Assessing the Social Interconnection of Retirement Village: A Framework of Landscape Design

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Abstract—**Due to the population ageing across the world, retirement villages have been playing an increasingly important role in providing appropriate housing alternatives for the seniors. It has been argued that social interconnection influences the quality of life of senior residents. However, little landscape literature has been delivered to address the social interconnection of retirement villages. This research aims to propose a framework of landscape design to assess and enhance the social interconnection of retirement villages. A theoretical baseline of the landscape design of the social interconnection in retirement villages is developed, analogue to the previous literature. Subsequently, three retirement villages in Geelong, Australia are assessed and compared against the theoretical baseline. The major social-interconnection features not being addressed by the landscape design are identified, including respect and social inclusion; civic participation and employment; and communication and information in retirement villages. Meanwhile, few retirement villages have embedded landscape narratives into the landscape design. This research argues that landscape narratives shall create unique meaning in terms of their former life, living environment and experiences and contribute to their elder life in retirement villages. This research presents a novel measure to enhance the social interconnection of the retirement villages within the landscape context.**

Index Terms— **ageing, landscape, social interconnections, retirement villages**

I. INTRODUCTION

With the ageing of the "baby boomer" generation, the provision of appropriate accommodation for seniors has become increasingly important for community, practitioners and policy-makers [1]. It is accepted that retirement villages are an important housing alternative for seniors which can offer enhanced lifestyle and social interaction while also providing care and community support [1], [2]. Previous research of retirement villages identified the push and pull factors that affect seniors moving out of their home and into retirement villages by surveying the living preferences and experiences of the senior population [3]-[7]. Many results demonstrated that the top-three living preferences of the later-life housing are the one providing physical security and accessibility, social and family interconnections, and financial affordability. More importantly, amount of studies demonstrated that the social interconnections were one of the major barriers that prohibit the seniors away from relocating into retirement villages [1], [2], [8]-[10]. As the consequence, various facilities and services, such as wellbeing centres, barbeque areas, village buses, regular group-activities, and so forth, are included inside of the retirement villages to enhance the residents' feeling of community interconnections [11]-[14]. However, little research in the field of the built environment has yet addressed to interconnections between the retirement villages and the neighbourhood community.

Landscape architects are working on master planning projects and urban regeneration, with the development of the cities, they are playing significant roles in solving the great issues during the process of development, including the issue of climate change and the scope of sustainable communities [15]. Landscape design is concerned with the public good, with community values and with human development and its impact on the land. The scope of the discipline has since grown from a visual appreciation of the landscape to encompass the whole of mankind's physical relationship with the land [16]. With the urban context, landscape design was implemented to produce an

age-friendly city and community [17]-[19]. It is demonstrated that the lack of connectivity in the street network, which represents barriers in the built environment and access to neighbourhood and retail, parks, and other community features [20]-[22]. In addition, the importance of landscape design in reducing the social isolation of the residents in the retirement villages was highlighted [23].

This research aims to achieve the interconnections between retirement villages and the neighbourhood community through the landscape design. The aim can be achieved by a combined research of the literature review and case studies.

The age-friendly elements of the landscape design for retirement villages are integrated by reviewing previous literature. A site analysis is applied to the boundary of a retirement village in Geelong, Australia by the developed landscape-design elements to assess the interconnection between the village and community. This research firstly uses landscape knowledge to build stronger interconnections between the village residents and the outside community. The newly developed landscape-design baseline can provide both the industry and governments with practical references in Australia and across the world.

II. Features of Social Interconnections in Retirement Villages

The features of social interconnections in retirement villages cover eight areas of city living, including outdoor spaces and buildings, transportation, housing, social participation, respect and social inclusion, civic participation and employment, communication and information as well as community support and health service [24]. In addition, reference [25] has identified home-likeness and privacy as the factors that influence the degree of social interconnections in retirement villages. This research adopts ten features including 1) Outdoor spaces and buildings; 2) Housing; 3) Community support and health service; 4) Transportation; 5) Social participation; 6) Respect and social inclusion; 7) Civic participation and employment; 8) Communication and information; 9) Privacy; and 10) Home-likeness.

Outdoor spaces and buildings have a significant impact on the quality of life and their ability to age in the life of older people [24]. The well-designed outdoor space allows elders to access a range of activities and views. *Transportation* is a key element affecting the active ageing, where the community minibuses, on-site vehicles, and the public transportations can provide the elder residents with the affordable access to major destinations including hospital, public parks, local shops and city centre. Meanwhile, the villages should provide sufficient parking close to buildings and transport stops for residents, visitors and disabled people. *Housing* requires much ageing-friendly concept for the older residents of retirement villages. The units are always designed to be suitable for wheelchair users with ramps and rails and adapted for residents with poor eyesight or

arthritis that are accessible for all elder residents. *Supportive infrastructure* ensures the older residents can get appropriate care in the villages, including maintenance, housekeeping and home-care services.

Social participation provides a range of on-site or off-site events and activities that allow older residents and their family participating in social activities in the community. *Respect and social inclusion* refers to the reported issues of conflicting behaviour and attitudes towards older people. Community action needs to strengthen neighbourhood ties and support include village residents as key advisers, informants and beneficiaries [24]. *Civic participation and employment* offers a range of volunteering and employment options for senior residents to provide valuable contributions in both villages and the outside community. *Communication and information* enables village residents staying connected with events and people, as well as getting timely, practical information.

Privacy could be strengthened by increasing the enclosure and defining the boundaries. The increased special enclosure enable village residents to feel that they are being sheltered and protected, which enhance the sense of security within the village. *Home-likeness* involves the process of belonging and agency [26]. Processes of belonging incorporate facts of people and environmental experience, which reflect interpretation of space, emotional bonding and place attachment. Therefore, increasing domestic cues will help residents familiar with the village living by engaging their previews living environment when they first move into retirement villages.

III. Baseline of Landscape Design for the Social Interconnections in Retirement Villages

In a broad sense, landscape design is a professional design discipline dealing with integrating people and the outdoor environment in order to benefit both [27]. The landscape design elements could be summarised as five major aspects, including neighbourhood environment, space, technique, circulation, and resources [15], [16], [28], [29].

The neighbourhood environment is composed of three elements including landscape organisation (LO), landscape narratives (LN) and human engagement (HE). These elements could contribute to the visual unity and connectedness of existing physical and cultural environment, association with the history of the site as well as the relationship between human and environment [28]. The landscape organization (LO) is referring to the existing site context and visual appreciation. By surveying contour, soil, weather, fauna and flora, the unity of the physical environment can be achieved to increase the visual connectedness and hierarchy. The landscape narratives (LN) refer to documenting and representing the historical activities of human and nature in a particular location. Therefore, a shift in design thinking is necessary that enables the environment could be understandable, meaningful and responsive. In addition, human engagement (HE) influences landscape

designing and decision making, where the consultations with stakeholders and local residents are an important part of landscape design in gathering specific information about the site and in canvassing the views of public on the proposed development [29].

Space combines elements of programs and scale to support the activities of and connections among people, nature and culture [30]. The programs involve the spaces for garden and outdoor activities. These spaces could provide a wide range of activities and opportunities for socialization that helps residents to maintain connections with the natural environment. The scale refers to the size in relation to the human or some other unit of measure. The scale can be utilized to give emphasis to an element of composition, like human with the surrounding environment and the proportion of green area in the overall field, which is an essential element in landscape design.

Technique includes materials and site structures (SS), which provide different purposes for the perception of space and safety [28]. Materials include organic, natural inorganic, and composite construction materials are used in landscape design for different purposes. Site structures (SS) provide ramps, steps, chairs and fences that allow people to move up and down efficiently and to have private living space [27].

The circulation includes the movement, linkage and pavement that offer the safety, the unity of the environment, the connectedness between people and the physical environment as well as the guidance of directions and destinations [28]. The resources include three main elements, which are water, plant and landform [27]. The elements are various in edge, form and colour, which creates a different visual and sensual perception.

Subsequently, the theoretical baseline of landscape design for the social interconnections in retirement villages is proposed in Table I.

TABLE I.   BASELINE OF LANDSCAPE DESIGN FOR THE SOCIAL INTERCONNECTIONS IN RETIREMENT VILLAGES

	LO	LN	HE	Programs	Scale	Materials	SS	Movement	Linkage	Pavement	Water	Plants	Landform	Total
Outdoor Spaces And Buildings	✓		✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	12
Housing			✓		✓	✓	✓	✓		✓				6
Community Support And Health Service				✓				✓	✓					3
Transportation			✓					✓	✓	✓				4
Social Participation	✓	✓	✓	✓	✓		✓	✓	✓		✓	✓	✓	11
Respect And Social Inclusion		✓	✓	✓										3
Civic Participation And Employment				✓										1
Communication And Information				✓										1
Privacy						✓	✓					✓	✓	4
Home-Likeness	✓	✓	✓	✓		✓	✓			✓	✓	✓	✓	10
Total	3	3	6	7	3	4	5	5	4	4	3	4	4	

The *outdoor spaces and buildings*, *social participation* and *home-likeness* are the most popular social-interconnection features that can be achieved by the landscape design. The order of the *outdoor environment and buildings* can be designed by the landscape organisation (LO), while the programs involve a number of indoor and outdoor spaces that are suitable for residents to exercise in. Pavement and materials are used to avoid uneven paving and increase the sense of safety. Moreover, plants and landform could create an in-between space where residents could look through before they enter the space. To achieve the *social participation*, the programs are used to create a range of on-site and off-site activities; site structures (SS), water, plants and landform could be used to promote social activities within the village; and the design of movement and linkage providing equal access to all facilities and the community close to the city centre. Moreover, for

achieving the *home-likeness*, the programs create a series of daily activities that helps village residents to remind their memories in previews life. Materials, pavement, site structures (SS) and landscape organization are creating different design features to increase the domestic cues for village residents and make them feel comfortable with the living environment in retirement villages. Nature resource, such as water, plants and landform design will increase the naturalness that improving the living environment as well as the familiarity that connecting residents with the ecology.

The *housing* is achieved by six landscape design elements, following closely by *transportation* and *privacy*. Specifically, for achieving requirements of *housing*, the site structures (SS), such as ramps, materials and pavement are important design elements that provide easy access for wheelchair users and for those residents with poor eyesight or arthritis. Besides, the design element of

scale ensures the proportion of houses and the green area are appropriately distributed. In addition, *transportation* can be achieved by human engagement (HE), movement, linkage and pavement, and the *privacy* can be addressed by site structures (SS) which are using fences and paving to avoid the vision from outside and to define the boundary that separates the space of village and outside and the space of private property and public space.

However, the landscape design techniques appear relatively fewer impacts on the other social-interconnection features, including *community support and health service, respect and social inclusion, civic participation and employment*, and *communication and information*. Specifically, the *community support and health service* can be addressed by programs, movement and linkage via arranging a series of supportive and care services, such as housekeeping, on-site health interventions. The *respect and social inclusion* can be achieved by the landscape narratives (LN), human engagement (HE) and programs by providing opportunities for residents to form a range of activities, volunteer groups or organisations to help each other and remove negative attitudes from the outside community. The *civic participation and employment* and *communication and information* only can be achieved by the design of programs which form the spaces for village residents to meet regularly and provide opportunities for residents to work.

IV. SITE ANALYSIS

A. Site Descriptions

Three Geelong-based retirement villages were tested and evaluated by the landscape design frameworks for social interconnections in the retirement village. The site information and the layouts of the retirement villages are indicated in Fig. 1.

Village A   Village B   Village C

Figure 1.   The descriptions of the three retirement villages

The Village A is located in Marshall, which is 7 kilometres from the city centre, walking distance to the train station and accesses to the popular beach destinations via the highways. The unity of houses and landscape is represented in its design of colours, forms, shapes, materials, and arrangements, which creates the visual harmony of the retirement village. The location of each property enables all dwellers could access to the on-site facilities with a similar distance. Moreover, the indoor and outdoor facilities and spaces enhance the social activities of residents in the retirement village.

Village B has 45 one-bedroom and 19 two-bedroom units and a public area. It is located at the inner edge of Geelong, and close to the country comforts, a local bowls club, a leisure centre, and a medical clinic. A public bus and the weekly-village shuttle can take the residents to the local shopping centre and the city centre.

Village C occupied about 65,600 square meters, in which around 6,600 square metres is the green area. It is located at the gateway to a local scenic area and is close to the social services. The village offers a variety of facilities and services that inspire relaxation, security and caring of the residents.

B. Assessments of Social Interconnections in Retirement Villages

The programs contribute to the features of community support and health service, social participation and home-likeness in the village. As shown in Table II, the program design enables Village A to contain adequate outdoor spaces for the social activities of Tai Chi, painting and walking groups. Consequently, the residents can keep active within the community by socialising with neighbours and recalling old memories from the homelike-living experiences.

TABLE II.   ASSESSMENT OF VILLAGE A

	LO	LN	HE	Programs	Scale	Materials	SS	Movement	Linkage	Pavement	Water	Plants	Landform	Total
Outdoor Spaces And Buildings	✓			✓	✓	✓	✓	✓	✓	✓		✓	✓	10
Housing				✓	✓	✓				✓				4
Community Support And Health Service				✓					✓					2
Transportation								✓	✓					2
Social Participation				✓			✓	✓	✓					4
Respect And Social Inclusion														0
Civic Participation And Employment														0
Communication And Information														0
Privacy						✓	✓							2
Home-Likeness	✓			✓		✓				✓	✓	✓	✓	7
Total	2	0	N/A	4	2	4	4	3	4	3	1	3	2	

The site structures (SS) enhance the *home-likeness, housing, social participation and privacy*. For instance, the fences and courtyards of the units provide the residents with the private living environment including the individual appreciations and aesthetic requirements, while the benches in the public areas create social opportunities. In addition, the linkage design contributes to the *outdoor spaces and building, community support and health service, transportation* and *social participation*. Specifically, this retirement village is located conveniently between the city centre and popular beach destinations and scenery points linking to outdoor space, activities, community services as well as public transportation. It also close to the train station where residents can access it by short time walking. Driving to the closest supermarket is convenient but access it by walking is very far away.

As shown in Table III, the most effective landscape elements are materials, site structures (SS) and linkage. The materials design in village B contributes to the *outdoor spaces and buildings*, *housing, privacy* and *home-likeness*. The on-site pavement is used the non-slip material in the pedestrian path, and the asphalt is used in vehicle path. The difference between colour, shape and materials among the on-site pavement distinct the different uses of outdoor spaces. Besides, the semi-transparent structure fences are used to define the site boundary and individual properties; ramps provide access for disabling residents in the village. The linkage design in the village allows residents could easily access the closest facilities, on-site medical centre and leisure centre.

TABLE III.   ASSESSMENT OF VILLAGE B

	LO	LN	HE	Programs	Scale	Materials	SS	Movement	Linkage	Pavement	Water	Plants	Landform	Total
Outdoor Spaces And Buildings	✓			✓		✓	✓		✓	✓		✓		8
Housing				✓	✓	✓				✓				4
Community Support And Health Service									✓					1
Transportation								✓	✓					2
Social Participation				✓			✓	✓	✓					4
Respect And Social Inclusion														0
Civic Participation And Employment				✓										1
Communication And Information				✓										1
Privacy						✓	✓							1
Home-Likeness				✓		✓						✓		3
Total	1	0	0	5	1	4	4	2	4	2	0	2	0	

However, there are a limited number of garages and carports on site and these are located on a wait turn basis when a vacant garage becomes available. In addition, the movement design of vehicle path is only connecting a certain number of properties, parking space in frontwards is not available. Moreover, the proportion of the living area is fair enough for residents, yet the scale of the public area, parking space and front courtyard are not

adequate. The semi-transparent structure fences are used to define the site boundary and part of individual properties, and ramps provide access for disabled residents.

The program design in village C (refers to Table IV) provides a range of facilities, services and activities on site, including communal vegetable gardens, community centre, computer room, craft and hobby room, library, lounge, social activities and clubs. These programs enhance the *outdoor spaces and buildings*, *community support and health services*, *social participation* and *home-likeness*. For instance, the *home-likeness* feature of the village can be achieved by the beautiful scenery of the public garden and domestic species of plants.

TABLE IV. ASSESSMENT OF VILLAGE C

	LO	LN	HE	Programs	Scale	Materials	SS	Movement	Linkage	Pavement	Water	Plants	Landform	Total
Outdoor Spaces and Buildings	✓			✓	✓	✓	✓		✓	✓		✓		8
Housing					✓	✓	✓			✓				4
Community Support and Health Service				✓										1
Transportation								✓	✓					2
Social Participation				✓			✓	✓	✓					4
Respect and Social Inclusion														0
Civic Participation and Employment														0
Communication and Information														0
Privacy						✓	✓							2
Home-Likeness	✓				✓		✓			✓	✓	✓		6
Total	2	0	N/A	4	2	4	4	2	3	3	1	2	0	

Asphalt and concrete are two major materials that used to construct the road in the community to improve the *privacy, outdoor spaces and buildings, housing* and *home-likeness* for elder residents. For example, wood is usually used for fences of the individual units and the site boundaries of the village. Moreover, the crossroad and intersection used different paint, colour and material to distinct from other materials of the road, which separates area in the outside environment and provides safety for village residents. However, the design and arrangement of circulation are not efficient enough, which generated few dead ends in the corner of the village.

V. PRACTICAL IMPLICATIONS

The assessment results demonstrated that the social-interconnection features that have been widely addressed by the landscape-design elements appear similar across the three retirement villages, which are the *outdoor spaces and buildings*, *home-likeness*, *housing*, and *social participation*. In contrast, the *respect and social inclusion*, *civic participation and employment*, and the *communication and information* can hardly be addressed by the landscape design elements, which, instead, can be addressed by the supports and services being provided by the retirement villages.

The results also indicate that Village A and Village C implemented relatively more landscape elements to achieve the *home-likeness*, *outdoor spaces and buildings*, as well as the *community support and health service*, *civic participation and employment*, *communication and information*, and *privacy*. Nevertheless, Village B is the only retirement village addressed to the *civic participation and employment*, and *communication and information* by providing an active Resident's Social Club that provides opportunities for elder residents to exchange information and participate in community activities. The gap of the practical application of the landscape-design elements used for the improvement of social interconnections in retirement villages is presented in Table V.

TABLE V.   THE LANDSCAPE FRAMEWORK (LK) FOR THE SOCIAL INTERCONNECTIONS IN RETIREMENT VILLAGES

	NEIGHBOURHOOD ENVIRONMENT			SPACE		TECHNIQUE		CIRCULATION			RESOURCES			
	LO	LN	HE	Programs	Scale	Materials	SS	Movement	Linkage	Pavement	Water	Plants	Landform	Total
Village A	2	0	N/A	4	2	4	4	3	4	2	1	3	2	31
Village B	1	0	0	5	1	4	4	2	4	2	0	2	0	25
Village C	2	0	N/A	4	2	4	4	2	3	3	1	2	0	27
Average	1.67	0	0	4.3	1.67	4	4	2.33	3.67	2.33	0.67	2.33	0.67	
Scores of LF	3	3	6	7	3	4	5	5	4	4	3	4	4	

The frequencies of the landscape-design applications in the three retirement villages are lower than the frequency in the baseline framework. Specifically, the three landscape aspects of technique, circulation and resources are slightly lower than the baseline. However, the neighbourhood environment and space should be enhanced in the future landscape design of retirement villages to improve the social interconnections. The result of Table V indicates that the landscape design in retirement villages has derived a considerable amount of its social value and artistic strength from three aspects of the endeavour, including 1) the richness of the medium in sensual and phenomenological terms; 2) the thematic content concerning the relationship of society and individuals to nature; and 3) the fact that nature is the great metaphor underlying all art [31]. In addition, it is noticeable that the elements of landscape narratives (LN) and human engagement (HE) have not been applied in any of these retirement villages, although the information of the application of human engagement (HE) in two villages is currently not available. The landscape narratives (LN) create unique stories and meaning in the landscape to satisfy the spiritual and psychological needs of village residents, which can be used to develop the *social participation* and *home-likeness* for social interconnections. Comparing to landscape narratives (LN), human engagement (HE) is a valuable tool in seeking understanding and agreement about the key issues and requirements of stakeholders and village residents and highlighting the local interests and values, which could contribute on more social-interconnection features include *outdoor spaces and buildings*, *housing* and *transportation*. It is arguable that the landscape narratives and human engagement (HE) should be explored and adapted to enhance the social interconnection in retirement villages.

VI.   CONCLUSIONS

The landscape element of programs achieved the highest points (7) in the baseline of landscape design for the social interconnection in retirement villages, following by human engagement (HE), site structures (SS) and movement. These elements are defined as the most efficient landscape design elements on social interconnection village design. In contrast, the elements

with the lowest score are landscape organisation (LO), landscape narratives (LN), scale and water. Especially, the landscape narratives (LN) do not show apparent achievements on social interconnection features. Narrative is an essential approach applied by people to shape and make sense of experience and landscape. It links the sense of experience, memory, event, time and other intangibles to the more tangible aspects of the place. A narrative plays a significant role in landscape design as we become to know a place when we know its stories [32]. For instance, the Rousham House (also known as Rousham Park) was remodelled by William Kent in the 18th century, which used masses of trees to frame the landscape as a picture. The design relates to a distant medieval past - the "natural" origin of British freedoms. It is noticeable that the landscape could contribute to creating meaning in everyday life and the aesthetic experiences are social in nature that makes them ideal locations for meaning [33]. Therefore, the design of landscape narratives (LN) in retirement village shall create unique meaning regarding their former life, living environment and experiences and contribute to their elder life in retirement villages.

CONFLICT OF INTEREST

The authors declare no conflict of interest.

AUTHOR CONTRIBUTIONS

PZ and LM conducted the research. PZ, LM and PC analyzed the data. PZ and LM wrote the paper. PC contributed to revising the paper. All authors read and approved the final manuscript.

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