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**CONCEPTUALIZING PLACE-BASED AGING: AN ANALYSIS OF
STRUCTURAL EQUATION MODELS FOR MALAYSIAN SENIORS**

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Abstract

This research examines aging in place among older persons in Malaysia, emphasizing the interconnected roles of assistive technology, quality of life, and age-friendly surroundings in facilitating this process. With Malaysia's senior demographic anticipated to rise from 10.3% in 2020 to 15.3% by 2030, the necessity for appropriate methods to facilitate aging in place has become increasingly pressing. This study analyzes survey data from 499 participants aged 60 to 75, investigating the impact of assistive technology on physical health, psychological well-being, and social involvement, revealing substantial improvements in quality of life. Furthermore, age-friendly surroundings enhance autonomy by alleviating environmental obstacles. Nonetheless, adoption obstacles, such as budgetary limitations and insufficient technological expertise, hinder the efficacy of assistive devices for certain seniors. This article emphasizes the importance of a balanced strategy that combines technological and human support, providing guidance for policymakers to create interventions that preserve the autonomy and dignity of older individuals in Malaysia.

Keywords: Ageing in place; assistive technology; quality of life; age-friendly environment; Structural Equation Modelling (SEM)

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INTRODUCTION

The concept of aging in place, which refers to the ability of individuals to continue living in their own homes and communities as they grow older, has garnered significant attention from researchers, policymakers, and healthcare providers in recent years. This concept reflects the preferences of many older adults who seek to maintain their independence, autonomy, and connection to familiar environments (Hatcher et al., 2019; Pynoos et al., 2010). Aging in place offers not only personal and emotional advantages but also psychological well-being, as remaining in a known setting reduces stress, anxiety, and feelings of isolation. Beyond individual benefits, aging in place presents broader societal value by contributing to cost savings in healthcare systems, primarily through delaying or reducing the need for institutional care, such as nursing homes or assisted living facilities. Such outcomes align with efforts to create sustainable care models that prioritize community-based solutions over institutional alternatives.

The global trend of population aging has brought about an urgent need for effective strategies that support older adults in achieving aging in place. One promising approach involves the use of assistive technologies, including devices such as smartphones, health-monitoring applications, and safety sensors, which can facilitate daily activities, enhance communication with family and caregivers, and provide access to essential services (Hatcher et al., 2019; Thakur & Han, 2021). These technologies enable older adults to remain connected, manage health conditions remotely, and maintain social interaction, which are key contributors to independent living. However, the success of these interventions depends on several contextual factors. The effectiveness of assistive technologies is influenced by the overall quality of life experienced by seniors, the availability of supportive services, and the presence of an age-friendly environment. Age-friendly environments offer accessible infrastructure, transportation, and social support systems that empower seniors to navigate their surroundings comfortably and safely. The interplay between these variables determines the extent to which older adults can successfully age in place.

In Malaysia, the demographic landscape is shifting rapidly, with a marked increase in the aging population. Department of Statistics Malaysia (2023) projects that the proportion of individuals aged 60 years and above will rise from 10.3% in 2020 to 15.3% by 2030. This demographic transition poses both challenges and opportunities for Malaysian society. On one hand, it necessitates the development of comprehensive strategies to address the growing needs of older adults, particularly in terms of healthcare, social services, and housing. On the other hand, it presents an opportunity to enhance public policy frameworks that promote well-being, independence, and dignity for seniors. Recognizing the importance of these efforts, the Malaysian government has

introduced initiatives such as the National Policy for Older Persons and the Action Plan for Older Persons, both of which emphasize the creation of age-friendly environments that support active and independent aging. These policies align with global recommendations from organizations such as the World Health Organization (WHO) to build inclusive and sustainable communities for aging populations.

Despite these policy directives, empirical research investigating the actualization of aging in place in Malaysia remains fragmented. While existing global literature has extensively explored assistive technology, quality of life, and age-friendly environments, previous studies have largely examined these factors in isolation (Tobi et al., 2017). There is a distinct lack of research that integrates these specific variables into a unified, comprehensive framework. This integration is particularly crucial in the Malaysian context, where unique cultural nuances, multi-generational family structures, and developing infrastructural landscapes mean that models derived from Western studies may not fully translate to local realities (Makhtar et al., 2023). Overlooking the complex interrelationships between technological adoption, environmental support, and the subjective well-being of Malaysian older adults leaves a critical blind spot in current literature (Abdullah et al., 2024).

To address this gap, this research aims to examine the interrelationships between aging in place and three critical variables: assistive technology adoption, quality of life, and the presence of age-friendly environments. The goal is to identify the factors that significantly influence the elderly's desire and ability to remain in their own homes and communities as they age. To achieve this objective, the research employed a survey-based approach, gathering data from 499 respondents aged between 60 and 75 years through snowball sampling. Snowball sampling was chosen due to its effectiveness in recruiting participants from hard-to-reach populations, such as older adults who may not actively engage with conventional research recruitment methods. The survey instrument was designed to capture data on the use of assistive technologies, perceptions of quality of life, and the availability of age-friendly amenities in the respondents' living environments.

The data analysis involved both descriptive and inferential statistics, as well as Partial Least Squares (PLS) analysis, a structural equation modelling technique suitable for complex models with latent variables. PLS analysis enabled the exploration of both direct and indirect relationships among the constructs, providing insights into how assistive technology, quality of life, and environmental factors interact to influence aging in place. This comprehensive analytical approach ensured that the nuanced relationships between these variables were adequately captured, contributing to a deeper understanding of the factors that affect the elderly's ability to live independently. The findings of this

research are expected to make a significant contribution to the growing body of knowledge on aging in place, particularly within the Malaysian context. By providing empirical evidence on the role of assistive technology, quality of life, and environmental factors, the research offers valuable insights for policymakers, service providers, and researchers working to support aging populations. The outcomes are also intended to inform the development of policies, programs, and practices that foster senior citizens' ability to remain in their own homes while maintaining their well-being and autonomy. Moreover, by addressing the specific needs and preferences of Malaysian seniors, stakeholders will be better equipped to design targeted interventions that promote aging in place, ensuring that the elderly population can enjoy an enhanced quality of life while staying connected to their communities.

LITERATURE REVIEW

The concept of "ageing in place" has garnered significant attention in recent years, particularly in the context of Malaysia, where the elderly population is projected to increase substantially. Ageing in place refers to the ability of older adults to live in their own homes and communities safely, independently, and comfortably, regardless of age or ability level. This concept is critical for enhancing the quality of life for the elderly, as it allows them to maintain their social connections and familiar environments, which are essential for their well-being (Azmi et al., 2021; Emlet & Mocerri, 2012). In Malaysia, the demographic shift towards an ageing population necessitates a comprehensive understanding of the factors that influence the ability of older adults to age in place. Research indicates that the elderly in both urban and rural settings prefer to remain in familiar environments, highlighting the importance of community and social connectedness in facilitating ageing in place (Aini et al., 2016). The preference for ageing in place is particularly pronounced among rural elderly, who often have stronger ties to their communities and family networks compared to their urban counterparts (Aini et al., 2016). This preference underscores the need for policies and infrastructure that support the elderly in their desire to remain in their homes and communities. Social connectedness plays a pivotal role in the ageing in place framework. Emlet and Mocerri emphasize that older adults who engage in volunteer and community activities are more likely to experience a sense of belonging and purpose, which can mitigate feelings of isolation and loneliness (Emlet & Mocerri, 2012). This is particularly relevant in Malaysia, where traditional family structures are evolving, and many elderly individuals may find themselves living alone or with limited social interaction (Hung et al., 2010). The development of age-friendly communities that promote social engagement and connectivity is essential for supporting the elderly population in Malaysia (Lai et al., 2016).

To rigorously examine the multifaceted nature of ageing in place, this study is anchored in two complementary theoretical frameworks: Lawton's Ecological Model of Aging (Person-Environment Fit Theory) and the Technology Acceptance Model (TAM). Lawton and Nahemow (1973) assert that successful ageing in place depends on a dynamic equilibrium between an individual's competencies (quality of life, mobility) and the "environmental press" or demands of their surroundings (built infrastructure). When an environment is age-friendly, it lowers the environmental press, allowing older adults with declining physical competencies to maintain independence. Concurrently, to understand the integration of modern solutions, TAM (Davis, 1989) provides a lens through which assistive technology adoption is evaluated based on perceived usefulness and perceived ease of use. While these frameworks have been extensively validated in Western literature, their application within an Eastern, developing context requires careful recalibration to account for distinct socio-cultural variables.

The built environment significantly impacts the ability of older adults to age in place. Tobi et al. highlight that the design of housing and community infrastructure must cater to the specific needs of the elderly, including accessibility features and proximity to essential services (Mohd Tobi et al., 2018). The lack of suitable housing options can create barriers to ageing in place, particularly for those with mobility challenges (Mohamad Bohari et al., 2024). Furthermore, Lai et al. assert that transportation and housing are critical components of an age-friendly environment, enabling the elderly to participate in community activities and access healthcare services (Lai et al., 2016). In addition to physical infrastructure, the socio-economic context also influences the quality of life for the elderly in Malaysia. Many older adults face financial constraints that limit their ability to maintain their homes or access necessary services (Che Amani Nurfadhilah & Kahar Rojanah, 2021; Khan & Tahir, 2014). The government and community organizations must work collaboratively to provide support systems that address these financial challenges, ensuring that the elderly can age in place without undue stress (Noor et al., 2020).

Moreover, the role of education and lifelong learning cannot be overlooked in the context of ageing in place. As highlighted by Abdul Mutalib et al. (2023), prioritizing education for the elderly can empower them to adapt to changing circumstances. However, what constitutes "adaptation" varies significantly across cultures. Contrasting studies from Western contexts, such as those in Scandinavian countries or the United States, often frame ageing in place around individualism, where success is defined by self-reliance, privacy, and state-funded welfare support or robust pension systems (Ahn et al., 2020). In contrast, the Malaysian context is heavily influenced by collectivist values and the concept of filial piety (*tanggungjawab anak*). Traditional beliefs position the

family, rather than the state, as the primary safety net (Hung et al., 2010). This cultural divergence directly impacts how variables like housing and technology are utilized. For instance, while Western studies frequently highlight the use of assistive smart home technologies for independent, solitary living (Peek et al., 2014), technology adoption among Malaysian elderly is often driven by a desire for social connectedness and intergenerational communication, such as using smartphones to stay in touch with extended family rather than for health monitoring.

Furthermore, socio-economic factors starkly differentiate the Malaysian experience. Unlike developed nations with comprehensive long-term care insurance, many Malaysian older adults face financial vulnerabilities due to inadequate retirement savings and out-of-pocket healthcare expenses (Che Amani Nurfadhilah & Kahar Rojanah, 2021). Therefore, models of ageing in place derived from Western literature which often assume a baseline of financial independence and state support must be critically adapted. As societal norms in Malaysia shift towards dual-income households and urban migration among the younger generation, there is a growing tension between traditional expectations of co-residence and the modern reality of elderly individuals living alone. This necessitates a uniquely Malaysian approach to ageing in place, balancing traditional familial support with the development of age-friendly community infrastructure and accessible assistive technologies. Therefore, models of ageing in place derived from Western literature which often assume a baseline of financial independence and state support must be critically adapted. As societal norms in Malaysia shift towards dual-income households and urban migration among the younger generation, there is a growing tension between traditional expectations of co-residence and the modern reality of elderly individuals living alone. This necessitates a uniquely Malaysian approach to ageing in place, balancing traditional familial support with the development of age-friendly community infrastructure and accessible assistive technologies.

Research on aging in place reveals several key gaps and methodological considerations. There is a need for more patient-centred interventions that align with older adults' goals and include social support, healthcare, and personal care services (Moscou-Jackson et al., 2019). The same study emphasized the need to focus on informal caregiver interventions, as they play a crucial role in enabling aging in place. Technology acceptance is influenced by various factors, including concerns about cost and privacy, expected benefits, perceived need, and social influence (Peek et al., 2014). However, research on post-implementation acceptance is scarce. Current studies on digital technologies for aging in place have primarily focused on efficacy and usability rather than their impact on re/enablement outcomes for older adults (Horne, 2023). Future research should address these gaps and explore factors that enhance the usability of digital

technologies by older people, utilizing qualitative approaches to gain valuable insights (Frochen & Pynoos, 2017; Horne, 2023). Yap et al. (2022) noted that most studies on the elderly are cross-sectional rather than longitudinal. While longitudinal studies provide deeper insights into trends over time, this research contends that a robust conceptual foundation must first be established through a review of existing literature before a longitudinal investigation is undertaken. In this context, the principles of ageing in place such as the ability to live independently in one's familiar environment with access to essential resources serve as the primary focus of the conceptual framework for this research. Consequently, this research employed a quantitative methodology, which involved the collection and analysis of numerical data using specific research designs grounded in relevant philosophical assumptions and theoretical frameworks. The quantitative approach was selected to facilitate objective measurement of constructs central to the elderly population, such as quality of life, mobility, and assistive technology usage.

This research intends to propose and examine a primary objective: to assess the influence of assistive technology, quality of life, and age-friendly surroundings on the aging-in-place process among senior adults. The research employs Partial Least Squares Structural Equation Modelling (PLS-SEM) as the principal analytical technique to rigorously analyse the correlations among the variables. This research framework incorporated three essential elements: assistive technology, quality of life, and environmental design into a holistic model that encapsulates the multifaceted dimensions of aged care in Malaysia. This approach enhances existing scholarships by providing new insights into how these elements collectively affect the ability of elderly individuals to age in place, defined as their capacity to maintain independence and reside comfortably in their homes or communities as they age. The findings seek to offer a detailed comprehension of these links, which can guide future policies and interventions designed for Malaysia's ageing population.

The theoretical framework proposed by this research is constructed as follows:

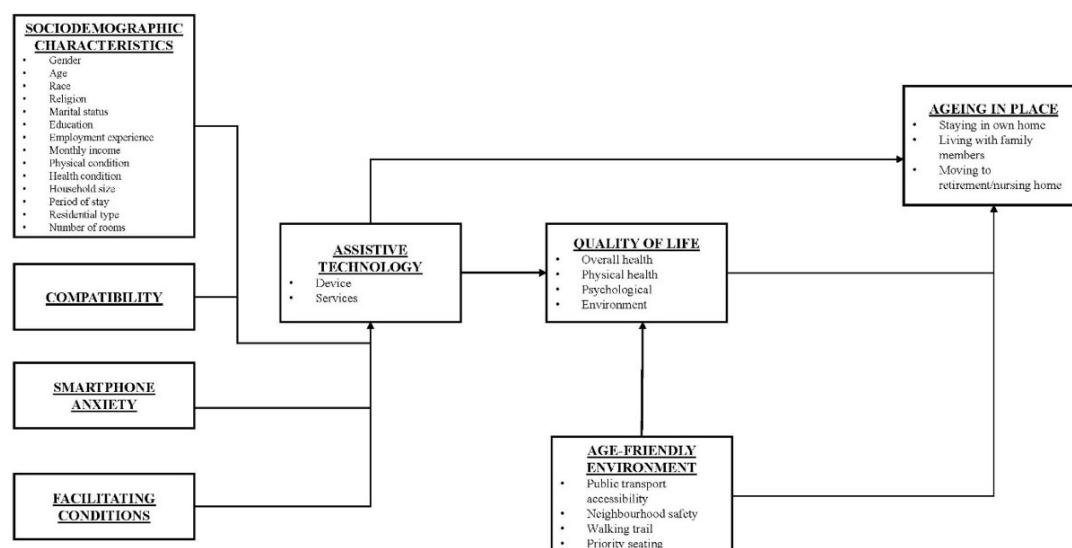


Figure 1: Research conceptual framework

The framework schematized ageing in place according to the usage of assistive technology, the impact of the quality of life among the elderly people and the assessment of person and place integration through age-friendly environment. Another scientific investigation for this research includes the evaluation of factors affecting technological adaptation such as sociodemographic characteristics, compatibility, smartphone anxiety and facilitating conditions. Within this framework, a high level of preference for one of these factors is likely to result in one choosing to age in place. This research investigated the complex concept of ageing in place, and it did this by measuring individual's preferences towards the ability to overcome physical dependence through usage of assistive technology, effort to ensure social connectedness through quality of life and feelings of belongs to place via person-place integration analysis through age-friendly environment.

RESEARCH METHODOLOGY

The first phase of this research involved reviewing secondary data from the Department of Statistics Malaysia as well as pertinent government policies on transportation, health, and the elderly. These secondary sources gave fundamental insights into the existing situation of older mobility and quality of life in Malaysia, indicating gaps and potential for future research. A Systematic

Literature Review (SLR) employing academic sources such as Scopus, Web of Science, and Google Scholar supplemented the secondary data analysis. The SLR contributed to the definition of the research objectives and research questions by synthesizing the most recent data on ageing in place, assistive technologies, and supportive environmental circumstances. Building on the insights from the literature, research instruments were developed to assess key constructs, including quality of life, assistive technology adoption, age-friendly environments, and perceived needs. These constructs were operationalized into measurable variables, forming the basis of the survey. To ensure the validity and reliability of these instruments, a pilot study involving 35 participants was conducted. The pilot provided valuable feedback regarding the survey's duration, complexity, and appropriateness for elderly respondents. Following Malmqvist et al. (2019), the pilot phase was crucial in identifying potential issues, such as confusing questions or design flaws, allowing for timely adjustments and improvements to enhance the overall research quality. Specifically, based on the pilot feedback, the physical survey's font size was increased for better readability, complex technical terms regarding assistive technologies were reworded into everyday language, and the questionnaire was streamlined to prevent respondent fatigue. The pilot study's input informed the necessary revisions to improve clarity and usability. Following then, the predominant sampling method was snowball sampling. This methodology enabled existing participants to recommend new responders, which was especially effective for reaching elderly persons who might not have been easily accessible using traditional methods. This method helps to broaden the participation pool while also ensuring the inclusion of different responders from varied demographic and geographical backgrounds. To adapt this method effectively for seniors, initial "seed" participants were purposefully selected from local community centres and senior citizen associations. These individuals were encouraged to distribute the survey links via WhatsApp groups; a highly popular communication platform among Malaysian older adults or hand over physical copies to their peers. While snowball sampling is a non-probability technique that limits the strict statistical generalizability of the findings to the entire Malaysian elderly population, it was deemed the most pragmatic approach to penetrate close-knit community networks and capture data from a demographic that is often hard-to-reach through conventional methods.

The data collection phase, which lasted five months, involved both online and in-person questionnaires to accommodate individuals with various levels of digital literacy and mobility. Data was collected from January 1, 2023 to May 19, 2023, using both physical and electronic questionnaires to include a varied participant pool. After collection, the data was subjected to quantitative statistical analysis to produce significant results. This dual-mode data collection

method increased inclusivity while simultaneously improving the authenticity and trustworthiness of the responses. Overall, the obtained data covered a wide range of variables related to the elderly's mobility, quality of life, and usage of assistive devices, which aligned with the study's aims. Following data collection, the third phase of the study involved extensive data analysis using statistical methods to explore patterns, relationships, and differences among the measured variables. Variance-based Partial Least Squares Structural Equation Modelling (PLS-SEM) was chosen as the principal analytical technique over Covariance-Based SEM (CB-SEM) for several key reasons. First, PLS-SEM is highly robust and does not strictly require data to fulfill distributional assumptions, making it ideal for survey data which often violates the assumption of multivariate normality (Hair et al., 2019). Second, PLS-SEM is particularly suited for exploratory research and complex models aimed at theory development and prediction, aligning perfectly with this study's goal of identifying the driving factors behind ageing in place. Finally, unlike CB-SEM, which relies heavily on global goodness-of-fit indices, PLS-SEM evaluates model quality and predictive capabilities through specific indicators such as the Standardized Root Mean Square Residual (SRMR), the coefficient of determination (R^2), and predictive relevance (Q^2). This statistical tool helps in estimating complex models with many constructs, indicator variables, and structural paths without imposing strict distributional constraints on the data.

ANALYSIS AND DISCUSSION

This research sample includes 499 older people, providing insights on key demographic and socioeconomic characteristics relevant to the study of assistive technology, quality of life, and age-friendly environments. The sample is predominantly male (60.5%), with females accounting for 39.5% of the participants. The age distribution of respondents shows that the majority (51.9%) are between the ages of 60 and 64, with 27.9% falling into the 65 to 69 age range. A smaller number (14.0%) belongs to the 70 to 74 age brackets, while 6.2% are 75 years or older. The racial makeup shows that the majority of individuals (84.0%) identify as Malay, with minorities including Chinese (10.8%), Indian (4.6%), and 0.6% from other ethnic groups. Religious affiliation is strongly tied to racial demography, as Islam is the dominant religion, practiced by 84.8% of the population. Other interviewees identified as Buddhist (8.2%), Hindu (5.2%), and Christian (1.8%). According to the data, 83.6% of respondents are married, with 12.6% widowed. A smaller proportion reported having divorced (2.4%) or never married (1.4%). The respondents have varying levels of educational attainment, with 55.7% having completed secondary education and 26.9% having completed university education. Furthermore, 15.0% only have an elementary education, while a small percentage (2.4%) lacks any formal education. The

participants' employment experience shows that 48.9% worked in the public sector and 47.7% in the private sector. A few (2.6%) reported a lack of employment experience, while 0.8% have worked in both the public and private sectors. 70% of members earn less than RM4,360 per month, with 24.4% earning between RM4,360 and RM9,619. Only 3.8% reported incomes above RM9,619, while 1.2% claimed no income. In terms of physical and health conditions, 11.4% of respondents claimed to have a physical limitation, while the vast majority, 88.6%, reported no physical constraints. In terms of overall health, 47.5% of respondents admitted to having a health problem, while 52.5% said they didn't. According to the household size data, most participants (74.3%) live in households with more than three people, followed by 23.3% who live with only two people. A small percentage (2.4%) live alone. In terms of residential tenure, most respondents (74.3%) have resided in their current homes for more than ten years, while 14.4% have been there for six to ten years. Fewer people reported living in their current homes for one to five years (10.6%), with only 0.6% staying for less than a year. The participants' home types are diverse, with 43.5% living in kampung houses and 29.7% in terraced houses. Bungalows (12.4%), semi-detached homes (8.2%), condominiums (2.4%), flats (1.8%), apartments (1.8%), and studio apartments (0.2%) are among the other types of housing. Most participants (55.3%) live in homes with more than three rooms, while 38.5% live in houses with three rooms. A minority of people live in two- or one-room homes (5.4% and 0.8%, respectively). This thorough assessment of sample characteristics provides a detailed description of the participants' demographic, socioeconomic, and residential profiles. The insights gained from these attributes are critical for understanding the factors influencing the elderly's ability to age in place, as well as the impact of assistive technologies and supportive environments on increasing their quality of life.

Examination of the primary objective of this study, which was to assess the influence of assistive technology, quality of life, and age-friendly surroundings on the aging-in-place process among senior adults in Malaysia, using Partial Least Squares analysis, revealed that three denominators had moderate explanatory power, as follows:

Table 1: The coefficient of determination (R^2)

	R-square
Age-friendly environment	0.190
Ageing in place	0.148
Quality of life	0.542

At this stage, the coefficient of determination (R^2) is set as the standard assessment criteria and the R^2 measures the variance, which is explained in each of the endogenous constructs and is therefore a measure of the model's explanatory power (Shmueli & Koppius, 2011). While the R^2 values for age-friendly environment (0.190) and ageing in place (0.148) may appear relatively low, this is a common and acceptable threshold in behavioral and social science research. The construct of 'ageing in place' represents a highly complex, multifaceted human decision influenced by a vast array of variables outside the scope of this specific model, such as sudden physical health crises, profound financial constraints, and deeply ingrained cultural expectations regarding co-residence with adult children. Therefore, explaining approximately 15% of the variance solely through the lenses of technology, environment, and quality of life is a meaningful empirical contribution. It highlights that while these factors are statistically significant pieces of the puzzle, the decision to age in place is ultimately shaped by a broader amalgamation of personal and societal factors (Hair et al., 2019).

This research reported the path coefficient, the standard errors, t-values and p-values for the structural modelling.

Table 2: Results of path coefficient, the standard errors, t-values and p-values for the structural modelling

	Original sample (O)	Sample mean (M)	Standard deviation (STDEV)	T statistics (O/STD EV)	P values
Age-friendly environment -> Ageing in place	0.214	0.215	0.071	3.034	0.002
Age-friendly environment -> Quality of life	0.218	0.218	0.060	3.621	0.000
Assistive Technology -> Age-friendly environment	0.436	0.436	0.065	6.720	0.000
Assistive Technology -> Ageing in place	0.091	0.092	0.088	1.032	0.302
Assistive Technology -> Quality of life	0.615	0.616	0.053	11.698	0.000
Quality of life -> Ageing in place	0.156	0.157	0.076	2.066	0.039

Hypothesis 1: Assistive technology influences the quality of life for the elderly.

The PLS analysis showed that assistive technology improves elderly quality of life. This suggests that older persons' physical health, psychological comfort, and social participation improve with assistive technologies. These technologies

increase autonomy and quality of life by simplifying everyday tasks and minimizing caregiver need. This link emphasizes the importance of assistive technology in facilitating successful aging and enabling the elderly to age in place independently. Previous research has shown that technological aids reduce age-related problems and improve quality of life (Peek et al., 2017; Wang et al., 2019).

Hypothesis 2: Assistive technology influences the ageing in place for the elderly.
Assistive technology influences ageing in place for the elderly. Contrary to expectations, the PLS analysis revealed that the direct relationship between assistive technology and ageing in place is not statistically significant ($t = 1.032$, $p = 0.302$). This indicates that simply providing older adults with technological gadgets does not directly dictate or guarantee their ability to remain in their homes. While technology is a useful tool, its mere presence is not the primary motivator for residential stability. Instead, as the broader model suggests, technology likely serves an indirect, facilitating role rather than acting as a direct driver of ageing in place.

Hypothesis 3: Quality of life influences the ageing in place for the elderly.
Quality of life greatly affects elderly aging in place, according to PLS analysis. This shows that increased well-being, pleasure, and psychological comfort help older persons stay in their homes and communities longer. High quality of life makes elderly people feel capable, secure, and supported, reducing the likelihood of institutionalization. Improved quality of life helps them manage health issues and retain social relationships, encouraging residential stability and independence. Prior research have shown that mental well-being, physical health, and social support are crucial to aging in place (Kim, 2024; Vitman Schorr & Khalaila, 2018)).

Hypothesis 4: Age-friendly environment influences the ageing in place for the elderly.
The PLS analysis showed that an age-friendly environment strongly affects elderly aging in place. This shows that accessible infrastructure, safe neighbourhoods, and community services help older persons stay in their homes and communities for as long as feasible. Enhanced mobility, safety, and health and social support in an age-friendly setting reduce barriers and increase autonomy, promoting aging-in-place. Tailoring the environment to the elderly's requirements increases community participation and minimizes the chance of institutionalization. These findings confirm prior studies showing that accessible transportation, inclusive community planning, and social support systems help older individuals age in place (E et al., 2024).

Hypothesis 5: Age-friendly environment influences the quality of life for the elderly.

PLS analysis demonstrated that age-friendly environments improve elderly quality of life. This shows that inclusive and supportive physical and social environments improve well-being, independence, and life satisfaction in older individuals. Age-friendly environments include accessible public spaces, barrier-free housing, and community support services for older adults. These qualities alleviate physical and social isolation and encourage community participation, promoting aging emotional and mental health. Such supportive surroundings foster good aging and a sense of safety and belonging, which are vital to quality of life. As a result, developing and maintaining age-friendly communities is critical for improving the quality of life for older people, allowing them to age with dignity and contentment (Ahmed et al., 2023; Fathkabar & Inalhan, 2024).

Hypothesis 6: Assistive technology, quality of life and age-friendly environments influence the desire to age in place among the elderly.

A careful review of the structural model reveals a nuanced, tiered relationship between the variables, correcting earlier assumptions about their collective direct impacts. The data confirms that both an age-friendly environment ($p = 0.002$) and quality of life ($p = 0.039$) have a statistically significant direct impact on the elderly's ability and willingness to age in place. The physical infrastructure, safety of the neighbourhood, and the senior's overall psychological and physical well-being are the primary, immediate drivers of their residential stability.

However, assistive technology stands out for its lack of a direct effect on ageing in place ($p = 0.302$). This presents a compelling, nuanced finding: in the Malaysian context, technology alone is not a primary motivator for seniors to stay in their homes. Instead, assistive technology acts as a powerful antecedent or facilitator. The model shows it heavily influences both the perception of an age-friendly environment ($p = 0.000$) and the individual's quality of life ($p = 0.000$). Providing a smartphone or a health monitor does not directly convince an elder to live independently; rather, that technology connects them to their family (drastically improving quality of life) and helps them navigate their surroundings safely (enhancing the age-friendly environment). It is these subsequent improvements in environment and well-being that ultimately enable them to age in place. Therefore, while assistive technology is a critical foundational component, its power lies in its indirect effects, supporting prior assertions that the decision to age in place is an intricate amalgamation of environmental and personal well-being factors (Buffel & Phillipson, 2025a, 2025b).

This study includes compatibility, smartphone anxiety, and supportive factors for older assistive technology uptake. To study how sociodemographic, quality of life, and age-friendly surroundings affect aging in place, the model

includes them. Structural Equation Modelling (SEM) helps quantify the intricate relationships between these variables, giving a comprehensive framework for understanding technology adoption and well-being. SEM allows concurrent examination of related components, including direct and indirect consequences, in a single analytical framework, making it new in this context. This holistic approach sheds light on how assistive technology, quality of life, and environmental factors promote senior independence. Policymakers and practitioners can adapt interventions to improve older quality of life by focusing on these interdependencies in the model.

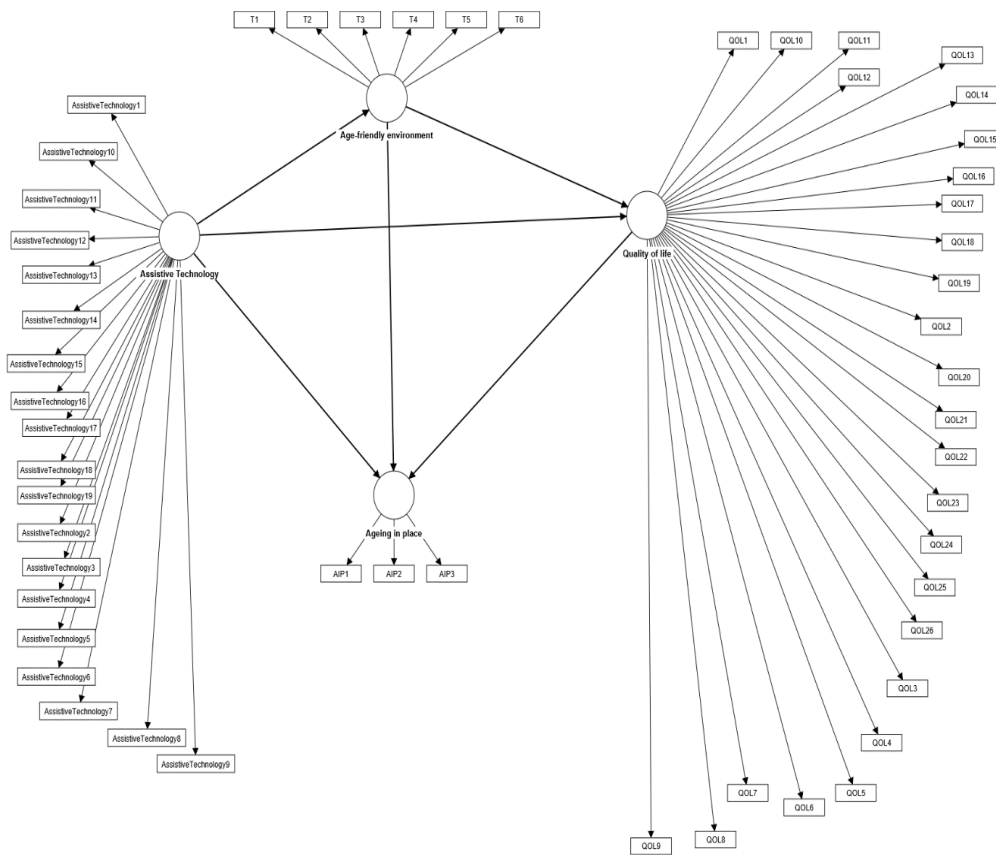


Figure 2: Proposed modelling for Ageing in Place

Ultimately, the concluding SEM figure indicated that assistive technology, quality of life, and age-friendly environments exerted no meaningful impact on the elderly's willingness to age in place. This result indicates that although these variables may enhance the overall well-being and autonomy of

older persons, they may not inherently lead to a pronounced preference for aging in their own residences or communities. The insignificance may be ascribed to several external circumstances, such personal health conditions, socio-economic position, or familial support, which could exert a more substantial influence on their inclination to age in place. Furthermore, psychological factors such as perceptions of safety, autonomy, and emotional attachment to one's living environment may exert a more significant influence on residential preferences. These findings correspond with other research demonstrating that the decision to age in place is intricate and multifarious, frequently shaped by an amalgamation of personal, societal, and environmental factors rather than a singular determinant (Buffel & Phillipson, 2025b; Egea de Haro & Navarro Gómez, 2024). Therefore, while assistive technology, quality of life, and age-friendly environments are important for supporting aging in place, they may not be the primary factors driving the elderly's desire to remain in their current residences.

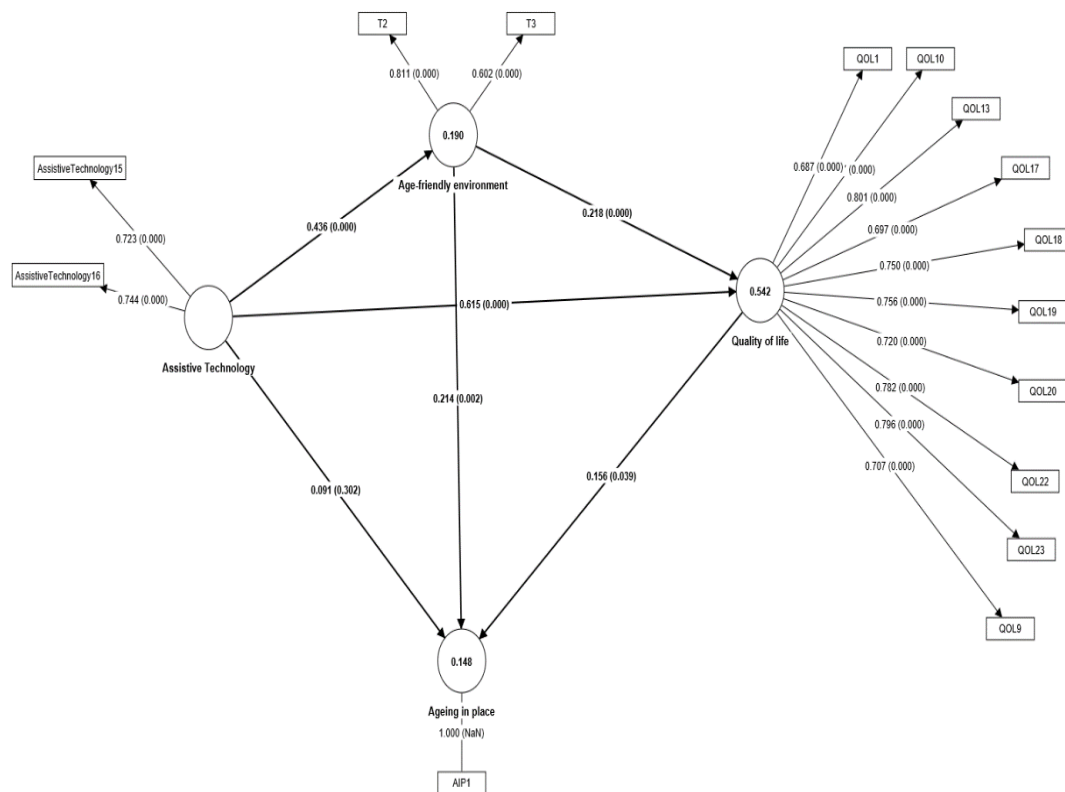


Figure 3: Final modelling for Ageing in Place

CONCLUSION

This research aimed to assess the interrelationships between assistive technology, quality of life, age-friendly environments, and the ability of Malaysian seniors to age in place. The empirical findings utilizing PLS-SEM highlight a nuanced reality: while quality of life and age-friendly environments act as direct, significant drivers for ageing in place, assistive technology functions primarily as a powerful facilitator. It significantly enhances both the perception of the living environment and overall well-being, but technology alone does not directly dictate residential stability. As highlighted in this study, technology cannot replace the foundational need for safe infrastructure and human connection. Therefore, while assistive technology offers distinct benefits, it should not be regarded as a universal remedy or a standalone solution for the complexities associated with ageing in place.

These findings offer critical practical interventions and policy implications for Malaysia's ageing population. Policymakers should adopt a balanced, holistic strategy that integrates both technological and human assistance. Rather than merely subsidizing digital devices, government initiatives—such as the National Policy for Older Persons; must prioritize the development of accessible, age-friendly community infrastructure and robust social support networks. When assistive technologies are introduced, they should be accessible, affordable, and accompanied by digital literacy programs. Furthermore, tech interventions in Malaysia should be explicitly designed to foster social connectivity and intergenerational communication, rather than isolating the elderly, ensuring that financial and technological barriers do not exacerbate disparities in care.

Despite these insights, this study is subject to several limitations that must be acknowledged. First, while the sample size of 499 respondents was robust for PLS-SEM analysis, the data was gathered predominantly using snowball sampling. Because this is a non-probability sampling method, it inherently limits the strict statistical generalizability of the findings to the entire, highly diverse Malaysian elderly population, particularly those in isolated rural areas who may lack access to initial community networks. Secondly, this study utilized a cross-sectional design, capturing only a snapshot in time.

To build upon these findings, future research should employ stratified random sampling to capture a broader, more representative demographic spectrum across different Malaysian states. Additionally, future studies would greatly benefit from longitudinal approaches to observe how the adoption of technology and perceptions of environmental support evolve as seniors age over time. Finally, incorporating qualitative research, such as in-depth interviews, could provide deeper context into the psychological, emotional, and cultural barriers to technology adoption among Malaysian older adults.

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