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*Published in:*  
Journal of Cleaner Production

*DOI:*  
[10.1016/j.jclepro.2017.06.227](https://doi.org/10.1016/j.jclepro.2017.06.227)

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*Recommended citation(APA):*  
Hu, X., Xia, B., Skitmore, M., Buys, L., & Hu, Y. (2017). What is a sustainable retirement village? Perceptions of Australian developers. *Journal of Cleaner Production*, 164, 179-186.  
<https://doi.org/10.1016/j.jclepro.2017.06.227>

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## What is a sustainable retirement village? Perceptions of Australian developers

Xin Hu<sup>1</sup>, Bo Xia<sup>2</sup>, Martin Skitmore<sup>3,4</sup>, Laurie Buys<sup>5</sup>, Yi Hu<sup>6</sup>

<sup>1</sup> PhD Candidate, School of Civil Engineering and Built Environment, Queensland University of Technology, Garden Point Campus, 2 George Street, Brisbane QLD 4001, Australia. Email: x8.hu@outlook.com, Phone: +61 450 386 818

<sup>2</sup> Senior lecturer, School of Civil Engineering and Built Environment, Queensland University of Technology, Garden Point Campus, 2 George Street, Brisbane QLD 4001, Australia. Email: paul.xia@qut.edu.au, Phone: +61 7 3138 4373

<sup>3</sup> Professor, School of Civil Engineering and Built Environment, Queensland University of Technology, Garden Point Campus, 2 George Street, Brisbane QLD 4001, Australia. Email: rm.skitmore@qut.edu.au, Phone: +61 7 3138 1059

<sup>4</sup> Guest Professor, Research Institute of Complex Engineering and Management, School of Economics and Management, Tongji University, Shanghai, China. Email: rm.skitmore@qut.edu.au, Phone: +61 7 3138 1059

<sup>5</sup> Professor, School of Design, Queensland University of Technology, Garden Point Campus, 2 George Street, Brisbane QLD 4001, Australia. Email: l.buys@qut.edu.au, Phone: +61 7 3138 1146

<sup>6</sup> Assistant Professor, School of Economics and Management, Tongji University, 1239 Siping Road, Shanghai 200092, China. Email: huyi82@163.com, Phone: +86-21-65987599

**This research did not receive any specific grant from funding agencies in the public, commercial, or not-for-profit sectors.**

## **Abstract**

Developers are key stakeholders in delivering sustainable retirement villages. Understanding the way they perceive sustainability is of great significance in shaping the provision of sustainable living environments in this industry. This study explores village developers' perceptions of a sustainable living environment through a comprehensive content analysis of their online descriptions of sustainability features of their villages. Thirty-nine sustainability features were identified, with the most mentioned being "care and services provision and accessibility", "social interaction", "secure/safe living" and "independent living". The social sustainability of the retirement village environment was highly valued by developers, with the majority of the sustainability features relating to this feature, while environmental sustainability was largely ignored. Although there is no significant difference between the private and not-for-profit village developers regarding the numbers of sustainability features mentioned, the private village developers value "social interaction" more while the not-for-profit village developers prioritize "independent living" and "care and services provision and accessibility" the most. The research leads to a better understanding of retirement village developers' perceptions on a sustainable living environment, which further reveals the meaning of sustainable retirement villages in Australia. All these will ultimately benefit the development of the Australian retirement village industry in general.

## **Keywords**

Retirement villages; sustainability; developers; perceptions; Australia

## 1. Introduction

It has long been argued that sustainable development should be incorporated into community development in order to deliver livable environments (Roseland, 2000). Sustainability is a holistic concept that incorporates social, economic and environmental aspects (Hopwood et al., 2005). As specially designed communities for older people, incorporating sustainability principles into retirement village developments is one way of providing residents with quality living environments (Hu et al., 2015b). Affordability is a major economic sustainability consideration for older people, particularly as they desire an active life-style (social sustainability) in which opportunities for participation in activities and establishing friendship are offered (Finn et al., 2011; Xia et al., 2015c). Environmental sustainability, such as using environment-friendly materials, energy and techniques in their construction and operation, is a consideration for construction and on-going operation and maintenance (Zuo et al., 2014).

Village developers are key decision makers in delivering sustainable retirement villages, as they are both the investors and final decision-makers of the project (Hu et al., 2015a). An increasing number of both private and not-for-profit village developers in Australia are providing sustainable retirement villages (Xia et al., 2015c; Zuo et al., 2014). Consequently, various sustainable practices are being incorporated into the site planning, unit design, provision of facilities and services, selection of construction materials and management of construction waste during village development and operation (Xia et al., 2015c; Zuo et al., 2014). Additionally, the retirement village industry is working closely with the Green Building Council of Australia to introduce a customized Green Star rating tool into the industry (Green Building Council of Australia, 2015).

Given the important role village developers play in the provision of sustainable retirement villages, their perceptions and understanding of the meaning a concept such as sustainable development has been shown to affect behaviors in practice (Vithessonthi, 2009). Thus village developers' perceptions of a

sustainable living environment shapes the future of their retirement village, which further affects the life quality of the residents (Kennedy and Coates, 2008). Given the increasing development of village living and Australia's rapidly ageing population, this represents a large amount of investment (Property Council of Australia, 2014). Those that truly understand the unique requirements of older people and embrace the idea of sustainable development will be most able to provide a suitably sustainable living environment to residents in future.

However, no effort has been made to date to fully understand retirement village developers' perceptions of the meaning of sustainable living environments. The present study addresses this research gap based on a content analysis of village developers' retirement village business information. The way village developers describe and implement the sustainable features of their retirement villages (i.e. behavior in practice) reveals their underlying perceptions toward sustainable development. The study contributes to a comprehensive understanding of the meaning of a sustainable living environment in retirement villages from the perspective of the most important stakeholder (i.e. the village developers). This will facilitate other village stakeholders' understanding of the newly proposed concept of "sustainable retirement villages" in the retirement village market. All these efforts will eventually promote the delivery of an age-friendly living environment in the Australian retirement village industry, and provide positive implications for the development of sustainable communities for older Australians.

## **2. Literature review**

The study focuses on the sustainability issue of retirement villages in Australia. This literature review leads to a better understanding of the most closely related topics, including sustainable communities and sustainable retirement villages. By depicting a clear picture of related topics, the theoretical background of this study is provided.

### *2.1 Sustainable communities*

Local communities play a crucial role in shaping regional sustainable development strategies (Yuan et al., 2003) and the development of a sustainable living environment, “sustainable community”, at the community level is increasingly popular (Roseland, 2000; Yuan et al., 2003). Sustainable community development integrates economic, environmental and social objectives to meet the economic needs of residents, enhance and protect the environment, and promote more humane local societies (Bridger and Luloff, 1999; Roseland, 2000). Its core aims include the design of a healthy environment for residents, promotion of a prosperous economy and enhancement of residents’ social well-being (Power, 2004). A healthy environment involves minimal environmental impact, such as the protection of ecosystems, conservation of resources and prevention of pollution (Bridger and Luloff, 1999; Power, 2004). Sustainable communities coordinate economic factors (e.g., investment, employment and consumption) and other elements of communities (e.g., the natural environment and humanity issues) to promote economic prosperity (Power, 2004; Xia et al., 2016; Yuan et al., 2003). Regarding social well-being, sustainable communities create a social atmosphere of respecting different cultures, traditions and background to ensure the residents’ sense of community, security, social inclusion, etc. (Bridger and Luloff, 1999; Power, 2004; Yuan et al., 2003).

Policy is an important driver of the development of sustainable communities (Xia et al., 2016). In Australia, for instance, the implementation of the Sustainable Communities package provided \$120 million to improve livability in cities (Major Cities Unit, 2011). In addition, local governments, such as in Queensland (QLD) and New South Wales, have also proposed sustainable community related strategies to ensure people live in a suitable residential environment (Department of Housing and Public Works, 2016; Department of Premier and Cabinet, 2011). The development of sustainable communities suggests the need for suitable rating tools to evaluate sustainability and facilitate decision-making relating to community development. Three sustainable community rating tools have been suggested in Australia, (Green Star-Communities PILOT, EnviroDevelopment, and VicUrban Sustainability Charter), from which

customers can choose based on their own requirements as they focus on different aspects of sustainability measurement (Xia et al., 2015a).

The unique requirements of older people need to be specially considered in community development (e.g., the natural and built environment, social systems, participation, health and safety) (Fitzgerald and Caro, 2014). Although sustainable communities involve people of all ages, older people are usually not specifically emphasized. Nevertheless, community development initiatives specifically designed to provide older people with a suitable living environment have been proposed, such as the age-friendly community, livable community and lifetime neighborhood (Bevan and Croucher, 2011; Kochera and Bright, 2006; Lui et al., 2009; Menec et al., 2011). Although these initiatives do not adopt the term “sustainable” directly and vary in their specific features or themes covered, they focus on the creation of a sustainable living environment for older people especially in their social and economic aspects (Lui et al., 2009). For instance, a livable community has affordable and appropriate housing, supportive community features and services and adequate mobility options to facilitate the independence of older people and their engagement in civic and social life (Kochera and Bright, 2006). There is also the appeal of connecting the older population to environmental sustainability to offer older adults an environmentally friendly living environment due to the impact of the environment on their health and their potential contribution to solving environmental problems (MaloneBeach and Zuo, 2013; Pillemer et al., 2010; Sykes and Pillemer, 2009; Wright and Lund, 2000). An environmentally friendly living environment should have features such as energy and resource efficiency, and a high quality indoor and outdoor environment (MaloneBeach and Zuo, 2013; Sykes and Pillemer, 2009). It is believed that an environmentally friendly living environment can benefit older people in several ways such as improving their health (Sugiyama and Thompson, 2007; Sykes and Pillemer, 2009; van Hoof et al., 2010).

## *2.2 Sustainable retirement villages*

Retirement villages are a specific community specially designed for older people. The major characteristics of a retirement village include independent living, institutionalization and an age-friendly environment (Hu et al., 2017). In Australia, around 5.7% of the over 65 population lived in retirement villages in 2014, a penetration rate predicted to rise to 7.5% by 2025 (Property Council of Australia, 2014). The reasons that contribute to older people's relocation in this way include the provision of outdoor living areas, support in maintaining independence, assisted living facilities and access to medical facilities (Crisp et al., 2013b). Social participation is an important component of the village social life and impacts residents' life quality profoundly (McDonald, 1996). Nevertheless, although some residents show great interests in social participation (e.g., females and widows needing more social involvement), not all residents are sufficiently active (McDonald, 1996; Nathan et al., 2014). Some residents report a satisfied life experience, such as improved independence, due to the benefits of living in retirement villages (Gardner et al., 2005; Kennedy and Coates, 2008). Nevertheless, retirement living is not an antidote to the ageing society and the majority of older Australians do not consider relocating to retirement villages (Crisp et al., 2013a). Issues such as affordability, for example, can affect potential residents, especially full-pensioners, due to their declined financial position in older age (Finn et al., 2011). The Australian retirement village sector is also confronting with various challenges, such as the difficulty in meeting the unique needs of baby boomers and responding to the sustainability initiative (Hu et al., 2017).

In Australia, the development of a sustainable living environment in retirement villages, or equivalently "sustainable retirement villages", is urgently needed, where the residents' social, economic and environmental requirements are adequately satisfied (Hu et al., 2015b; Xia et al., 2015c). Both the private and not-for-profit developers are paying an increasing attention to the provision of a sustainable living environment to residents (Xia et al., 2015c; Zuo et al., 2014). For instance, Stockland, one of the largest private developers in Australia, states that "*... we have both the opportunity and the responsibility to create the right balance of social, environmental and economic conditions for our communities, ...*"

(Stockland, 2017). Village developers also value the incorporation of sustainable features in the development and operation of retirement villages. For instance, the case study of a private village in Brisbane, QLD found that it used various sustainable features covering areas of the design of landscaping, provision of facilities and services, design of internal communication and social activities and arrangement of living fee (Xia et al., 2015c). Residents are also an important stakeholder who is promoting the development of sustainable retirement villages. A case study of a not-for-profit retirement village found its residents to be concerned with the amount of unsustainable resource consumption involved and preferred an environmental-friendly lifestyle (Barker et al., 2012). A similar situation was also found in a private retirement village, in which residents undertook various daily activities to make their village sustainable (Xia et al., 2014b). Meanwhile, the majority of not-for-profit village residents are concerned with the extra cost of sustainable practices; and the higher initial investment involved in the construction of a sustainable living environment is one of the major concerns of not-for-profit village developers (Barker et al., 2012; Zuo et al., 2014). Nevertheless, this does not seem to be a serious problem for the residents and developers of private villages (Xia et al., 2014b; Xia et al., 2015c). However, only a limited amount of work has been done in this area and more studies are needed to investigate the interaction between ageing and sustainability.

The development of sustainable retirement villages is a relatively new phenomenon in Australia, which has not been widely explored in other parts of the world. Only few explorations were found in the United Kingdom (UK), where the term “age-friendly retirement villages” is more commonly used (Bernard et al., 2007; Liddle et al., 2014). A comparison between the sustainable retirement villages in Australia and age-friendly retirement villages in UK found that the age-friendly retirement villages in UK focus more on the social and economic sustainability of a village environment and ignore the environmental sustainability (Liddle et al., 2014). In contrast, in Australian context, besides the social and economic sustainability of a village environment, the importance of the green features of environmental sustainability have also been

heavily stressed given its profound impacts on residents' daily life (e.g., health, independence, safety and social interaction) (Xia et al., 2014b; Zuo et al., 2014). Another significant difference is that the development of age-friendly retirement villages in UK is heavily driven by the initiative of developing age-friendly cities and communities that was proposed by the World Health Organization (2007), while the delivery of sustainable retirement villages in Australia is mainly contributed by sustainable development (Barker et al., 2012).

### **3. Research method**

#### *3.1 Introduction of content analysis*

To achieve the research aim, the content analysis of retirement village information retrieved from the official websites of a sample of village developers was conducted. Content analysis is a method used to make valid inferences from collected data (e.g., documents) to describe and quantify specific phenomena in a systemic and objective way (Downe-Wamboldt, 1992), and has been successfully employed in similar recent research topics (Xia et al., 2015b). Several reasons contribute to the use of this method. First, developers provide detailed information of their retirement villages (e.g., village life style, living cost arrangement and village built environment) to the public in order to attract potential residents. This information normally includes a description of the villages' sustainability features, which are of great use in revealing how the developers perceive sustainable living environment. Therefore, retrieving and analyzing the retirement living business information provide an alternative and acceptable way of achieving research purpose. Second, the traditional methods such as interview and questionnaire survey have some limitations, especially given the time and resources constraints of this study. The nature of this study needs to recruit and investigate as many developers as possible to obtain robust research results. Content analysis of developers' retirement living business description provides a relatively fast and convenient way to achieve the proposed research aim compared with other methods such as interview

and questionnaire survey as it will be extremely hard to recruit a large number of participants in one study. Therefore, compared with traditional methods (e.g., interview and questionnaire survey), content analysis provides more objective and reliable results (based on real and “mute” evidence), and consumes less time and resources. Furthermore, given the lack of previous efforts in exploring this issue, the content analysis in this primal exploratory research can provide valuable implications for the further investigation of village developers’ sustainability perceptions by using other methods such as interview and questionnaire survey.

### *3.2 Data collection*

The content analysis started with the identification of the sample of village developers. There are more than 2,000 retirement village developers in Australia (Hu et al., 2017). As it is difficult to include all Australian village developers in one study given the time and resource constraints, the retirement village developers targeted were those who registered their villages in the Department of Housing and Public Works in QLD. These village developers are representative, and the reasons to choose them are diverse. First, QLD was selected as it not only has a relatively larger number of village residents but also has a higher proportion of people over 65 (Property Council of Australia, 2014). Second, village developers who own registered retirement villages are the main players of the retirement village sector in QLD, and the government highly recommends registered village developers to prospective residents when they choose their villages. By the date of data collection (30 April 2016), there were 376 registered retirement villages developed by 89 village developers in QLD. 87 of these developers were selected as two did not provide their retirement village information online. Of these 87, 58 are private and the remaining 29 are not-for-profit developers. The official website of each village developer was searched and accessed using Google during May-August 2016 and the detailed information regarding each developer’s retirement village business information was recorded to establish the database.

### *3.3 Data analysis*

The collected data were then reviewed and the sustainability features of the retirement villages identified and coded manually. To be more specific, the village developers' retirement living business contains different kinds of keywords/phrases to describe what kinds of sustainable retirement living environment will be provided to their residents (e.g., safety/safe/secure/security, independent living/independence, care and services provision/accessibility). The keywords/phrases employed to describe their villages were identified firstly. Based on the meanings of keywords/phrases, those with the same meanings were grouped together and renamed where necessary into various themes of sustainability features. In addition, developers can also use descriptions instead of keywords/phrases to in-directly express what kinds of sustainable village environment will be offered. In this situation, based on the expressed meaning of a description, it will either be grouped into an existing sustainability feature or create a new sustainability feature by using a terse phrase. These identified sustainable features were then classified into the three categories of social, environmental and economic sustainability based on Hu et al. (2015b)'s proposed sustainable retirement village framework.

Additionally, as not-for-profit villages differ from private ones in various aspects (McNelis, 2004), both a qualitative comparison of their most important sustainability features and quantitative comparison of the numbers involved were conducted based on the Independent-Samples T test and chi-square ( $\chi^2$ ) contingency table analysis. The IBM SPSS Statistics 21 was used to conduct statistical analysis in this study.

The Independent-Samples T test determines whether there is a statistically significant difference between the means in two unrelated groups. The calculation of the test statistics  $t$  is shown in Table 1. The calculated  $t$  value is compared with the critical  $t$  value from the  $t$  distribution table with degrees of freedom and confidence level (0.05). If the calculated  $t$  value is larger than the critical  $t$  value, the null hypotheses (the two population means are equal) should be rejected.

<Insert Table 1 here>

The chi-square ( $\chi^2$ ) contingency table analysis is used to determine the extent to which a statistical relationship exists between two variables (Xia et al., 2014a). A 2 x 2 contingency table was used in this study and is shown in Table 2.

<Insert Table 2 here>

The test statistics  $\chi^2$  is computed as:

$$\chi^2 = \frac{(ad - bc)^2 N}{(a + b)(c + d)(a + c)(b + d)}$$

The degrees of freedom is computed as:  $df = (r - 1)(c - 1)$ , where the  $r$  represents the number of rows and  $c$  represents the number of columns. In a 2 x 2 contingency table, the  $df = (r - 1)(c - 1) = (2 - 1)(2 - 1) = 1$

The calculated  $\chi^2$  value is compared with the critical  $\chi^2$  value from the Chi-Square distribution table with degrees of freedom and confidence level (0.05). There will be a statistical relationship between two variables if the calculated  $\chi^2$  value is larger than the critical  $\chi^2$  value.

#### **4. Research results**

Table 3 shows the results of the content analysis. In total, 39 sustainability features were identified. Of these, “care and services provision and accessibility” is the most frequently mentioned (90.80%). This is followed by “social interaction”, “secure/safe living” and “independent living”, with over 80% frequency of occurrence.

The 39 features were classified into the three categories of social, environmental and economic sustainability. As can be seen, 30 features are associated with social sustainability, covering a wide range of the village life mainly referring to an age-friendly atmosphere and lifestyle, daily care and support, and village operation and management. Environmental sustainability covers six features with relatively small

frequencies, focusing on the use and consumption of energy, materials and resources, environmental protection and waste management. Another three features are contained within economic sustainability, including affordable living, capital gains sharing and transparent financial arrangement. Overall, social sustainability features have larger frequencies, followed by economic sustainability features. Environmental sustainability features have relatively lower frequencies. In addition, it was also found that each village developer mentioned 9.51 items of social sustainability features on average in contrast with 0.72 and 0.21 items of economic and environmental sustainability features respectively.

<Insert Table 3 here>

Table 4 compares the three most frequently mentioned sustainability features of the private and not-for-profit village developers. Both emphasize “social interaction”, “secure/safe living” and “care and services provision and accessibility”, but ranked differently for each type of developer. The private developers emphasize “social interaction” most, while the not-for-profit developers place most importance on “independent living” and “care and services provision and accessibility”.

<Insert Table 4 here>

Table 5 gives the results of the Independent-Samples T test, indicating that there is no statistically significant difference between the number of sustainability features mentioned by the private and not-for-profit developers ( $t=0.925$ ,  $p=0.358>0.05$ ). However, the average number of sustainability features mentioned by the private developers is larger than that of the not-for-profit developers ( $10.47>9.86$ ). Private developers also mention more sustainability features on average in all the three specific sustainability aspects (Table 6).

<Insert Table 5 here>

<Insert Table 6 here>

Given that social sustainability is mentioned most (Table 3 and 6), a chi-square ( $\chi^2$ ) contingency table analysis was additionally used to examine whether the financial type of village developers (i.e. not-for-profit vs private) affects the provision of social sustainability features (Table 7). It indicates that the village developers' finance type is independent of the number of social sustainability features ( $\chi^2=0.489 < \chi^2_{0.05}=3.841$ ,  $p=0.485 > 0.05$ ). Nevertheless, the not-for-profit developers are more likely to provide the social sustainability features compared with private developers, with 85.29% of the features mentioned by the not-for-profit developers are related to the social sustainability.

<Insert Table 7 here>

## **5. Discussion**

The most mentioned sustainability features are “care and services provision and accessibility”, “social interaction”, “secure/safe living” and “independent living”. These have already been identified and confirmed in previous studies as the main features of sustainable retirement villages (Xia et al., 2015c; Zuo et al., 2014) and contributing most to the residents' relocation decision (Buys, 2000; Crisp et al., 2013b). They have also been widely emphasized in community development initiatives specifically designed for older people (Bevan and Croucher, 2011; Fitzgerald and Caro, 2014; Kochera and Bright, 2006; Lui et al., 2009). Thus, it is not surprising that they are the most emphasized by village developers. Due to the likelihood of an increased requirement for care and services as people age, the village residents place more importance on the accessibility to care and services (e.g., health care and services, activity services and room services) in order to support their active ageing (Kennedy and Coates, 2008; Nathan et al., 2013). As village residents may experience loneliness and social isolation after relocation from their previous familiar residential environment (Gracia et al., 2010), retirement villages aim to provide residents with a socially-interactive environment (e.g., for participation in activities and civil affairs) (Hu et al., 2015b; Xia et al., 2015c). Residents also expect to live in a secure environment where both the security of the physical

environment and their individual safety (e.g., the physical health and financial security) is ensured (Finn et al., 2011; Hu et al., 2015b; Kennedy and Coates, 2008). Moreover, independent living has also been widely cited as one of the benefits of village-living in this industry, and is valued by residents to maintain autonomy as long as possible (Hu et al., 2015a; Property Council of Australia, 2014; Towart, 2005).

Overall, social sustainability features are more frequently mentioned than economic and environmental sustainability features. The reason may be due firstly to the fact that residents normally prefer a socially sustainable residential environment as it can benefit them in various ways (Xia et al., 2015c). For example, the residents expect to establish friendships to obtain acceptance, companionship and emotional support, and reduce loneliness and depression (Buys, 2001), and actively participate in activities, programs and civil affairs to be connected with their community (Buys and Miller, 2007; Gardner et al., 2005). Second, retirement villages, as an important social housing option in Australia, have a long history of providing residents with a supportive social environment by offering them care, services and opportunities of social interaction (McNelis, 2004; McNelis and Herbert, 2003). In addition, older people often experience declined financial capabilities after retirement, and they are concerned about the living cost issue in retirement villages (Finn et al., 2011; Hu et al., 2015a). Environmental sustainability is largely ignored by the investigated village developers. This ignorance is inconsistent with village residents' concern about the consumption of unsustainable resources and expectation of living in a green village environment (Barker et al., 2012; Xia et al., 2014b). It also conflicts with the ongoing trend of making retirement villages green in the Australian retirement living sector (Green Building Council of Australia, 2015; Zuo et al., 2014).

The social sustainability features identified mainly relate to the creation of an age-friendly atmosphere and lifestyle (e.g., social interaction, security, independent living and respect), provision of daily care and support, and operation and management of villages. These social sustainability features match the suggested features of sustainable retirement villages in previous studies (Hu et al., 2015b; Xia et al., 2015c).

For instance, the prior study of Xia et al. (2015c) placed greater stress on an active and healthy lifestyle for social interaction. Hu et al. (2015b) suggested that social sustainability features include independent and safe living, privacy protection, support and accessibility of services, social interaction, residents being informed and their lifetime learning and improvement. Importantly, comparing the research findings of this study with earlier studies indicates that the social sustainability features identified in this study additionally extend current understanding of the social sustainability of retirement villages. Based on the relatively large-scale of village developers' practices that take place, the research findings here indicate that additional social sustainability features such as "friendly, supportive and like-minded residents" and "personalized/customized care and support" have also been noticed by village developers and practiced in the retirement village industry. These newly identified features have been confirmed to greatly benefit village residents in previous studies. For instance, McDonald (1996) found that friendly and supportive neighboring in villages creates a strong obligation for reciprocity, such as the exchange of goods and services between residents and the establishment of an informal emergency payment system.

The economic sustainability of retirement villages mainly refers to affordable living, sharing capital gains and transparent financial arrangement. The affordable living and sharing capital gains have been recognized as important economic features of sustainable retirement villages in prior studies (Hu et al., 2015b; Xia et al., 2015c). Historically, the Australian retirement village sector targeted households with relatively low incomes and low value assets (McNelis, 2004; McNelis and Herbert, 2003). There is also the appeal of affordable living for residents in the current retirement living sector, as relocating to retirement villages includes a significant financial investment, which is not easy for village residents given their generally reduced financial circumstances after retirement (Hu et al., 2015a; Walker and McNamara, 2013). Some prior studies also indicated that, although residents expect to live in a sustainable village environment, the high cost of sustainable practices is an important concern (Barker et al., 2012; Xia et al., 2014b). Ignorance of the affordability issue can negatively affect the development of the industry, as a

financially comfortable environment is an important consideration for both residents' pre- and post-relocation phases, with expensive village living negatively influencing life satisfaction, a problem reported in several previous studies (Crisp et al., 2013b; Finn et al., 2011; Kennedy and Coates, 2008). The research findings here also suggest that transparent financial arrangement is an additional important economic sustainability feature that has not been identified and stressed in prior studies. It is important, as retirement village fee structures are often complex and vary a great deal between developers, which can create uncertainty and confusion for residents (Eardley, 2000; Finn et al., 2011; Productivity Commission, 2015).

Compared with the environmental sustainability features suggested in prior studies (Hu et al., 2015b; Xia et al., 2015c; Zuo et al., 2014), the village developers investigated in this study generally appear to ignore the need for a suitable level of indoor environmental quality. A high quality indoor environment is necessary to support healthy ageing as older people are vulnerable to indoor neurotoxins and air pollution (Lee et al., 2011; van Hoof et al., 2010). A smoking-free environment is a newly identified environmental sustainability feature in this study. Smoking is a strong risk factor in premature mortality of older people (Gellert et al., 2012) that negatively affects indoor air quality, which further negatively influences the health of other residents.

The perceptions of private and not-for-profit village developers on the most important sustainability features are similar. Both emphasize "social interaction", "secure/safe living" and "care and services provision and accessibility". This finding is consistent with current studies which have stressed the importance of these three sustainability features to residents' daily life in both private and not-for-profit retirement villages (Crisp et al., 2013b; Gardner et al., 2005; Xia et al., 2015c; Zuo et al., 2014). It is also seen that private village developers emphasize "social interaction" most, while not-for-profit village developers value "independent living" and "care and services provision and accessibility" most. Private

village developers usually have more financial resources to enrich their residents' village life by increasing the range of accommodation, facilities and services provided (McGovern and Baltins, 2002; Xia et al., 2015b), which may be a possible reason for their greater emphasis on lifestyle related sustainability features, such as social interaction, to attract prospective residents. In contrast, not-for-profit village developers initially provide residents with independent living units (now better known as the retirement village industry), which has placed more importance on the provision of care and services to older people in order to ensure their independent living through old age (McNelis, 2004; McNelis and Herbert, 2003).

The statistical results indicate that there is no statistically significant differences between the number of sustainability features mentioned by the private and not-for-profit developers. This result is consistent with the current industry situation where both private and not-for-profit developers are increasingly interested in developing a sustainable living environment in retirement villages and taking various actions to meet the green requirement of the market (Barker et al., 2012; Green Building Council of Australia, 2015; Xia et al., 2015c; Zuo et al., 2014). One explanation for this is that both the private and not-for-profit developers acknowledge the importance of meeting the sustainability requirements of residents due to the market competition. It is believed that the competition determines the extent to which residents' aged requirements can be satisfied (Hu et al., 2017). Moreover, there are an increasing number of older people preferring to living in a sustainable environment (Barker et al., 2012; Pillemer et al., 2010; Wright and Wadsworth, 2014). This promotes both the private and not-for-profit developers to incorporate sustainability features into the development and operation of their retirement village projects in order to attract more potential residents and retain the current ones as long as possible. In addition, the statistical results indicate that the finance type of village developers does not affect the provision of social sustainability features. This result is not surprising as practitioners of both private and not-for-profit sectors in the Australian retirement village market have the tradition of providing social sustainability

features to residents such as social interaction, independent living, privacy and safety (McNelis, 2004; McNelis and Herbert, 2003).

## **6. Conclusion**

The popularity of sustainable development is increasing in the Australian retirement village industry and developers are crucial contributors. It is therefore important to understand their perceptions of sustainable living environments. This study examines the sustainability features of village developments to reflect these perceptions based on a content analysis of selected developers' retirement village business information retrieved from their official websites. In total, 39 sustainability features were identified, with the most mentioned being "care and services provision and accessibility", "social interaction", "secure/safe living" and "independent living". In addition, the developers place most importance on social sustainability, with environmental sustainability being largely ignored. Furthermore, although private and not-for-profit village developers value different aspects of the sustainable living environment in retirement villages, there is no significant difference between the numbers of sustainability features provided by them.

The limitation of this study is that only 87 village developers who developed registered retirement villages in the Department of Housing and Public Works in QLD were involved, which restricts the external generalizability of the research findings to the whole industry. In addition, it is possible that some of the selected developers may not fully disclose their retirement village business information online and some of the information may be out of date. Moreover, it has the possibility that some sustainability descriptions are intentionally focused on one or two certain sustainability aspects, mainly for the marketing purpose. All these can affect the accuracy of the research findings. Further research is needed to clarify.

This study provides important implications for the development of sustainable retirement villages. First, the sustainability features identified and their frequencies can be used as a benchmark. Village developers with little knowledge/experience of developing sustainable retirement villages can reference this benchmark to understand the kind of sustainability features that should be incorporated into their villages. Other village developers who have already developed sustainable retirement villages can also benefit from the research findings by contrasting the benchmark with their villages to determine the aspects they need to change or where to make more effort. In addition, village developers investigating their residents' perceptions of the sustainable living environment in comparison with the research findings of this study will better understand the different perceptions involved in progressing towards a customer-centric sustainable living environment in the retirement village industry in Australia.

## **References**

Barker, J., Xia, B., Zuo, J., Zillante, G., 2012. Sustainable retirement living: what matters? *Australasian Journal on Construction Economics and Building* 12 (1), 56-61.

Bernard, M., Bartlam, B., Sim, J., Biggs, S., 2007. Housing and care for older people: life in an English purpose-built retirement village. *Ageing and Society* 27 (4), 555-578.

Bevan, M., Croucher, K., 2011. Lifetime neighbourhoods. Department for Communities and Local Government, London, UK. [https://www.gov.uk/government/uploads/system/uploads/attachment\\_data/file/6248/2044122.pdf](https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/6248/2044122.pdf) (accessed 16.09.15).

Bridger, J.C., Luloff, A.E., 1999. Toward an interactional approach to sustainable community development. *Journal of Rural Studies* 15 (4), 377-387.

Buys, L., Miller, E., 2007. The physical, leisure and social activities of very old Australian men living in a retirement village and the community. *Geriaction* 25 (2), 15-19.

Buys, L.R., 2000. Care and support assistance provided in retirement villages: expectations vs reality. *Australasian Journal on Ageing* 19 (3), 149-151.

Buys, L.R., 2001. Life in a retirement village: implications for contact with community and village friends. *Gerontology* 47 (1), 55-59.

Crisp, D.A., Windsor, T.D., Anstey, K.J., Butterworth, P., 2013a. Considering relocation to a retirement village: Predictors from a community sample. *Australasian Journal on Ageing* 32 (2), 97-102.

Crisp, D.A., Windsor, T.D., Butterworth, P., Anstey, K.J., 2013b. What are older adults seeking? Factors encouraging or discouraging retirement village living. *Australasian Journal on Ageing* 32 (3), 163-170.

Department of Housing and Public Works, 2016. Working together for better housing and sustainable communities. Department of Housing and Public Works, Brisbane, Australia. <http://www.hpw.qld.gov.au/SiteCollectionDocuments/HousingDiscussionPaper.pdf> (accessed 16.12.09).

Department of Premier and Cabinet, 2011. Building sustainable communities. Department of Premier and Cabinet, Sydney, Australia. <http://www.environment.nsw.gov.au/resources/communities/110563-Building-Sustainable-Communities.pdf> (accessed 16.12.09).

Downe-Wamboldt, B., 1992. Content analysis: method, applications, and issues. *Health Care for Women International* 13 (3), 313-321.

Eardley, T., 2000. Rent assistance policy for residents of retirement villages. *Australasian Journal on Ageing* 19 (3), 130-135.

Finn, J., Mukhtar, V.Y., Kennedy, D.J., Kendig, H., Bohle, P., Rawlings-Way, O., 2011. Financial planning for retirement village living: a qualitative exploration. *Journal of Housing For the Elderly* 25 (2), 217-242.

Fitzgerald, K.G., Caro, F.G., 2014. An overview of age-friendly cities and communities around the world. *Journal of Aging and Social Policy* 26 (1-2), 1-18.

Gardner, I.L., Browning, C., Kendig, H., 2005. Accommodation options in later life: retirement village or community living? *Australasian Journal on Ageing* 24 (4), 188-195.

Gellert, C., Schöttker, B., Brenner, H., 2012. Smoking and all-cause mortality in older people: systematic review and meta-analysis. *Archives of Internal Medicine* 172 (11), 837-844.

Gracia, N., Moyle, W., Oxlade, D., Radford, K., 2010. Addressing loneliness in a retirement village community: a pilot test of a print-delivered intervention. *Australasian Journal on Ageing* 29 (4), 179-182.

Green Building Council of Australia, 2015. Green Star for retirement living. [https://www.gbca.org.au/uploads/20/3092/Retirement\\_Living\\_Fact\\_sheet.pdf](https://www.gbca.org.au/uploads/20/3092/Retirement_Living_Fact_sheet.pdf) (accessed 16.08.23).

Hopwood, B., Mellor, M., O'Brien, G., 2005. Sustainable development: mapping different approaches. *Sustainable Development* 13 (1), 38-52.

Hu, X., Xia, B., Buys, L., Skitmore, M., Kennedy, R., Drogemuller, R., 2015a. Stakeholder analysis of a retirement village development in Australia: insights from an interdisciplinary workshop. *International Journal of Construction Management* 15 (4), 299-309.

Hu, X., Xia, B., Skitmore, M., Buys, L., 2015b. Conceptualizing sustainable retirement villages in Australia. Lincoln, UK. In: Raidén, A.B. and Aboagye-Nimo, E. (Eds), *Proceedings of the 31st Annual ARCOM Conference*. Available online. <http://www.arcom.ac.uk/-docs/proceedings/e7abb6aeba495388b9c4e78de2a8fc37.pdf>.

Hu, X., Xia, B., Skitmore, M., Buys, L., Zuo, J., 2017. Retirement villages in Australia: a literature review. *Pacific Rim Property Research Journal* 23 (1), 101-122.

Kennedy, D.J., Coates, D., 2008. Retirement village resident satisfaction in Australia: a qualitative enquiry. *Journal of Housing for the Elderly* 22 (4), 311-334.

Kochera, A., Bright, K., 2006. Livable communities for older people. *Generations* 29 (4), 32-36.

Lee, Y., Yoon, H., Lim, S., An, S., Hwang, J., 2011. Housing alternatives to promote holistic health of the fragile aged. *Indoor and Built Environment* 21 (1), 191-204.

Liddle, J., Scharf, T., Bartlam, B., Bernard, M., Sim, J., 2014. Exploring the age-friendliness of purpose-built retirement communities: evidence from England. *Ageing and Society* 34 (9), 1601-1629.

Lui, C.W., Everingham, J.A., Warburton, J., Cuthill, M., Bartlett, H., 2009. What makes a community age-friendly: a review of international literature. *Australasian Journal on Ageing* 28 (3), 116-121.

Major Cities Unit, 2011. Our cities, our future: a national urban policy for a productive, sustainable and liveable future. Department of Infrastructure and Transport, Canberra, Australia. [https://infrastructure.gov.au/infrastructure/pab/files/Our\\_Cities\\_National\\_Urban\\_Policy\\_Paper\\_2011.pdf](https://infrastructure.gov.au/infrastructure/pab/files/Our_Cities_National_Urban_Policy_Paper_2011.pdf) (accessed 16.09.12).

MaloneBeach, E.E., Zuo, Q., 2013. Environmental sustainability in U.S. assisted living facilities. *Journal of Housing For the Elderly* 27 (3), 255-275.

McDonald, J., 1996. Community participation in an Australian retirement village. *Australian Journal on Ageing* 15 (4), 167-171.

McGovern, S., Baltins, E., 2002. The retirement village industry in Australia: evolution and structure, in: Stimson, R.J. (Eds), *The Retirement Village Industry in Australia: Evolution, Prospects and Challenges*. University of Queensland Press, Brisbane, pp. 23-46.

McNelis, S., 2004. Independent living units: the forgotten social housing sector. Australian Housing and Urban Research Institute, Australia. [https://www.ahuri.edu.au/\\_\\_data/assets/pdf\\_file/0016/2086/AHURI\\_Final\\_Report\\_No53\\_Independent\\_living\\_units\\_the\\_forgotten\\_social\\_housing\\_sector.pdf](https://www.ahuri.edu.au/__data/assets/pdf_file/0016/2086/AHURI_Final_Report_No53_Independent_living_units_the_forgotten_social_housing_sector.pdf) (accessed 16.09.12)

McNelis, S., Herbert, T., 2003. Independent living units: clarifying their current and future role as an affordable housing option for older people with low assets and low incomes. Australian Housing and Urban Research Institute, Australia. [https://www.ahuri.edu.au/\\_\\_data/assets/pdf\\_file/0016/2833/AHURI\\_Positioning\\_Paper\\_No59\\_Independent\\_living\\_units.pdf](https://www.ahuri.edu.au/__data/assets/pdf_file/0016/2833/AHURI_Positioning_Paper_No59_Independent_living_units.pdf) (accessed 16.09.12).

Menec, V.H., Means, R., Keating, N., Parkhurst, G., Eales, J., 2011. Conceptualizing age-friendly communities. *Canadian Journal on Aging* 30 (3), 479-493.

Nathan, A., Wood, L., Giles-Corti, B., 2013. Environmental factors associated with active living in retirement village residents: findings from an exploratory qualitative enquiry. *Research on Aging* 35 (4), 459-480.

Nathan, A., Wood, L., Giles-Corti, B., 2014. Examining correlates of self-reported and objectively measured physical activity among retirement village residents. *Australasian Journal on Ageing* 33 (4), 250-256.

Pillemer, K., Wells, N.M., Wagenet, L.P., Meador, R.H., Parise, J.T., 2010. Environmental sustainability in an aging society: a research agenda. *Journal of Aging and Health* 23 (3), 433-453.

Power, A., 2004. Sustainable communities and sustainable development: a review of the sustainable communities plan. Sustainable Development Commission, UK. <http://sticerd.lse.ac.uk/dps/case/CR/CASEReport23.pdf> (accessed 16.09.12).

Productivity Commission, 2015. Housing decisions of older Australians. Productivity Commission, Canberra, Australia. <http://www.pc.gov.au/research/completed/housing-decisions-older-australians/housing-decisions-older-australians.pdf> (accessed 16.09.1).

Property Council of Australia, 2014. National overview of the retirement village sector. Property Council of Australia, Australia. <http://www.retirementliving.org.au/wp-content/uploads/2015/03/National-overview-of-the-retirement-village-sector-Grant-Thornton.pdf> (accessed 16.09.12).

Roseland, M., 2000. Sustainable community development: integrating environmental, economic, and social objectives. *Progress in Planning* 54 (2), 73-132.

Stockland, 2017. Sustainability at Stockland. <https://www.stockland.com.au/about-stockland/sustainability> (accessed 17.05.10).

Sugiyama, T., Thompson, C.W., 2007. Outdoor environments, activity and the well-being of older people: conceptualising environmental support. *Environment and Planning A* 39 (8), 1943-1960.

Sykes, K., Pillemer, K., 2009. The intersection of aging and the environment: introduction. *Generations* 33 (4), 6-9.

Towart, L., 2005. Retirement villages: a sunset industry in a sunrise situation. *Australian Property Journal* 38 (5), 350-361.

van Hoof, J., Kort, H.S.M., Duijnste, M.S.H., Rutten, P.G.S., Hensen, J.L.M., 2010. The indoor environment and the integrated design of homes for older people with dementia. *Building and Environment* 45 (5), 1244-1261.

Vithessonthi, C., 2009. Corporate ecological sustainability strategy decisions: the role of attitude towards sustainable development. *Journal of Organisational Transformation and Social Change* 6 (1), 49-64.

Walker, E., McNamara, B., 2013. Relocating to retirement living: an occupational perspective on successful transitions. *Australian Occupational Therapy Journal* 60 (6), 445-453.

World Health Organization, 2007. Global age-friendly cities: a guide. World Health Organization. [http://www.who.int/ageing/publications/Global\\_age\\_friendly\\_cities\\_Guide\\_English.pdf](http://www.who.int/ageing/publications/Global_age_friendly_cities_Guide_English.pdf) (accessed 16.09.12).

Wright, S.D., Lund, D.A., 2000. Gray and green?: stewardship and sustainability in an aging society. *Journal of Aging Studies* 14 (3), 229-249.

Wright, S.D., Wadsworth, A.M., 2014. Gray and green revisited: A multidisciplinary perspective of gardens, gardening, and the aging process. *Journal of Aging Research* 2014, Article ID 283682.

Xia, B., Chen, Q., Skitmore, M., Zuo, J., Li, M., 2015a. Comparison of sustainable community rating tools in Australia. *Journal of Cleaner Production* 109 (2015), 84-91.

Xia, B., Chen, Q., Xu, Y., Li, M., Jin, X., 2014a. Design-build contractor selection for public sustainable buildings. *Journal of Management in Engineering* 31 (5), 04014070.

Xia, B., Skitmore, M., Zuo, J., Buys, L., 2015b. Review of community facilities in Australian retirement villages: a content analysis. *Australasian Journal on Ageing* 34 (3), 144-148.

Xia, B., Wu, T., Skitmore, M., Chen, Q., Li, M., Zuo, J., 2016. Delivering sustainable communities: a case study in China. *Built Environment Project and Asset Management* 6 (3), 253-267.

Xia, B., Zuo, J., Skitmore, M., Buys, L., Hu, X., 2014b. Sustainability literacy of older people in retirement villages. *Journal of Aging Research* 2014, Article ID 919054.

Xia, B., Zuo, J., Skitmore, M., Chen, Q., Rarasati, A., 2015c. Sustainable retirement village for older people: a case study in Brisbane, Australia. *International Journal of Strategic Property Management* 19 (2), 149-158.

Yuan, W., James, P., Hodgson, K., Hutchinson, S.M., Shi, C., 2003. Development of sustainability indicators by communities in China: a case study of Chongming County, Shanghai. *Journal of Environmental Management* 68 (3), 253-261.

Zuo, J., Xia, B., Barker, J., Skitmore, M., 2014. Green buildings for greying people: a case study of a retirement village in Australia. *Facilities* 32 (7/8), 365-381.

**Table 1**Calculation of the test statistics  $t$ .

Test statistics $t$	$t = \frac{\bar{x}_1 - \bar{x}_2}{\sqrt{\frac{(n_1 - 1)s_1^2 + (n_2 - 1)s_2^2}{n_1 + n_2 - 2}} \sqrt{\frac{1}{n_1} + \frac{1}{n_2}}}$	$t = \frac{\bar{x}_1 - \bar{x}_2}{\sqrt{\frac{s_1^2}{n_1} + \frac{s_2^2}{n_2}}}$
Application condition	Equal variances assumed	Unequal variances assumed
Degrees of freedom	$df = n_1 + n_2 - 2$	$df = \frac{\left(\frac{s_1^2}{n_1} + \frac{s_2^2}{n_2}\right)^2}{\frac{1}{n_1 - 1} \left(\frac{s_1^2}{n_1}\right)^2 + \frac{1}{n_2 - 1} \left(\frac{s_2^2}{n_2}\right)^2}$

Where,  $\bar{x}_i$  is the mean of the  $i$ th sample,  $n_i$  is the sample size of the  $i$ th sample,  $s_i^2$  is the standard deviation of the  $i$ th sample;

**Table 2**

2 x 2 contingency table.

	Category A1	Category A2	Total
Category B1	a	b	a + b
Category B2	c	d	c + d
Total	a + c	b + d	a + b + c + d = N

**Table 3**

Identified sustainability features and their frequency.

Sustainability	Code	Sustainability feature	Frequency (%)
Social sustainability	1	Care and services provision and accessibility	90.80
	2	Social interaction	88.51
	3	Secure/Safe living	87.36
	4	Independent living	85.06
	5	Worry free/Stress free/Peace of mind/Relaxation	62.07
	6	Residents' privacy protection	57.47
	7	Availability of qualified professionals on-site	56.32
	8	Active and healthy lifestyle	43.68
	9	Residents being respected	40.23
	10	A sense of family/home, community and belonging	37.93
	11	Comfortable living	37.93
	12	Freedom of residents	34.48
	13	Convenient living	32.18
	14	Friendly, supportive, and like-minded residents	21.84

15	Personalized/Customized care and support	21.84
16	Ensuring residents' dignity	19.54
17	Lifetime learning and improvement of residents	19.54
18	Ensuring residents' fulfilment and satisfaction	19.54
19	Religious, spiritual and emotional support	17.24
20	Sustained improvement of villages' operation and management	10.34
21	Maintaining, sharing, and pursuing interests	10.34
22	Listening and understanding residents' needs	10.34
23	Quiet environment	10.34
24	Justice and fairness towards residents	9.20
25	Residents being kept informed	6.90
26	Community diversity	5.75
27	Balance between care, independence and socialization	4.60
28	Empowerment to residents	4.60
29	Residents being valued	3.45

	30	Maintaining residents' confidence	2.30
Environmental sustainability	31	Use of renewable and recyclable energy, materials and resources	8.05
	32	Energy generation and efficiency	5.75
	33	Habitat and wildlife protection of village surrounding areas	2.30
	34	Waste management	2.30
	35	Smoking-free	1.15
	36	Reducing the consumption of energy, materials and resources	1.15
Economic sustainability	37	Affordable living	52.87
	38	Capital gains sharing	12.64
	39	Transparent financial arrangement	6.90

**Table 4**

Three most frequently mentioned sustainability features of the private and not-for-profit village developers.

Private	Not-for-profit
1. Social interaction (94.8%);	1. Independent living (96.6%); Care and services provision and accessibility (96.6%);
2. Secure/Safe living (91.4%);	2. Secure/Safe living (79.3%);
3. Care and services provision and accessibility (89.7%);	3. Social interaction (75.9%);

**Table 5**

Independent-Samples T test results.

	Levene's Test for Equality of Variances		t-test for Equality of Means		
	F	Sig.	t	df	Sig. (2-tailed)
Equal variances assumed	0.053	0.819	0.925	85	0.358
Equal variances not assumed			0.919	55.224	0.362

**Table 6**

Average number of sustainability features in the three specific sustainability aspects.

Sustainability	Private village developers	Not-for-profit village developers
Social sustainability	9.62	9.18
Economic sustainability	0.88	0.41
Environmental sustainability	0.24	0.14

**Table 7**

Relationship between the financial type of village developers and social sustainability.

		Social sustainability features			Total
		Yes	No		
Village developer type	Private	Count	30	8	38
		Expected count	31.1	6.9	38.0
	Not-for-profit	Count	29	5	34
		Expected count	27.9	6.1	34.0
Total		Count	59	13	72
		Expected count	59.0	13.0	72.0

Pearson Chi-Square:  $\chi^2=0.489 < \chi_{0.05}^2=3.841$ , (df=1, Sig.=0.485>0.05)