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Eldercare in the Singapore Real Estate Market – An Emerging Perspective

By Tee Meng Tan
Swiss School of Management

Abstract- Aging has become one of the primary concerns of the world in the present time. The proportion of people in society at extreme old age is higher compared to the last decades (World Health Organization, 2011, p. 1). According to the United Nations, by 2050, the number of people above 60 will double, and there is a high chance that it will increase three times by 2100 (United Nations, 2015, p. 1). Hence, with the increasing number of older adults, the demands to address their needs in healthcare and real estate will increase as well – both quantitatively and qualitatively. This situation prompted the author to ask the following questions: What are the characteristics of real estate that address the needs of the aging society? Which Singaporean mechanisms can amalgamate the healthcare domain requirements and create a market and robust solutions for eldercare in real estate? In this paper, the author analyses various research overviews and case studies from past decades which discussed older people's environment and policies designed by public authorities. In addition, the author used the United Nations Economic Commission for Europe variables to project the real estate market prospective for senior people in Singapore.

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Eldercare in the Singapore Real Estate Market – An Emerging Perspective

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Abstract- Aging has become one of the primary concerns of the world in the present time. The proportion of people in society at extreme old age is higher compared to the last decades (World Health Organization, 2011, p. 1). According to the United Nations, by 2050, the number of people above 60 will double, and there is a high chance that it will increase three times by 2100 (United Nations, 2015, p. 1). Hence, with the increasing number of older adults, the demands to address their needs in healthcare and real estate will increase as well – both quantitatively and qualitatively. This situation prompted the author to ask the following questions: What are the characteristics of real estate that address the needs of the aging society? Which Singaporean mechanisms can amalgamate the healthcare domain requirements and create a market and robust solutions for eldercare in real estate? In this paper, the author analyses various research overviews and case studies from past decades which discussed older people's environment and policies designed by public authorities. In addition, the author used the United Nations Economic Commission for Europe variables to project the real estate market prospective for senior people in Singapore. The results of the study can also be utilized to enumerate assumptions on various factors that may impact future development; among these include the urbanisation process, global climate changes, deterioration of air quality, poor accessibility to open areas, and other factors related to adaptation. Thus, the author lays out the assumption that the elderly population will be provided with relocation measures and benefits in housing in the future the real estate market will have to cope with the challenges related to relocation in the future. This warrants further discussion on new trends and future investments related to eldercare in the real estate market.

Keywords: aging, healthcare and real estate needs, real estate market, adaptation.

I. Introduction

The Aging population has been recognized as an emerging social challenge in several parts of the world, with the majority of studies and literature focusing on diverse topics such as labour impact on economic growth and supportive systems to support the elderly such as pension plans, healthcare, insurance, retirements policies, housing, urban planning and settlement, and real estate concerns (Kudo, et al., 2015, p. 941). Aside from accelerating the aging process, aging issues have gained popularity and interest due to the following issues: increased in the dependency ratio, increased expenditures on healthcare and pensions, labor market shortage, bigger market for goods and services linked to older people such as retirement homes (Pettinger, 2019). Globally, countries respond to the needs of aging population differently. Aging has been treated as an opportunity to improve elderly care in the Western Pacific region, but it has been shown to negatively affect economic consumption and cost of social security system services; meanwhile, Singapore's Gan Kim Yong actively took the initiative in developing elderly policies and strategies to cover needs in long-term care, employment, learning, and retirement (World Health Organization, 2019). Singapore has one of the highest life expectancies globally, and in 2035, there will be approximately 32% of Singaporeans over the age of 65 (Hirschmann, 2020). By this time, Singapore will face challenges related to decreased number of working populations while supporting the needs of the aging population.

People who are 65 years or older are usually included in the aging population. When people reach this age, they usually withdraw from the labor force, otherwise known as the effective retirement age. According to the OECD (2021), most countries' normal retirement age for men is 60; the retirement age for Portugal, Ireland, Denmark, Iceland, and Switzerland is 65; while that for Japan and Korea is close to 70 (OECD, 2021). However, the normal retirement age across the globe continues to rise from 55 years in 1950 to 65 years in 2018. This is equivalent to an increase of 7.7% seniors in 1950 to 17.8% seniors in 2018 due to re-employment programs geared towards the welfare of seniors and a better health care system (OECD, 2021). By 2050, the proportion of seniors still in the workforce are expected to increase to 25%, or approximately 143 million seniors (OECD, 2021). Evidently, in Singapore, when the re-employment age in 2017 was raised from 65 to 67 years, an addition of 145,000 employed residents were deployed in silver industries (Hirschmann, 2020). Coupled with that, the median age of the working population in Singapore was 36.7 in 1993 and jumped to 42.9 years in 2013 - a staggering increase in a decade (Hirschmann, 2020). Keeping these statistics under consideration, there is a dire need to engineer aging-friendly societies, communities, cities and consider local circumstances to understand aging and its effects on society. Considering the senior citizen's better healthcare status and rise in re-employment age, it is imperative to assume that most of

Author: Swiss School of Management, Singapore.
e-mail: teemeng.tan@sg.ssm.swiss

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the elderly population own houses. In an article from Lin (2021), she stated that 86% of Singaporean elderly residents owned a house and intended to continue and age in place. These data, along with the other arguments presented, highlight the importance of analysing the context of real estate demands among the elderly, especially elderly preferences, current demographic situation, pension, healthcare, and retirement accommodation.

II. Housing for Senior Citizens and the Real Estate Market

The evolving demographic dynamics globally concerning the aging population highlights the need for senior co-living options in housing and the development of modern retirement communities (Alomary, 2020); thus, the real estate sector could offer an extensive range of pretty similar properties in terms of a particular feature. In addition, there is a trend for real estate products that are elderly-friendly, thus shifting the direction of investments (Worzala, et al., 2020). Real estate markets are generally classified according to the type of traded estate, parties to the transaction such as third-party involvement of an escrow company or a collecting agency, types of real estate, and geographic reach (Renigier-Biłozor, 2017, pp. 443-444). Real estate markets according to the type of traded estate include apartments, land plots, and buildings, whereas parties to the transaction may not only involve a company or a collecting agency but also local and central governments and private individuals. The classification to use among Singapore eldercare in real estate depends upon the purpose or use among these potential customers, users, or buyers. In this case, taxonomy and segmentation, which use basic criteria, could be applied to increase real estate market awareness (Renigier-Biłozor, 2017, p. 444).

Considering the senior citizen's better healthcare status and rise in re-employment age, it has been mentioned in the introduction that most of the elderly population own houses (86% of Singaporean elderly residents) (Lin, 2021). Lin (2021) also stated that the elderly wanted to practice 'aging in place' or continue living at their present houses due to the strong emotional attachments to their homes They want to spend their years in a known setting because this could affect their self-confidence and sense of independence.

According to the National Institute on Aging (2017), 'aging in place' is a common concern among the elderly which requires preparation in terms of cost, support groups or institutions, activities of daily living, food, finance, healthcare, neighborhood, etc. As these factors are being considered, not all older adults can remain living in their homes. This happens when the older adults are alone in their homes, living with chronic diseases which require frequent monitoring, immobile or have difficulty moving around, or have problems with access to transportation. Hence, it is essential to consider eldercare and analyze existing buildings and architectural procedures in real estate that could allow them to age in place. Moreover, making individual houses aging-friendly should also be made a priority and this can be done by looking out on the architectural strengths of nursing homes and adopting these to individual houses.

III. Characteristics of Real Estate for the Aging Population

The age of the person does not determine frailty or dependency on others for activities of daily living. However, there are some health and functioning issues that older adults are more prone to. Examples of these include natural changes affecting vision, hearing, muscle and bone mass, and memory which could put them at an increased risk for fall and injury (Center for Aging with Dignity, 2011, p. 1). Another is age-related conditions such as arthritis, dementia, heart disease, and stroke which could impede the performance of activities of daily living and make them vulnerable to danger (Center for Aging with Dignity, 2011, p. 1). These conditions of the elderly have molded not only their healthcare needs but also the requirements, conditions, and policies related to the market and task of public housing.. Singapore government has recognized that its population is aging thus it has taken a multifaceted, integrated, and holistic approach to maximize opportunities for older adults and minimize the adverse effects of aging. Singapore's long-term care of the elderly ensures an age-friendly and enabling environment addressing issues in income, environment, health, and social issues. Policies and strategies enabled elderly integration in the community, betterment of health and wellness, allocation of funds to social services, and evaluation and research for the future welfare of older adults (Asian Development Bank, 2020, pp. 21-22). Highlighting Singapore's long-term care of the elderly to ensure an age-friendly and enabling environment, supporting changing needs in terms of housing is one of the most interesting concepts among seniors as most of them prefer to be independent of their children. According to the Ministry of Health (2016), Singapore's elderly prefers safe and senior-friendly housing options with integrated health and social services, as well as retrofitted features such as wheelchair-level light switches, manageable clothes drying system, emergency alert system, and unhazardous fire stove (p. 18). These are some of the conditions and examples in which Singapore's long-term care and aging in place can be realized.

Over the years, the Housing and Development Board (HDB) introduced several housing modifications to build senior-friendly housing in Singapore. One of the

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earliest modifications made by HDB in 1985 is the barrier-free design (Ministry of Health, 2016, p. 71). HDB also introduced new and upgraded lifts, highly subsidized retrofit features (e.g., slip-resistant bathroom tiles or grab bars) to ensure safety in HDB flats (Ministry of Health, 2016, p. 71). Other options offered by HDB are co-habiting of multi-generation families to sustain care and support of the elderly and purchase of two-room Flexi-flats (Ministry of Health, 2016, p. 71). Overall, there are almost 70,000 applications for home improvement programs that address the needs of Singapore eldercare in real estate (Ministry of Health, 2016, p. 71).

Currently, existing reforms and programs related to the long-term care of the elderly in Singapore are being polished to make new initiatives aligned with better healthcare and public housing. Co-location in nursing homes, aging hubs, 'smarter homes', and senior-friendly towns are some of the innovations in housing that Singapore has started (Ministry of Health, 2016, p. 71). Towns are expected to have smooth pathways, rest stops, less slippery metal drain covers, and contrasted colors on uneven surfaces.

IV. Issues Faced by Family Caregivers Concerning Housing

Taking good care of the elderly is not an easy task, especially among family caregivers. Caring for an invalid elderly demands a lot from the caregivers but the interest and welfare of caregivers are often neglected. Studies revealed that most of the caregivers caring for older adults are also old and are experiencing chronic diseases such as heart problems, diabetes, arthritis, and even depression (Tan, 2017). Besides, caregivers are also obliged to adapt to the elderly housing modifications, and this, in turn, affects the quality of life. Moreover, the caregivers may need support themselves and may request modifications in the environment that facilitate supportive care.

A few nationally published article provide family caregivers with data on making environmental modifications at home. These include Ontario, Canada, and the Netherlands Ministry of Community and Social Services. Usually, technology is considered an effective solution for supporting aging in place. Specific devices can be used to improve mobility. However, the complex use of technology at home highlights the disabling repercussions of modern technology. But the fact that technology provides support cannot be ignored. Many new technologically advanced solutions such as home automation systems and several others are becoming increasingly popular in the healthcare industry. Some solutions include cost-effective support systems that allow people to provide care and healthcare facilities to help their clients remotely. Still, there are a few questions regarding the efficiency and acceptance of cost-effective support systems, especially for older adults with disabilities.

V. Methodology

The primary purpose of this research is to define a real estate sector that is aging-friendly with technological and architectural features that need to be included. The study consists of a literature review of scientific outcomes from the previous years presented in other sections. The prospective assessment of senior citizens' independent living was based on data acquired from the United Nations Economic Commission for Europe. All information was covered with the Active Aging Index (AAI). To date, the indicators for 2010, 2012, and 2014 have been prepared. It comprises 22 variables that describe factors such as independent living, employment rates among different age groups, a fraction of the population aged above 55 years that are participating in voluntary work, for example, care of older people, healthy lifestyle options, safety conditions, and others that affect the quality of life.

Public statistics, surveys, and interviews were used to measure all the AAI indicators depending on the variable that was being measured. The same data sources were utilized for the comparison of data across all countries. The primary datasets used for determining active aging indicators were Household Income by the Department of Statistics Singapore, the Labor Force Survey by the Ministry of Manpower Singapore, and the Quality-of-Life Survey by EDB Singapore. Most of the data obtained were from the years 2008, 2010, and 2012. Coupled with that, the sample size for any country was not defined beforehand. There were a few critiques and limitations of AAI as well. For example, it is stated that AAI is an insufficient tool because AAI does not determine the aging population's capabilities in a particular field.

Consequently, we do not know whether any actions will impact a change as standards for every country might not be the same. However, the author used the AAI because of its comparability between the countries, mainly because of the current circumstances among those countries, which could allow real estate industry professionals to focus on specific customers. Literature and scientific papers supported all the variables presented in this paper through the existence of the cause-effect relationship. The variable related to physical exercise indicates the fraction of the senior people who regularly participate in sports or regularly undertake physical exercise. Hence, this means that positive physical condition allows individuals to be mobile and independent in their social environment.

In 2016, Floegel and Perez identified the positive relationship between physical activity and the different factors of quality life. They state that senior people with chronic heart issues can improve their

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health by increasing their fitness level, reducing mortality. Sports and physical exercises can be the main element that can satisfactorily aid wellbeing while improving aging people's mental skills. Likewise, it has been noted that inactivity among senior people predisposes them to chronic illnesses. To have an active and healthy independent life, it is imperative to have excellent and regular access to health and dental care. Senior citizens who have more chronic health problems usually undergo more healthcare inequalities and acts of discrimination than individuals who do not have chronic diseases. Moreover, residence in remote and rural areas also complicates things as people have limited access to healthcare institutions.

Transportation accessibility further exacerbates geographical discrimination, and financial issues complicate the situation even more. Senior people with meager resources and low incomes typically experience high healthcare bills. Hence, the relative median income, absence of material deprivation, and the risk of poverty are the main factors that determine independent living. Designed to measure economic independence, these variables form the health profile baseline and quality life indicators in the absence of the risk for poverty. Lack of worries or fear of becoming a victim is one of the significant indicators of quality life. For the wellbeing and health of the aging population, neighborhood safety is of immense importance. The stronger the cohesion in a society, the better is the mental health and wellbeing of aging adults. Hence, these systems affect the quality of life of the aging population. Relying on individuals' competence and knowledge, society is more inclusive and cohesive when the people are competent. Hence essential indicator used in this situation is lifelong learning. All the AAI variables discussed above have implications on the chances of successfully aging in place and thus impact the decisions regarding continuing living in one's own house. The Pearson correlation coefficient (r) was used to test the correlation between seven factors describing the living conditions and to identify and highlight which factors have the most significant impact on senior people's independent living.

VI. Results

The living environment and the conditions of the aging population differ across countries. To observe the differences, the United Nations Economic Commission for Europe started AAI calculations. Independent Living Arrangements were assumed as the reference variable. Other than where the senior people had been living for several years, a few cases of seniors are living in a single or a two-member house. However, the author's primary purpose is to view the possibility of real estate for an aging population; it was assumed that independent living is relevant. From the group of independent, healthy, and seniors with secure living, seven variables were highlighted, and the correlation between every variable was divided into the following years: 2010, 2012, and 2014.

The relative median income showed the most apparent results. It is essential to mention that the three years are not statistically significant, and no positive r results were observed. Hence, aging in place across countries remains unaffected by the income. The most considerable correlation magnitude was observed between independent living arrangements with physical exercise and lifelong learning. The range of the r value was from 0.65 to 0.69. This shows that the results are statistically significant and have a strong correlation. However, it does not answer the cause-effect relationship between those factors. It is possible that physical and mental activities influence older people, affecting their health condition. Hence, this helps them to fulfill their everyday chores and remain independent.

Further research can be done to verify that suitable physical and mental abilities are the primary drivers of aging. Multiple regression analysis was utilized for deriving the coefficient of multiple correlations (multiple R). A value of 0.809 of multiple R was derived that highlights the relationship between the variables calculated using the combined data from all the years. The obtained statistics also highlight that physical exercise, lifelong learning, and accessibility to health and dental care services are independent variables that must be used in another multivariate regression modeling. Using this model, an estimated 0.6761 coefficient of determination and residuals will be normally distributed. The k-means algorithm was used for grouping all countries. Lloyd's algorithms with squared Euclidean distances to calculate k-means clustering for every k were used. It was applied to all eight independent variables. Three was the optimal number of classes. There were 18 items in the first cluster, six items in the second cluster, and three items in the third one.

There was only a single outlier. To calculate the differences between clusters, the values of the between-group sum of squares and within-group sum of squares were used.. The value of the former was 5.4507 and for the latter was 6.2285. Regardless of the determining factors impacting aging in place, the state of people aged 65 and more living in a single- or two-member home was critically evaluated. It was observed that this value is not the same for all the counties - from almost 69.2% in Malaysia to 99.5% in the Philippines. The range of figures across all countries was divided into thirds. A business intelligence system, Tableau, was utilized for data visualization. The ranking does not vary significantly over the years. All countries that joined the European Union in the 21st century have either a medium or a low fraction. In future research projects, it can be analyzed whether different socio-cultural factors

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also impact the differentiation or not. Despite several reasons for the diversity of factors, it is imperative to state that majority of the population lives independently. Therefore, there is a considerable need for the development of real estate properties and projects according to the requirements of the older adults regardless of the decision to give up living in their own homes or not. Developing houses that are more aging-friendly, accessible, and technologically equipped for improving the functionality and keeping in mind the increasing expectation of real estate owners, will give the senior population an opportunity to age in place and enhance the quality-of-life fraction of the Singapore population.

VII. Discussions and Conclusions

There is no doubt that maintenance, development, and occupancy of buildings are not an easy process. The complexity of these processes increases when facilities cater to specific user classes such as aging adults, as discussed in this research. The design process involves several professionals who work together and create buildings and are incumbent for the design, construction, maintenance and operation of the building. Everyone contributes during the process of designing in which they may do what they are familiar with.

Moreover, the complexity also increases due to the users' increased demand for functionality such as improved care and wellbeing support, including having sufficient space for easy mobility. Coupled with that, design complexity also increases over time due to requirements that emerge from varying performance levels. It can also be attributed to the increased awareness in terms of quality among the users and from having advanced general understanding. The designing, operating, and maintenance processes of healthcare institutions are particularly complex as the standards are constantly changing. Talks regarding the relevance of built environments for promoting healthcare extend almost as back as Hippocrates in 400 BC. In today's world, climate change affects decisions when it comes to the relocation of people. For instance, the aging population is forced to move from apartments in the top building floors to lower floors due to rising temperatures that exacerbate the heat risk. In healthcare and medicine, professionals' work includes evidence-based practice, and that the interventions and solutions picked are the best answers for the problem identified. Hence, building designs should be based on evidence-based practices, as well as the real estate housing facilities for individuals with dementia. Healthcare, along with medicine, is currently taking the direction of evidence-based design. Numerous research has been conducted to establish the relationship between the physical environment and resident outcomes and create a healthier and safer environment. The primary concern of different studies is to monitor the design and improve decision-making in the future (Brawley, 2005). This also calls for a mechanism that can amalgamate the healthcare domain requirements with robust solutions from the real estate sectors. The real estate industry plays a vital role in identifying solutions regarding aging adults' housing needs. Hence, it is imperative to identify which environmental solutions impact aging in place and senior citizens' wellbeing to enhance independence for a long period. According to the AAI data, older individuals in Singapore live independently. This establishes the need to visualize and develop real estate properties and projects that are accessible, technological, and functional in fulfilling the requirements of their users in the future. In most countries, the real estate sector's potential for the aging society is high in the modern era than it was in the 20th century. Enhancing the mental and physical abilities and capabilities of older people may significantly affect the power of senior citizens to live independently. This may need flexible as well as robust solutions from the real estate industry for the aging population.

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