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Enablers for Healthy Aging and Intertwined of Sustainable Built Environment

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Abstract
Purpose: Aging is a process that all individuals will tend to encounter as their life journey progresses. The World projection of the aging population by the United Nations is rather alarming whereby there will be one in every six people that will be over the aged of 65 by 2050. Similarly, in Malaysia, the scenario is projected that by the year 2030, it will become an aging nation. Due to such pressing issue on-hand, there are still lack of studies that links between environmental studies with aging. The elderly is concerned with the impact brought upon from the economic, social and environmental challenges. Therefore, our research plans to explore the element of economic, social and environmental sustainability towards attitude in buying a place within the retirement village by using ecological theory of aging and ecological system theory.
Design/methodology/approach: This study utilized Partial least squares path modelling SmartPLS to analyze the theoretical model. There are 224 samples collected and analysed using structural equation modelling - SmartPLS. Due to the timing of the study which collided with the world's Covid-19 pandemic, thus both online and face-to-face data collection were utilized concurrently using convenience and snowballing technique.
Findings: It was found that social sustainability does affect buying intention directly and indirectly via attitude.

Research limitations/implications: The research limitation includes the data collection method used which partly using the online and thus is skewed towards the younger age group rather than the elderly.
Practical implications: The study is beneficial to the property developers whereby the need to understand the concept of retirement village in this country to facilitate better development and marketing of the product.
Originality/value: This study contributes by investigating the element of economic, social and environmental sustainability towards attitude in buying a place within the retirement village by using ecological theory of aging and ecological system theory

Keywords: Aging, Retirement Village, Ecological Theory of Aging (ETA), Ecological System Theory, Sustainable Built Environment

1. Introduction

Over the years, the world population is increasing exponentially with the latest figure in the year 2020 reaches around 7.8 billion ('World population dashboard', 2020). It further projected that by the year 2030 and 2050, the world population will be reaching a greater height of 8.5 billion and 9.7 billion respectively (Worldmeters.info, 2020). United Nations further reported that the contribution of the aging society by the year 2050 is similarly alarming whereby for every six people in the world, one will be over the age of 65 as compared to one over eleven in the year 2019 (United Nations, n.d.). They also reported that in the year 2020, those who are above the age of 65 years old is 727 million which is around 9.3% of the world population but this number is significantly projected to increase to almost 1 billion (11.7%) and 1.5 billion (15.9%) respectively by the year 2030 and 2050 (United Nations, 2019). While back to Malaysia, a similar trend has been observed whereby the gradual increase of the older generation has targeted the country to become an aging nation by 2030 (Yusof, 2019). With such an alarming trend that is predicted to take place, it is expected that it will cause some economic, social and environmental challenges to many nations.

From 'active aging' to 'healthy aging', the World Health Organization (WHO) has realign their future plan into emphasizing the need to include the broader perspective of environments which include the built environment, people and relationships as well the larger social systems to enable the wellbeing in older age ('What is healthy ageing?', n.d.). It was said that physical and social environments play a crucial role in influencing people's physical and mental health. The interaction between the older people and environment will either enable or constraint the potential of achieving "Healthy Aging" ('Age-friendly environments, n.d.). Healthcare demand, formal or informal care for elderly, and housing and other accessible environments are clearly linked with all the main dimensions of sustainability (social, economic and environmental) (Grazuleviciute-Vileniske et al., 2020). This present ample opportunities to various parties for understanding since there is still study that claims there are limited links between environmental studies with aging especially in the area of creating new socioecological models and theories to explain the interaction between the two (Lak, et al., 2020). Greenfield (2012) argued that ecological-based framework allows the researchers to address the interactions among individuals with the diverse social and physical environments and currently there is still lacking of such focus that examine both social and physical environments simultaneously. Therefore, this study aims to incorporate the use of ecological theory of aging (Lawton, et al., 1973) and ecological system theory (Bronfenbrenner, 1979) to study the integration of environments on the behavioral intention of aging society.

1.1 Problem Statement

The issue of retirement planning has always been a concern among Malaysian. It is expected that the aging population above 65 years old will be more than 15% in 2030 (Department of Statistics, 2016). The increasing projection indicates that there is a concern to show priority towards the elderly especially their living environment and condition during their golden years. However, the concept of retirement village was largely ignored as more attention were given on securing their financial requirements (Zuo et al., 2014). Hence, not much interest was shown on providing or designing a shelter which will facilitate their living needs of the elderly.

However, in recent decades, the importance of having a conducive shelter for the elderly has been the agenda, where the development of retirement village with sustainability features have gain attention from various stakeholders. This trend has been further driven by the cooperation between developers and relevant building authorities. For example, The Green Building Council of Australia, (2015), have shown concern in supporting the development and operations of and operation of sustainable retirement villages. In fact, the aging population have also shown their interest towards the concept of retirement village (Bernard et al., 2012) as they seek to live a more productive and meaningful life. Therefore, with the acceptance of this new concept by current and future elderly, it is necessary to understand the needs and requirement of a retirement village. However, there is insufficient studies that provides a comprehensive understanding towards the needs of the elderly that lead them to purchase a unit. Therefore, the current study aims to examine specifically the element of social sustainability, economic sustainability and environment sustainability towards the attitude of current and future elderly towards purchasing a place within the retirement village.

2. Literature Review

2.1 Ecological Theory of Aging (ETA)

This theory was developed from the field of gerontology and is used to explain the connection between humankind and environment (Hu et al., 2015; Xia, et al, 2015). ETA describes that the competence and environment should reach a balance to produce a sense of well-being in particular for the aged (Iwarsson, 2005; Lawton, 1977).

Generally, "competence" refers to the capability of the aged in relation of physical, mental and cognitive (Iwarsson, 2005) and the "environment" covers the social-spatial surroundings where the aged are staying (Lawton, 1977). This theory proposed the willingness of elderly to stay in a sustainable surrounding where their social, environmental and economic needs can be fulfilled (Hu et al., 2017).

Notably, this theory advances with the integration of the triple bottom line of sustainability (Hu, 2019) in which considerable focus has been given to sustainable home using social, economic, and environmental interventions to achieve an effective way of providing the elderly with quality living environment (Hu et al., 2015).

2.2 Ecological System Theory

As for the ecological system theory, psychologists Urie Bronfenbrenner (1979) mentioned that human development is influenced by the different environmental surroundings during their lifetime which will have influence on their behavior. It includes micro, mesosystem, exosystem, macrosystem and chronosystem. Micro system is the direct environment surrounding us such as family, friends and neighbors. Mesosystem is the interaction between the person's surrounding micro system and how it ultimately affects the individual. Exosystem is the individual's extended families or the larger communities which the

individual is not actively participating. Macrosystem is the macro setting of the culture or even country where is the is from/stay. Chronosystem refers to the environmental changes that occur in the individual's lifespan (Ettekal & Mahoney, 2017; Guy-Evans, 2020). In the study, the different environmental surroundings of individuals will affect their behavioral outcome of the aging society.

2.3 Environmental Sustainability

Environmental sustainability is a promising construct in developing a sustainable retirement village. This is because, sustainable resources are an important element to ensure that resources are protected and maintained for future generation. As such, the issue has created increased awareness among scholars in the area of retirement village (Xia et al., 2013)

Having said the above, developers are encouraged to use environment friendly materials and efficient architecture building design to ensure environment sustainability in the development of a retirement village (Smith, 2009, West 2001). According to Green building Council of Australia (2011), stakeholders encourage developers to implement environmental concepts in the development of a retirement village to ensure elderly's health and well-being. With that, the developers of retirement village need to prioritize the environmental sustainability concept to deliver a sustainable retirement village (Zuo et al., 2014). Some researchers have argued that economic capabilities are the major concern in persuading to buy a unit, however the environmental sustainability concept should not be neglected Hu et al, (2018). This is said so because many elderlies are seeking for eco-family living concepts as they are aware of the importance of having a green building concept that landscapes their living environment (Baeker et al.,2012; Zuo et al., 2014) Therefore, examining the economic sustainability constructs towards their buying intention is significantly important.

Most researchers also recognize that understanding attitude of the society towards sustainable environment is the key priority in many research areas (Barr et al, 2011). In fact, understanding the attitude of the senior citizen gives the importance emphasized by the elderly on the environment protection which will help them to lead a more environmentally friendly lifestyle (Xia et al., 2014). Adding on, Pillemer et.al, (2011), highlighted that attitude is an important element that needs to be understood among the elderly. However, few studies have documented senior citizen's attitude towards sustainable development, such as environmental sustainability (Murray & Cotgrave, 2007).

2.4 Economic Sustainability

Economic sustainability implies a system of production that satisfies present consumption levels without compromising future needs (Lobo, Pietriga, & Appert, 2015). According to Xia et al., (2014), within the context of retirement village, economic sustainability plays the role of savings to the community. The savings include cost of living, cost of construction, running and efficiency cost. Affordability and maintenance costs continues to be of great importance to the aged as they tend to have reduced financial capability after retirement when deciding on housing options (Poterba et al., 2011). Many of them tend to only depend on their retirement funds to aid the remainder of their golden years. Past research on retirement village found that even though the elderly aspired to have an eco-friendly living environment, issue of whether they can afford to live in it becomes a great concern to them (Barker et al., 2013). Having an affordable retirement village living implies that the elderly coming from different socioeconomic environment can sustain their life costs without compromising their future financial needs.

Affordability is possible when practices that brings benefits outweigh the costs and an obvious benefit is through capital gains sharing where the added resale value of their units can provide a healthy return to the purchaser (Zuo et al. 2014). Prior research by Nymberg et al. (2019) state that behavior can be predicted by attitudes; an individual may construct a positive or negative attitude to certain phenomenon, the outcome of the action depends on that attitude. Besides, when consumers formed a positive attitude about a product, this attitude will have a positive impact on the future intention to buy. This is supported by Tan (2013) where he mentioned that a favorable attitude towards a housing attribute is a number one factor in consumers' purchase intention. It can be concluded that affordability as a housing feature which the elderly will have as a positive attitude towards this feature should be viewed as a potential prerequisite in impacting elderly retirement village buying intention.

2.5 Social Sustainability

Social sustainability in the context of housing or property refers to "a process for creating sustainable successful places that promote wellbeing, by understanding what people need from the places they live. It combines design of the physical realm with design of the social world which includes infrastructures to support the social and cultural life, social amenities, systems for citizen engagement, and space for people and places to evolve." (AEDC Innovation, n. d.); and the foreground should include elements of social equity and safety to meet diverse needs of the society (Eizenbert and Jabareen, 2017). Whereas, Ng, Zhao, Lim, Basha and Sambasivan (2019) conclude it as services and facilities which are able to shape the socio-spatial environment that enable to support and satisfy the mental and physical needs of the community in enhancing their quality of life. Further, other researchers state that the opportunity to communicate, engage, build network and friendships subsequently will lead to a feeling of belongingness is crucial for the elderly to fill up their free time. (Liu, Dijst, Geertman and Cui, 2017; Xia, Zuo, Skitmore and Rarasati, 2015)

Many studies found that attitudes have a positive impact on the purchase intention on property (Zhang, Wang, Tian & Zhang, 2020; Chung, Yeong, Low & Ung, 2018). This further supported by Lim, Ng, Basha, Cheah and Ting (2020) specifically stated that social sustainability has a positive effect on attitudes and hence create an intention to move into the retirement village in Malaysia context. Many researchers also found that consumers' positive attitudes always correlated with purchase intention and willingness to pay premium if the products/services meet their expectation (Morel and Kwakye, 2012). Hence, the internal and external including the environment design of the retirement village that meets the expectation of the community will create a positive attitude and has high possibility of leading to buying intention.

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The following hypotheses are advanced based on the above discussions:

H1: Significant relationship between economic sustainability and attitude among consumers' intention to purchase retirement village.

H2: Significant relationship between environmental sustainability and attitude among consumers' intention to purchase retirement village.

H3: Significant relationship between social sustainability and attitude among consumers' intention to purchase retirement village.

H4: Significant relationship between attitude and among consumers' intention to purchase retirement village.

H5: Attitude is a mediator between economic sustainability and among consumers' intention to purchase retirement village.

H6: Attitude is a mediator between environment sustainability and among consumers' intention to purchase retirement village.
H7: Attitude is a mediator between social sustainability and among consumers' intention to purchase retirement village.

3. Method

The study aims to understand the impact of ecological environments on the aging society. A survey questionnaire was developed and validated for data collection. Due to the timing of the study which collided with the world's Covid-19 pandemic, thus both online and face-to-face data collection were utilized concurrently using convenience and snowballing technique. The survey includes 53 items to measure the ecological environment, attitude and the behavioral intention of the aging society and questions related to their background. The questions adopted from Ng et al. (2020) and Xu et al. (2017). A total of 224 questionnaires was collected for the purpose of the research.
This study utilized Partial least squares path modelling SmartPLS to analyze the theoretical model. The analysis using post hoc Harman single-factor analysis was performed to ensure the variance in the data was not explained by one single factor after data collection to address the common method bias (CMB) (Chang, et al., 2010; Podsakoff, et al., 2003). The results shows that a single factor enlightens 41.03% of the total variance. Thus, there is no issue with common method bias in the data. A value of total variance greater than 50% reveals that a CMB issue exists, while a value of CMB less than 50% indicates that there is no CMB issue. Hence, in this study, there is no CMB issue in the data.
Most of the respondents are females within the age group of less than 25 years old. Surprisingly, about 59.4% of the respondents have not heard about retirement village. The sample consists of 59% of unmarried respondents and about 37% have one to two siblings.

4. Findings

4.1 Data Analysis

This study utilized Partial least squares path modelling SmartPLS to analyze the theoretical model. As recommended by Hair et al., (2014), SmartPLS is suitable for both reflective and formation models. Besides, to assess at the centrality of the loadings and path coefficient, 5,000 resample were used in bootstrapping strategies (Hair *et al*., 2016).

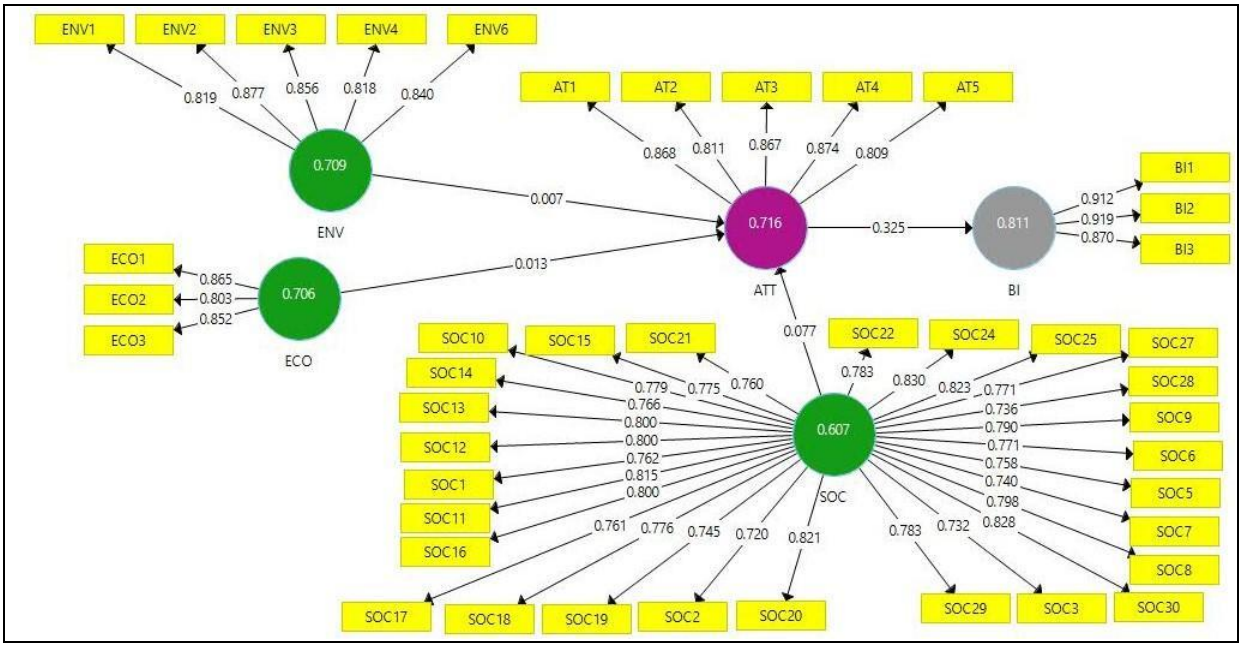

Figure 1: Measurement Model

4.2 Assessment of Measurement Model

In measurement model (Figure 1), the constructs relationship and its relevant items were measured based on indicator reliability, internal consistency reliability, convergent validity and discriminant validity (Henseler et al., 2016; Mohammad et al., 2019). All items' loadings as revealed in Table 1 for ENV, ECO, SOC and BI are above the recommended values of 0.708 (Hair et al.,2017) which are acceptable level. The composite reliability (CR) values of 0.926 (ATT), 0.928 (BI), 0.924 (ENV),0.878 (ECO) and 0.977 (SOC) in Table 1 confirm that all items have high levels of internal consistency. Thus, the measurement model's reliability reached a satisfactory level. The results of Average Variance Extracted (AVE) for all the constructs value above than 0.500 signifies that surpassed the threshold values (Hair et al., 2014) which is 0.607 to 0.811 in this study (Table 1) means constructs are highly correlated.

Table 1: Reliability and Validity Assessments

Constructs	Items	Loadings	CR	AVE
ATT	ATT1	0.868	0.926	0.716
	ATT2	0.811		
	ATT3	0.867		
	ATT4	0.874		
	ATT5	0.809		
BI	BI1	0.912	0.928	0.811
	BI2	0.919		
	BI3	0.87		
ENV	ENV1	0.819	0.924	0.709
	ENV2	0.877		
	ENV3	0.856		
	ENV4	0.818		
	ENV6	0.84		
ECO	ECO1	0.865	0.878	0.706
	ECO2	0.803		
	ECO3	0.852		
SOC	SOC1	0.762	0.977	0.607
	SOC10	0.779		
	SOC11	0.815		
	SOC12	0.8		
	SOC13	0.8		
	SOC14	0.766		
	SOC15	0.775		
	SOC16	0.8		
	SOC17	0.761		
	SOC18	0.776		
	SOC19	0.745		
	SOC2	0.72		
	SOC20	0.821		
	SOC21	0.76		
	SOC22	0.783		
	SOC24	0.83		
	SOC25	0.823		
	SOC27	0.771		
	SOC28	0.736		
	SOC29	0.783		
	SOC3	0.732		
	SOC30	0.828		
	SOC5	0.758		
	SOC6	0.771		
	SOC7	0.74		
	SOC8	0.798		
	SOC9	0.79		

Note: Composite Reliability (CR), Average Variance Extracted (AVE)

Table 2 revealed the results for Heterotrait–Monotrait (HTMT) for this study. HTMT method represents the ratio between-trait correlation to within-trait correlation, which should be

below 0.85 (Henseler *et al*., 2015). Likewise, HTMT use for testing the null hypotheses (H0: HTMT ⩾ 1) against the alternative hypothesis (H1: HTMT < 1), if the confidence interval includes 1, then it is not possible to reject H0, which indicates a lack of discriminant validity (Mohammad, Quoquab, Idris, Al Jabari, and Wishah, 2019). The values of HTMT shown in Table 2 were less than 0.85 for all the constructs. Moreover, the confidence interval (CI) for all HTMT values did not include the value of one, thus indicating that discriminant validity was achieved. The measurement model attained its reliability and validity at satisfactory level.

Table 2: Assessment of discriminant validity using Heterotrait-Monotrait (HTMT)

Constructs	ATT	BI	ECO	ENV	SOC
ATT					
BI	0.559 CI97.5:0.662-0.444				
ECO	0.504 CI97.5:0.627-0.373	0.299 CI97.5:0.437-0.177			
ENV	0.5 CI97.5:0.632-0.358	0.349 CI97.5:0.474-0.213	0.699 CI97.5:0.819-0.574		
SOC	0.559 CI97.5:0.656-0.456	0.262 CI97.5:0.381-0.15	0.727 CI97.5:0.816-0.632	0.781 CI97.5:0.876-0.661	

4.3 Structural Model

Before assessing the structural model, it is important to ensure that there are no collinearity issues in the structural model. The VIF value for each of the constructs is lower than the offending value of 3.3 (Diamantopoulos & Sigouw, 2006), thus suggesting that there is no issue with collinearity in the study.

4.4 Direct effect analysis

To validate the proposed hypotheses, the bootstrapping is executed. Table 3 shows that H1 and H2 are not supported. This indicates the direct relationship between ECO and ATT (t-value=1.807, p>0.05), and, ENV and ATT (t-value=0.327, p>0.05) are not significant at p value < 0.05. However, the pathway of SOC to ATT and ATT to BI, H3 and H4 respectively shows significant.

Table 3: Hypotheses results for direct relationship.

Hypotheses	Paths	β value	t-values	P-values
H1	ECO -> ATT	0.129	1.807	0.071
H2	ENV -> ATT	0.107	0.980	0.327
H3	SOC -> ATT	0.368	3.687	0.000
H4	ATT -> BI	0.497	9.626	0.000

4.5 Mediation analysis

In the inner model to test the proposed hypotheses, the researchers calculate p-value and t-value. If the t-value is greater than 1.96 or the p-value below 0.05 then the proposed hypotheses are accepted and vice versa. The ATT does not have a mediation effect between

ECO and BI (β= 0.064, t-value=1.786, p>0.05) and H5 is not supported. Similarly, ATT does not mediate the relationship between ENV and BI (β= 0.053, t-value=0.935, p>0.05). Thus, H6 is not supported. Based on Table 4, the mediation analysis presented strong support for H7 (β=0.183, t=3.589, p<0.05).

Table 4: Hypotheses results for indirect effect

Hypotheses	Paths	β value	t-values	P-values	Mediation Results
H5	ECO -> ATT -> BI	0.064	1.786	0.074	No
H6	ENV -> ATT -> BI	0.053	0.935	0.350	No
H7	SOC -> ATT -> BI	0.183	3.589	0.000	Yes

4.6 Predictive Accuracy (R^2) and Predictive Relevance (Q^2)

Table 5 presents the assessment of co-efficient of determination (R2), the effect size (f2) as well as the predictive relevance (Q2) of exogenous variables on the endogenous variable in this study. In SmartPLS 3.3.2, the Q2 computed by using the blindfolding technique. The Q2 should be higher than zero (0) as suggested by Chin (1998). As suggested by Cohen et al. (2013), a value of Q2 greater than 0.35, 0.15, and 0.02 indicates large, medium, and small predictive relevance. Relatedly, results in Table 5 indicated the Q^2 value for both of the constructs, ATT (Q^2 = 0.205) and BI (Q^2 = 0.196) are more than zero. Hence, this model has obtained sufficient predictive relevance.

Table 5: Coefficient of determination (R^2) and predictive relevance ($Q^{2)}$

Exogenous variables	Q^2	R^2
ATT	0.205	0.303
BI	0.196	0.246

Additionally, Table 5 shows the value for the coefficient of determination (R^2) suggests that the exogenous variables in this study, namely ECO, ENV and SOC explain 24.6% of variances in BI and 30.3% in ATT. Overall, all exogenous variables possess predictive ability over the endogenous variable.

Table 6: Effect size of constructs

Exogenous variables	f^2
ECO	0.013
ENV	0.007
SOC	0.077

The value of f^2> 0.02, 0.15, and 0.35 were considered small, medium, and large effect size, as suggested by Cohen (1998). Accordingly, Table 6 elucidates that each of exogenous variables (ECO, f^2 = 0.013; ENV, f^2 = 0.007; SOC, f^2= 0.077) has small to medium effect size on the endogenous variable.

Discussion and Conclusion

The study incorporates the ecological theory of aging and ecological system theory shows that as an individual aged, he/she will have different needs to decide on their future living environment. Based on the current study, the social environment plays the greatest impact directly and indirectly via attitude in affecting their behavioral intention when considering to purchase a place within the retirement village. This was further confirmed by past studies conducted that social sustainability is important since it includes the services and

development of facilities that assist in shaping the socio-spatial environment to support and satisfy ones' mental and physical needs (Ng et al., 2019) and Sritharan, Hong, Krishnan et al. (2019) found that attitude has positively affected the buying intention in a retirement village in Malaysia. The social environment also allows the elderly to communicate, engage, build a network and create a sense of belonging (Liu et al., 2017; Xia et al., 2015) which further strengthen the Maslow's Need Theory whereby having a sense of belongingness is important to people from all walk of lives. Hence, the developer and service management play a vital role in creating an environment that able to meet both physiological and phycological needs of the elderly (Maslow, 1943).

Besides, based on the ecological systems theory, ranging from the microsystem to the exosystem, the result shows that an individual cannot live in isolation and by having good social surroundings will lead to creating a better environment for them to age healthily. Therefore, it is important for the marketers to include in their retirement village planning to incorporate various infrastructure and facilities that help to promote an active lifestyle. This may include taking an example such as a common board room or town hall that allows for group activities to takes place. The decision on design features and facilities, location and neighboring has significantly affected the accessibility on care services, convenient and comfort (Chong and Omkar, 2017; Md Mansor, Maon, Ahmad and Mohd Daud, 2016) while the effective management service able to reduce hassle and enhance the quality of life through creating an environment where the elderly can build their relationship, belongingness and meeting their various interest and needs in their daily life (Eizenbert and Jabareen, 2017; Xia, et. al 2015; Crisp, Windsor, Anstey & Butterworth, 2012).

However, contrary to Hu et al., (2018) and Zuo et al., (2014) studies, the current study found that there is no relationship between economic and environmental sustainability directly or indirectly in affecting buying intention. This study supports the past study by Lim, Ng and Basha (2019) which also shows that both economic and environmental sustainability does not affect buying intention in a retirement village. The study by Stimson and McCrea (2003) further found that couples, males and those that have visited a retirement village would be the ones that are attracted by the affordability feature of the retirement village. However, based on the current study, there is no relationship between economic sustainability in affecting buying intention as most of the respondents are female with 59% of them are unmarried. It could be one possible reason why the current study found that economic sustainability does not affect buying intention.

In terms of environmental sustainability, it might be insignificant in this sense due to the fact that many still believe that the preservation of the environment is the prime responsibility of the government and not on the individuals (Levermann, 2019). It should be the government role to preserve the environment and thus it should be in the government policy and not the practitioners to enforce it. Besides that, Howes et al. (2017) also claimed that it is the lack of effective communication by policy-maker that led to the levity towards environmental sustainability issues. Thus, if the government is still lackadaisical in its approach to tackle the environmental issues by having more stringent implementation and reinforcement, it will only lead to more severe environmental problems in the future. Therefore, the government should also take the lead in the preservation and conservation of the environment to ensure long-term sustainability.

Limitations and Future Directions

The research was not without its limitation whereby as stated in the methodology, the data collection was partly conducted online due to Covid-19 pandemic and thus the data may be more skewed towards the younger age group rather than the elderly. Besides, with the

pandemic in view, the current financial and well-being of livelihood may be more of the respondents' concern instead of looking at retirement which may be years away for some. Therefore, for future research, it is suggested to conduct qualitative-based research to allow for probing of the respondents in terms of their attitude towards retirement village.

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