housing function, especially the building facilities. Lastly, when the core and supportive parts are well established, some more age-friendly community factors can be developed, including discrimination prevention, respect, communication and information, age-friendly facilities, environmental safety, and public transportation accessibility. Discrimination prevention and respect are two bureaucratisation methods for older people's human activities. These measures ensure older people's rights to participate in community activities, especially when using community built environment resources. Age-friendly facilities, environmental safety, and public transportation accessibility are three housing function factors belonging to community facilities. These three factors also indicate that the social relations expanded in community services are influential in determining community environments. Overall, the practical framework partially validates the theoretical prototype and improves its applicability.

5.1.3 What should be the implication of the framework on real policies?

To identify the entry point for incorporating age-friendly community development into old neighbourhood renovation, a policy analysis tool was developed to evaluate the consideration of ageing issues. The evaluation results of the policies related to ageing issues and old neighbourhood renovation policy were discussed by referring to the practical framework.

By analysing the policies related to ageing issues, the core position of social services in the policy system was validated. At the same time, several improvement suggestions were also given. Currently, policies stress too much on endowment insurance, while other services have comparatively lower importance in the policy system. To tackle the lack of diversity of care services, the central government has issued a policy to promote universal elderly services, encouraging commercial actors to provide more diversified elderly services. However, as a newly started policy initiative, universal elderly services still need further development, and a deeper investigation of Hong Kong's experience would be helpful.

By analysing the evaluation results of the old urban neighbourhood policy, the role of the social relations expanded in elderly services in age-friendly community development was validated. The built environment demands for conducting services can increase the policymakers' and developers' attention to community built environments for older people. However, the policy content of developing suitable environments and facilities for services is still very vague. Thus,

policymakers should be aware of the importance of different policy elements for ageing issues and integrate higher-importance and lower-importance policy elements. The policy specification can also be made by referring to the endowment insurance's experience. Lastly, three more policy improvement suggestions were given. (1) Older people should be respected when using community built environment resources to conduct their daily activities, especially public open spaces and public transportation. The ageism in older people's preferred daily routine should be minimised. (2) The commercial service providers' outreach activities to isolated older people should be regulated and ensured. It can boost community silver hair markets while reducing the risk faced by older people and the resistance of their families and community workers. (3) The specific built environment requirements from community elderly care service providers should be considered in policymaking. Low energy-consumption development, age-friendly facilities, public transportation accessibility, and environmental safety could be four entry points as indicated by Hong Kong's case.

5.2 Research contribution

Each stage of the study produces its significant research contributions. These contributions also show the originality of this study. The contribution of this research can be summarised as theory introducing, benchmark setting, and policy tool development.

5.2.1 Theory introducing

This study further introduced the theory of the production of space into age-friendly community

modelling. As shown in the previous chapter, most models related to age-friendly communities are created from the ecological theory. However, no single theory is sufficient to represent age-friendly communities, such a complex system. Age-friendly communities themselves are a kind of community. Like many other kinds of communities, the development of age-friendly communities should consider both person-environment fit and the social dynamics inside the communities. Thus, some promising theoretical trends in the research area were identified in the first stage of the study. The production of space is one of the most promising theories in the research area, which can develop more models for age-friendly community development by considering social dynamics. Moreover, there is seldom a model specifically for age-friendly community policymaking. Thus, the theoretical prototype is a significant contribution produced in this research stage. This theoretical contribution is valuable for policymakers because it can give some possible choices for age-friendly community development. Policymakers may use this framework differently according to their regional contexts and resources.

The study also extended the application of the production of space through innovative ways. Firstly, the two datasets used in the empirical analysis were both retrieved from governmental open sources. Secondly, this research used cutting-edge analysis methods facilitated by the booming computational sciences. Compared with traditional empirical research methods, this study adopted a data-driven mode to conduct the research. Meanwhile, to avoid the critique of lacking theoretical depth, this study used the production of space, a classic and well-developed spatial theory, to explain the analysis results. This study indicates that scholars still need to find

proper theories to analyse data-driven studies. This kind of research practice can bring mutual benefits to the data-driven research mode and classic theories. On the one hand, this research practice can deepen the theoretical foundation of data-driven analysis and make the conclusions more convincing. On the other hand, this research practice also gives continuous life to classic theories, such as the production of space in this study.

5.2.2 Benchmark setting

This research identified Hong Kong as a new benchmark city for age-friendly community development and deeply explored its policy structure to support age-friendly community development. Hong Kong is an extraordinary case among the GNAFCC members. The unit to participate in the Network in Hong Kong is not the city but each of the 18 electoral districts. It means two things. Firstly, Hong Kong has very high coverage of age-friendly community development because the WHO has accredited each district. Secondly, this means the cities with different characteristics can adopt Hong Kong's practices of age-friendly community development because different electoral districts in Hong Kong have unique urban features. This study explored how Hong Kong policies support the development of age-friendly communities in its different districts. As a contribution of this stage, Hong Kong's case produced a latent policy structure. This latent structure is called the practical framework because it filters infeasible options from the theoretical prototype and gives more practical instructions for policymaking in different regions.

5.2.3 Policy tool development

To reflect the practical framework in actual policies, this research developed a tool to evaluate the current policy system and indicate a more efficient way for future policymaking. Nowadays, urban planners have introduced cutting-edge technologies into their practices. As a policy study, this research tried to preliminarily introduce some applicable technologies into the urban development policymaking processes. Policies are usually presented in text format. Therefore, this study used a basic natural language processing technology to develop a policy evaluation tool. The technology is called the TF-IDF algorithm. The tool helped identify some improvable points for the Chinese age-friendly community policy, referring to the practical framework. What is more promising is that the tool can be continuously used to track and assist the future policymaking for age-friendly communities. The tool can form the foundation of an intelligent system for age-friendly community policymaking. The system can continuously collect newly developed policies that support age-friendly community development. The policies will form a constantly expanding policy corpus. Then by applying the TF-IDF, the system can evaluate whether current policies well or insufficiently support age-friendly community development. The system can also track the longitudinal changes of the importance of age-friendly community policy elements and let policymakers check whether policymaking meets their expectations. Finally, the system can also give strategies to promote some age-friendly community elements that are not well supported by current policies.

5.2.4 Contribution to Chinese Practice

Correspondingly, the three contributions mentioned above also have significance for Chinese academics and practices. **For theory introducing**, this study also introduces a new perspective to Chinese age-friendly community studies. As mentioned in Chapter 2, Chinese academics have been interested in the theory of the production of space and its related issues for a long time, which means the theory fits well with the Chinese situation, especially in urban development. However, it is also found that the theory has not been widely used in Chinese age-friendly community studies. Thus, this study wants to trigger more future studies in China using either the production of space or this study's theoretical prototype to improve age-friendly community development and policymaking.

For **benchmark setting**, the exemplar case of Hong Kong can provide a practical model for the central government. As stated in Chapter 3, Hong Kong is a pioneering city in China in policymaking for older people. Some policy strategies reacting to population ageing have also been put into the central government's policies. Thus, the latent policy structure for age-friendly community development illustrated by Hong Kong's case can also be instructive for the Chinese central government's top-level policy system design. Furthermore, the practical framework containing Hong Kong's experience can supplement the pilot cities' experience to provide more innovative policymaking ideas. As shown in Chapter 4, some policymaking recommendations for the Chinese central government have been given. Meanwhile, some pilot cities with suitable conditions and resources may find the practical framework, or a part of it,

can be directly used in their policymaking.

For **policy tool development**, the tool can facilitate more reactive policymaking for age-friendly community development in China. Nowadays, policymakers seek different ways to embed innovative intelligent technologies in urban development practices. The policy evaluation framework can continuously track the policymaking for age-friendly community development in China. It will help policymakers identify the age-friendly community elements that are insufficiently stressed in policies and integrate them into some elements with higher importance. Moreover, as the non-government actors often give their policy demands through the platforms collecting their literal comments, such as the 12345 hotline in every Chinese city, the tool can help policymakers better react to the policymaking demands frequently raised through this bottom-up way.

Chapter 6 Conclusion

6.1 Summary

The study developed a policy framework to integrate age-friendly community development and old neighbourhood renovation. The policy integration can increase the policy support for age-friendly communities and realise age-friendly community refurbishment in China.

The study was done through three sub-tasks. Firstly, a theoretical prototype of the policy framework was developed. To develop the theoretical prototype, the production of space was identified as a suitable theory by a scientometric literature review. Next, the theory was used to analyse barriers to policymaking for the age-friendly community. Finally, the analysis produced the strategic and component dimensions of the theoretical prototype of the policy framework.

The strategic dimension of the prototype has three factors: commercialisation, bureaucratisation and expanding social relations. The component dimension has three factors: community services, human activities and housing functions. The interactions between the strategic and component dimensions form nine theoretical solutions to overcome barriers to age-friendly community policymaking. (1) Community services x Commercialisation: policies can encourage the development of the elderly service industry within communities. (2) Community services x Bureaucratisation: policies can give elderly service providers convenience to conduct services in communities, especially when they need access to proper venues. (3) Community services x Expanding social relations: Policies can establish a mechanism to let older people

express their spatial demands with the help of service providers. (4) Human activities x Commercialisation: Policies should support the introduction of commercial factors into the activities for older people. (5) Human activities x Bureaucratisation: Policies can officially regulate community activities for older people to ensure proper time and spaces. (6) Human activities x Expanding social relations: Policies can establish a mechanism to let older people express their spatial demands with the help of their neighbours and community administrators. (7) Housing functions x Commercialisation: Policies should encourage the supply of multi-generational housing in real estate markets. (8) Housing functions x Bureaucratisation: Policies can encourage the application of environmental arrangement strategies and technologies to facilitate intergenerational mixed communities. (9) Housing function x Expanding social relations: Policies can establish a mechanism to let older people express their spatial demands with the help of their social relations with their families. This study used Hong Kong's case to validate these theoretical solutions to form a practical framework for China. Other countries can also validate these theoretical solutions using their cases to form their own practical frameworks.

Secondly, the theoretical prototype was operationalised to make it suitable to realise old neighbourhood renovation in the Chinese context. Hong Kong was chosen as an exemplar city of age-friendly community development in China. A factor analysis was applied to a secondary dataset to explore how age-friendly communities can realise continuous neighbourhood development, which is the main task of old neighbourhood renovation. From the analysis, the

theoretical prototype of the policy framework was refined to the practical framework.

Lastly, some policy recommendations were raised by analysing the related policies issued by the Chinese central government because these policies are influential in China. To analyse the policies, a policy analysis tool to evaluate the consideration of ageing issues in Chinese policies was developed through the TF-IDF. The central government's policies related to ageing issues and old neighbourhood renovation were evaluated using the tool. As a result, some policy recommendations were finally given to indicate how to increase the policy support for age-friendly communities and realise age-friendly community refurbishment in Chinese old neighbourhood renovation.

6.2 Limitations of study

Four limitations were found in this study. Firstly, the theoretical development of this study aimed to introduce other theories to supplement the models developed by the ecological theory, which is currently dominant in age-friendly community studies. However, the theoretical prototype developed in this study still has its limitations because the model is underpinned by only one theory. Experts of other theories may find some limitations in this theoretical prototype. Thus, the theoretical prototype should open up to incorporating other theories to make it closer to reality.

Secondly, although the secondary dataset analysis produced several pioneering policy recommendations for China, even globally, the 66 criteria cannot fully reflect current people's

demand for age-friendly and sustainable community development. Our world has changed significantly since 2015, especially during the pandemic period. As a result, people have some new demands for environments nowadays. Thus, it is time to redesign and reconduct the survey. Especially after this preliminary exploration, the survey can be first conducted in the other Chinese member of the GNAFCC, Qiqihar. Then, other pilot cities for age-friendly community development in China can be reached, which will improve the policy framework's applicability in China's context.

Thirdly, the applicability of the practical framework for municipal and national policymaking in China still needs more validation. Here are two reasons. Firstly, the framework generally reflects the policymaking at the city level. However, there are various participants in Hong Kong's age-friendly community development, especially the district councils. Thus, although the policy supports are fixed at the city level, different district councils may take advantage of the policies differently. Therefore, it is necessary to explore how districts with varying urban features differently depend on the policies. This can ensure that the practical framework is more applicable for the districts with different urban features. Secondly, Hong Kong has higher freedom for different actors to participate in age-friendly community development. It may be different from many Mainland cities where the central government's policies are very determinant in urban development. However, nowadays, encouraging broad participation in infrastructure projects for public welfare has become one of the development preferences of the Chinese central government. The central government has also issued policies to protect the

involvement of different public actors. Therefore, it is worthy to compare the difference in freedom for participation between Mainland cities and Hong Kong and how the difference will influence age-friendly community policymaking and development.

Lastly, the policy evaluation tool was developed using the policies issued by the central government. It is not enough to ensure that the evaluation tool reflects people's daily life. Thus, the policies at the provincial and city levels should also be retrieved. This study did not collect these policies because of the limitation of technical ability. This gap should be filled by the corporation with information technology professionals in the future. Another limitation of the evaluation tool resulted from linguistic knowledge. Although the research tried its best to make the tokenisation results more accurate and filter out the stop words, there is still a need for incorporating linguistic professionals in the improvement work of the evaluation tool. It is believed that more constructive policy implications will be produced after improving the evaluation tool.

6.3 Future research directions

The following are a few future research recommendations given by the researcher of this study. (1) The theoretical prototype can trigger more use of the theory of the production of space in age-friendly community studies. The model can also be further developed with more collective intelligence from other scholars in the future. (2) The operationalisation of the theoretical prototype can inspire more policy integration studies about age-friendly communities. Scholars

can further explore the possibilities to integrate the concept of the age-friendly community into other policy agendas. (3) The corpus and evaluation tool are designed to be expandable. Thus, with the enlargement of the policy library, a longitudinal policymaking observation can be conducted, and the conclusion from this research can be updated continuously in future research development. It would also be an interesting future research direction to incorporate other NLP techniques to expand the tool's functions to assist policymaking.

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