Factors Affecting Design and Management of Residential Community for Enhancing Well-being of Thai Early Stage Elderly

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Abstract. This article presents factors related to environmental perception, residential community, and design of the healing environment, which affect Thai early stage elderly perceptions and requirements. Structural equation modeling was used to assess influences among the factors. Empirical data were collected from 419 samples of Thai early stage elderly. The research revealed that requirements of the residential community were classified into three groups including (1) general facilities and activities, (2) facilities related to health and security, and (3) facilities related to physical exercise. Results showed that factors of the elderly’s requirements have direct effects on willingness to join in with project activities of the residential community. The result led to formulating policies in design and management of the residential community which enhanced the quality of life both physically and mentally for the Thai early stage elderly.

1. Introduction
The United Nations anticipates that by 2050, the number of elderly people, defined as older than 60 years, will reach 2 billion worldwide. This poses challenges for rich and poor countries alike. Thailand also faces this challenge as its population ages. As a result of modern medical technology and improved public health policy and planning the death rate in Thailand is declining, leading to an aging population. In its annual report for 2012, the Thailand National Committee on the Elderly [1] reported that the proportions of Thai elderly over 60 year in 2020, 2030, and 2040 will be 19.1%, 26.6% and 32.1% respectively. The key question is therefore how Thailand’s government can address this scenario. In response, the National Committee on the Elderly under the Ministry of Social Development and Human Security Thailand [2] created a formal structure to define the condition of the elderly in Thailand: Firstly, those elderly people defined as having good living standards: are in good physical and mental health; have a happy family life; have access to social care friendly environment; have security and stability; have access to welfare and social services; lead valuable, independent lives with dignity; participate in the lives of family and community, and continue to follow news and information sources. Secondly, the family and the community are a key source of support for the elderly, acting as an efficient and enabling institution. Thirdly, the system of welfare and services guarantees a higher standard of living allows the elderly to participate fully in family and community life. Fourthly, all involved parties and sectors must work to ensure the accessibility of the welfare and services system so the elderly can use these services
in a safe and supported manner with the protection of the system. Lastly, the correct approach shall be implemented in order to recognize the needs of all elderly people, including those facing difficulties, to ensure they are welcomed to participate fully in the community in all areas. This structure leads subsequently to the next issue which is that of where the elderly will live once they have retired and they are in the physical twilight of their lives. At this stage, they require help from their children, or other people, whenever they need to visit a hospital or seek medical assistance. The ideal solution may be the residential community to enhance elderly well-being. This researcher sought to examine a facility which would provide for all the needs of the elderly, which is well-managed, where the elderly receive medical care when they are sick, where they can enjoy a happy social life, where they can be a part of society, and where they can live conveniently and safely for the remainder of their lives. The aim of this study is to determine how such a place should operate. This will first require a study of the needs of the early stage elderly in Thailand in order to apply environmental design and management of residential community principles through the use of structural equation modeling (SEM). To achieve these goals, the study first of all determines the factors comprising the requirements of the elderly in Thailand along with a means of measuring these. Then an SEM is created to show the associations between these various factors along with the willingness of the elderly to join such a residential community. Recommendations can then be made to residential community design and management so that the well-being of the Thai elderly can be enhanced.

2. Research Background

2.1. Elderly
The National Committee on the Elderly under the Ministry of Social Development and Human Security Thailand [2] explained clearly that “the elderly are not a vulnerable nor social burden, but able to take part as the social development resources, so they shall be entitled to recognition and support by the family, community and the state to lead a valuable life with dignity and sustain their healthiness and living standards as long as possible”. Meanwhile, the World Health Organization (WHO) [3] explained that throughout the world in general, it is commonly accepted that the elderly can be defined as those people aged 65 or older. However, this is a concept which may apply well in westernized nations but is less appropriate in Africa. Although the choice of number may seem arbitrary, it is also the age at which many countries begin to pay pensions. The UN offers no specific age definition, but has stated that 60 years is the agreed age at which the “older population” begins. The Act on the Elderly B.E. 2546 Thailand [4] sets out three different age groups as below:
- Early stage elderly (60-69 years): people are still able to look after themselves.
- Middle stage elderly (70-79 years): people become sick, weaken, and suffer from chronic disease or poor physical health.
- Late stage elderly (80 and older): people’s health deteriorates further, including disability and degeneration.

This paper serves to build upon earlier studies [5], [6] which examined the factors associated with the environmental perceptions of such residential communities and the design of healing environments which are able to positively affect those Thai elderly residents in the early stage who are aged 60-69. This study focuses in particular on the early stage elderly.

2.2. Healing environment
The WHO [7] originally defined health in a manner which did not incorporate the notion of spirituality, but this was adjusted in 1998 to create a definition which covered the four dimensions of physical, mental, and social health, along with spiritual well-being. Meraviglia [8] defined spirituality as the expression and experience of the spirit in a manner which reflects faith in a supreme being or god, along with a feeling of self-connectedness integrating the minds, body and spirit. In elderly adults, this concept can be linked to an improved quality of life [9]. In Thai culture, this idea of spiritual well-being is connected to general respect for the elderly and will also involve Buddhism. It may involve an
appreciation of religious practices such as pouring water upon the hands of respected older people, or requests for blessings and participation in other rituals or meditation [10]. Barrera-Hernandez et al. [11] added that within the notion of the spiritual environment can be found the links between the physical and intangible elements which form a positive spiritual environment creating human well-being, environmental quality, and sustainable activities. The Cambridge Dictionary [12] gave the definition of a spiritual home as a place where an individual has a sense of belonging, despite not having been born in that place, probably as a result of the connections with the culture, people, and way of life. This definition fits the aims of this research to enhance elderly well-being in the spiritual and cultural environment of Thailand. Jonas and Chez [13] took the view that the future of medical management in the context of chronic diseases will lie in a focus on healing if a sustainable health care approach is to be employed. Healing can be defined as an ongoing process of repair and recovery, and forms the foundation of a new medical vision which brings together diverse techniques from all over the world to relieve suffering, treat chronic conditions, and improve well-being. Healing requires the creation of suitable attitudes and intentions on the part of both the recipient and the provider of the care, along with the use of self-care activities in the part of the elderly. The aim of to form healing relationships, making use of a deeper understanding of health promotion and maintenance, and suitable ways to effectively combine complementary and conventional medical techniques. Nelson et al. [14] explained that the “healing environment” can be considered similar to the therapeutic environment, which is typically designed to make use of the latest medical advances to provide high-quality patient care in a safe and secure setting, as well as inviting the family of the patient to collaborate in creating a psychosocially beneficial environment. From this description, it might be concluded that a spiritual environment enhancing the well-being of the Thai early stage elderly might incorporate many aspects of the therapeutic or healing environment. These concepts should be compared and further analyzed using the literature in the Thai context, and the findings can be incorporated in the design of the research questionnaire.

2.3. Environmental design
Plunz [15] described environmental design as a system of taking into consideration the surrounding environmental parameters as plans and policies are formulated to develop buildings, or products. Environmental design also plays a part in the arts and sciences when considering the human-designed environment. Such fields would include urban planning, interior design, and landscape architecture, as well as architecture and geography. Environmental design involves relating the physical surroundings to the needs of human activity, and therefore this context would include parks and buildings on a smaller scale, and whole community spaces on a larger scale. Environmental design can also be defined as the physical and constructed environment where people live their daily lives. It takes into account the experiences of the users of the designed space as well as their aesthetic perceptions of the environment created. In the context of this study, environmental design must be researched in order to meet the needs of the early stage elderly in Thailand.

2.4. Residential community
Paul et al. [16] explained that any community can be described as a social unit located in a particular area and sharing common values. It can be of any size, but will typically comprise a group of people who are connected for reasons other than family ties, and who value those connections in a social context. The WHO Regional Office for Europe [17] gave the definition of a community residential health facility as a non-hospital, community-based mental health facility which offers full-time accommodation and care for those personas who suffer mental health problems. Such facilities might include supervised housing in group homes without staff, group homes which have a number of residential staff or visiting staff, hotels which provide staff by day and night, homes or hostels which offer nursing staff full-time, or simply therapeutic communities or halfway houses. These facilities would include both public and private institutions, and some would seek profits while others would not. Perkins et al. [18] developed a textbook covering the main considerations in building design for elderly...
people, and noted that there are a number of features which must be offered in skilled-nursing facilities for the elderly. These include a multipurpose room, library, coffee shop or snack bar, gift shop, outdoor seating areas, recreation facilities, art or activity rooms, clinics, and rehabilitation centers. The book added that where communities are designed for senior adults, it is important to create landscaped areas for walking, while facilities for leisure activities such as golf, lawn sports, fishing, gardening and so forth should be offered.

3. Research Method

3.1. Factor identification and questionnaire design
The related factors and their indicators were identified. A literature review was undertaken of related theories and concepts from many sources such as textbooks, research articles, on-line databases and annual reports. All factors were summarized and listed to compare similarities and differences in meanings of their components. The listed factors were saturated and categorized by the researcher, and constructed and prepared for analysis in the next section. A questionnaire survey was designed for data collection to confirm the factors or items of requirements in the residential community. The subjects comprised a group of Thai early stage elderly. The questionnaire was designed in three parts by referring to the listed factors. The first part requested general information of the respondents including gender, marital status, age, health condition, education, and economic status (6 questions). The second part concerned their expected requirement items in the residential community (30 questions), while the last part identified the elderly’s willingness to participate in residential community activities (3 questions). The first part was measured by frequency (percentage) of respondents, while the second and third parts were assessed by a 5-level Likert scale from ‘strongly disagree’ to ‘strongly agree’. The questionnaire items are listed in Table 1.

| Factor                  | Item                                                                 |
|-------------------------|----------------------------------------------------------------------|
| Location                | Q1: Calm and natural environment                                    |
|                         | Q2: Near religious places                                            |
|                         | Q3: Near hospitals                                                   |
|                         | Q4: Health food shop                                                 |
|                         | Q5: Convenience shop                                                 |
|                         | Q6: Beauty salon                                                     |
|                         | Q7: Laundry service                                                  |
|                         | Q8: Cleaning service                                                 |
|                         | Q9: Building maintenance service                                     |
|                         | Q10: 24-hour security guards                                         |
|                         | Q11: 24-hour medical center                                          |
|                         | Q12: Care center for the elderly                                     |
|                         | Q13: Sauna and spa                                                   |
| Elderly’s requirements  | Q14: Training center for improving quality of life                   |
|                         | Q15: Library                                                         |
|                         | Q16: Computer and internet room                                      |
|                         | Q17: Karaoke lounge                                                  |
|                         | Q18: Swimming pool                                                   |
|                         | Q19: Fitness                                                        |
|                         | Q20: Outdoor stadium                                                 |
|                         | Q21: Garden and outdoor patio                                        |
|                         | Q22: Indoor activities                                               |
|                         | Q23: Religious place                                                 |
|                         | Q24: Sidewalks and bike lanes                                        |
Table 1(b). Questionnaire items

| Factor          | Item                                                |
|-----------------|-----------------------------------------------------|
| Q25: Fence and 24-hour gate guard | Q26: Religious activity  |
| Q27: Recreational activities | Q28: Important day activities |
| Q29: Training activities | Q30: Excursions Programs |
| Activity        |                                                      |
| W1: Interesting in the community | W2: Willingness to live in the community |
| W3: Willingness to recommend the community to others |

3.2. Validity and reliability
To ensure that the research items were appropriate for the elderly, interviews were held with five experts who had relevant experience in elderly behaviors and residential communities. The experts reviewed and suggested whether the items were accurate representations to measure the research model. They also suggested some items which were more appropriate in the context of the research. This exercise was useful to provide content validity and ensure that the items were neither ambiguous nor confusing. Cronbach’s alpha was used to evaluate the reliability of the questionnaire. A pilot study was conducted on 30 target elderly to assess reliability. The coefficients for location, activity, and facility were 0.942, 0.953, and 0.850 respectively. The value for all items (Q1-Q30) was 0.964. All coefficients were above 0.7 and demonstrated that the questionnaire was reliable [19].

3.3. Data collection
Once the questionnaire was designed, a target group of Thai early stage elderly (age of 60 to 69 years) was selected using a convenient non-probability sampling technique. Almost all of the respondents lived in Bangkok while some resided in large cities surrounding the Bangkok area. The survey period was three months. Face-to-face interviews were conducted to explain the details of the questionnaire and ensure that the respondents understood the purpose of the survey. In total, 500 questionnaires were completed, with 81 rejected due to incomplete and bias responses. As such, 419 data sets were accepted as valid and used for analysis in the next section.

3.4. Exploratory factor analysis
Exploratory factor analysis (EFA) with varimax rotation was implemented to categorize the 30-items (Q1-Q30) and determine the underlying factor structure construct of the environmental design and management of the residential community. The Kaiser-Meyer-Olkin (KMO) measure of sampling adequacy was .97 (KMO>.7) [20], Bartlett’s test of sphericity had a significant value of .000 (less than .05), approx. Chi-Square was 11805.305, and df was 435. Factor loading values of less than 0.5 were eliminated. The EFA output showed that three factors of the 30 items (Q1-Q30) were grouped as factor 1: Q2, Q4, Q6, Q7, Q8, Q9, Q13, Q14, Q15, Q16, Q17, Q23, Q26, Q28, Q29, and Q30; factor 2: Q1, Q3, Q5, Q10, Q11, Q12, and Q25; and factor 3: Q18, Q19, Q20, Q21, Q22, Q24 and Q27. Furthermore, the reliability of the questionnaire in terms of the three factors was assessed on the basis of Cronbach’s alpha coefficient. According to Nunnally [19], Cronbach’s alpha coefficients of 0.7 or higher are recognized as acceptable values. Thus, values of the coefficient were acceptable for all three factors, ranging 0.923, 0.939 and 0.962. The Cronbach’s alpha value of all items (Q1-Q30) was 0.973. Outputs for all the questionnaire items are shown in Table 2.
In Table 2, EFA results indicated that requirements in the residential community of the Thai early stage elderly could be classified as three factors. These three factors were named by considering the majority of the included items as factor 1 ‘activities and general facilities’, factor 2 ‘health and security’, and factor 3 ‘exercises’.

### Table 2. Factor loading of the EFA and Cronbach’s alpha

| Item  | Factor loading | Cronbach's alpha |
|-------|----------------|------------------|
| Q28   | .772           | 0.962            |
| Q29   | .754           |                  |
| Q14   | .753           |                  |
| Q15   | .738           |                  |
| Q2    | .717           |                  |
| Q30   | .716           |                  |
| Q13   | .711           |                  |
| Q26   | .711           |                  |
| Q23   | .690           |                  |
| Q4    | .682           |                  |
| Q16   | .676           |                  |
| Q9    | .672           |                  |
| Q17   | .654           |                  |
| Q7    | .625           |                  |
| Q8    | .615           |                  |
| Q6    | .600           |                  |
| Q11   | .193           |                  |
| Q10   | .150           |                  |
| Q3    | .246           |                  |
| Q12   | .379           |                  |
| Q25   | .131           |                  |
| Q1    | .344           |                  |
| Q5    | .450           |                  |
| Q19   | .221           |                  |
| Q18   | .377           |                  |
| Q20   | .383           |                  |
| Q22   | .362           |                  |
| Q27   | .395           |                  |
| Q21   | .375           |                  |
| Q24   | .303           |                  |

(Requirements)

### 3.5. Research hypotheses

To better understand the elderly’s expected requirements in their residential community, research hypotheses were formulated. Once EFA had been performed, the three factors of the elderly’s requirements in the residential community including ‘activities and general facilities’, ‘exercises’, and ‘health and security’ were treated as independent variables [21] which had direct effects on the dependent variable as the elderly’s willingness to join in with the activities has of the residential community. This concept was presented as the conceptual research model (Figure 1). Three research hypotheses were developed as follows:
H1: The factor of activities and general facilities has an effect on the elderly’s willingness to join in with the activities of the residential community.

H2: The factor of health and security has an effect on the elderly’s willingness to join in with the activities of the residential community.

H3: The factor of exercises has an effect on the elderly’s willingness to join in with the activities of the residential community.

![Conceptual Research Model](image)

**Figure 1. Conceptual Research Model**

4. Analysis and results

4.1. Demographic information

Data profiles of the 419 Thai early stage elderly respondents were analyzed in terms of demographics as shown below in Table 3.

| Description                              | Frequency | Percentage |
|------------------------------------------|-----------|------------|
| Gender                                   |           |            |
| - Male                                   | 851       | 73.3       |
| - Female                                 | 168       | 61.7       |
| Marital status                           |           |            |
| - Single                                 | 44        | 10.5       |
| - Married                                | 263       | 62.8       |
| - Widowed                                | 81        | 19.3       |
| - Divorced                               | 31        | 7.4        |
| Age                                      |           |            |
| - 60-64 yrs.                             | 265       | 67.1       |
| - 65-69 yrs.                             | 154       | 76.1       |
| Health condition                         |           |            |
| - Strong, can take care of everything themselves | 147   | 51.8       |
| - Occasionally need some assistance      | 154       | 36.1       |
| - Mainly need assistance                 | 81        | 4.7        |
| - Need assistance all the time           | 4         | 8.8        |
Table 3(b). Demographic information of the respondents

| Description                                      | Frequency | Percentage |
|--------------------------------------------------|-----------|------------|
| Education level                                 |           |            |
| - No education                                  | 86        | 7.1        |
| - Primary school                                | 75        | 1.4        |
| - High school                                   | 112       | 78.1       |
| - Bachelor degree                               | 286       | 58.6       |
| - Higher bachelor degree                        | 17        | 5.5        |
| Economic status (last income, before retirement)|           |            |
| - Less than 10,000 Baht/month                   | 56        | 87.4       |
| - 10,000 to 30,000 Baht/month                   | 827       | 46.8       |
| - 30,001 to 50,000 Baht/month                   | 35        | 17.9       |
| - 50,001 to 100,000 Baht/month                  | 37        | 83.4       |
| - More than 100,000 Baht/month                  | 11        | 5.7        |

4.2. Structural equation modeling

Structural equation modeling (SEM) was used for data analysis. Byrne [22] stated that SEM can explain influences or effects between latent variables (factors) on other latent variables (factors) in the model. Here, once the EFA had been performed, the latent variable named ‘willingness’ with its three observed variables; W1 (interest in the community), W2 (willingness to live in the community) and W3 (willingness to recommend the community to others) was added to the model. The first output of the model analysis did not fit. The software suggested that some variables (items) should be deleted from the model and some covariance relations should be added. These suggestions were implemented. Then, the model was reanalyzed. The final output showed model fit by Chi-square = 57.627, df = 48, p = .161 (> .05), CMIN/DF = 1.201 (< 3.5), GFI = .977 (> .9), RMSEA = .022 (< .08) [23] as shown in Figure 2.

![Figure 2. Structural equation model](image)

Chi-Square = 57.627, df = 48, p = .161 (> .05), CMIN/DF = 1.201 (< 3.5), GFI = .977 (> .9), RMSEA = .022 (< .08)

The research hypotheses were tested using the outputs of the model as implemented above. Table 4 presents the test results of each factor and variables with significant effects (p-values < .05) between each other.
Table 4. Results of the tested hypotheses

| Hypothesis | Relationship | Standardized Path Coefficient | Result | Significant (p) |
|------------|--------------|-------------------------------|--------|----------------|
| H1         | Activities and General facilities →Willingness | -.22 | Supported | .019 |
| H2         | Health and Security →Willingness               | .43 | Supported | *** |
| H3         | Exercises →Willingness                         | .38 | Supported | .005 |

Note: *** = p < .001

The SEM results in Figure 2 and Table 4 showed path coefficients in the standardized estimate of regression weight. All hypotheses (H1, H2, and H3) were significantly supported at the .05 level.

5. Conclusions
Factors related to environmental perception, residential community, and design of the healing environment which have effects on Thai early stage elderly requirements were studied. All of the elderly in this study resided in metropolitan areas. Profiles of the respondents are shown in Table 3. The requirements of the elderly were classified as three factors including ‘activities and general facilities’, ‘exercises’, and ‘health and security’. The factor of ‘activities and general facilities’ comprised four variables including the requirements of ‘building maintenance service’ (Q9), ‘health food shop’ (Q4), ‘beauty salon’ (Q6), and ‘cleaning service’ (Q8). The factor of ‘health and security’ comprised two variables as the requirements of ‘calm and natural environment’ (Q1), and ‘near hospitals’ (Q3). For the factor of ‘exercises’, four variables included the requirements of ‘garden and outdoor patio’ (Q21), ‘indoor activities’ (Q22), ‘recreational activities’ (Q27), and ‘sidewalks and bike lanes’ (Q24). In Figure 2, the factor of ‘activities and general facilities’ had a negative effect on “willingness”, thus, the Thai early stage elderly who required ‘activities and general facilities’ were not willing to join in with the activities of the residential community. The ‘health and security’ factor had a positive effect on ‘willingness’, and Thai early stage elderly who required ‘health and security’ were willing to join in with the activities of the residential community. Finally, the factor of ‘exercises’ had a positive effect on ‘willingness’, meaning that Thai early stage elderly who required ‘exercises’ were also willing to join in with the activities of the residential community. From the results, Thai early stage elderly with strong health do not require all facilities and activities in the residential community. The most important requirements in terms of ‘activities and general facilities’ were ‘building maintenance service’ and ‘health food shop’. The most important requirements in terms of the ‘health and security’ were ‘calm and natural environment’ and ‘near hospitals’. The most important requirements in terms of ‘exercises’ were ‘garden and outdoor patio’ and ‘indoor activities’. In the aspect of willingness to join in with the activities of the residential community, the factor which had the highest effect on the elderly was not ‘activities and general facilities’ or ‘exercises’ but ‘health and security’.

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