



Relationships between indoor facilities management components and elderly people's quality of life: A study of private domestic buildings



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ABSTRACT

The rate at which the population is ageing increases the magnitude of the challenge of providing private domestic buildings with facilities meeting those needs of the elderly occupants that arise from their changing health condition. This study aims to examine the relationships between indoor facilities management (FM) components and the quality of life (QoL) of elderly people residing in private domestic buildings. A questionnaire based on an extensive literature review was distributed among elderly respondents in order to assess their level of satisfaction with 13 indoor FM components and five QoL domains – namely overall QoL, physical health, psychological health, social relationships and their living environment. In all, 348 questionnaires were completed by elderly respondents drawn from the 18 political districts of Hong Kong; the data were analyzed using reliability tests, Pearson correlation and multiple regression analysis. The results reveal that (1) the respondents' overall QoL was significantly affected by ventilation and space; (2) their physical health was predicted by space, doors and windows, and temperature; (3) their psychological health was affected by furniture and fixtures, lighting, acoustics, and doors and windows; (4) their social relationships were influenced by furniture and fixtures and space; and (5) their level of satisfaction with the living environment was affected by space, lighting, furniture and fixtures and acoustics. It is recommended that architects, interior designers, building services engineers and facilities managers include adequate turning spaces in the design of flats for the elderly; and that they pay attention to the brightness and hue of lighting, consider the micro-climate in the orientation of new buildings, incorporate sound insulation materials in walls, install on doors and windows lever handles that require minimal force and increase the width of doors in flats for elderly residents.

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1. Introduction

According to an international database, there were globally 532.6 million people aged 65 or above (7.8% of the world's population) in 2010 and it is anticipated that this figure will rise to 990.3 million (12.0% of the world's population) by 2030 (United States Census Bureau, 2010). The Asia-Pacific region accounts for 54% of the world's elderly population; this region is projected to have an elderly population of about 500 million by 2030 (United Nations, 2006). To address some of the problems posed by ageing populations, housing policies (of diverse kinds) have been established

by the governments of various countries. For instance, the Japanese government requires the provision of safe, secure and high-quality living environment (Koboyashi, 2016); the housing policy in Hong Kong supports elderly people's ageing in their home environment without their having to move elsewhere (Hong Kong Planning Department, 2002); and in the United States the government provides income support and in-kind transfer programmes to assist in the housing of low-income individuals/families (Porteba, 1994).

However, in Japan only 34% of the elderly reside in public housing (Statistics Bureau of Japan, 2015); in Hong Kong 46% of the elderly reside in various kinds of public, subsidized housing (Hong Kong Housing Authority, 2015); and in the United States 30% of elderly renters dwell in public housing (Golant, 2002). Thus, in many cities across the world more than half of the elderly population must seek shelter in private domestic (PD) buildings. Having

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retired, elderly people have limited financial resources for upgrading the facilities in their apartments in PD buildings so as to meet their changing needs. Some elderly people may be able to afford only flats that have poor facilities for maintaining their daily routines late into their life.

Those responsible for providing the facilities in flats for the elderly should consider the characteristics of elderly people and the need for maintaining their physical health, satisfying their psychological needs and meeting their need for social support (Dong, Guo, & Jiang, 2014). In order to fulfil these goals, the design and construction of flats for the elderly require good planning and accurate information (Uotila & Skogster, 2007). The aim of the present study is therefore to investigate the relationships between indoor facilities management (FM) components and the quality of life (QoL) of elderly individuals residing in PD buildings.

2. PD buildings

PD buildings meet the needs of residents who cannot find accommodation in the public housing subsidized by the government. There are no statutory standards governing the minimum living space for an elderly individual or the maximum occupier density of PD buildings housing the elderly anywhere in the world. In Japan, it is recommended that an elderly person's residence should have a floor space of at least 25 m² (269 ft²), but this is not legally binding (The Building Center of Japan, 1998); the standard size of private apartments for adults in the United Kingdom ranges between 30 m² and 35 m² (323–377 ft²; Bristol City Council, 2011). In Hong Kong, no standards have been set for the minimum amount of space that should be occupied by an elderly person in a PD flat, while Liu, Wu, and Lee (1999) estimated that an average saleable residence had an area of 15.6 m² (168 ft²) per person. However, the elderly may need additional space to cater for their mobility problems, particularly those using wheelchairs. As the main motive of building developers is profit-making (Yeh, 1990), the provision of residential apartments to meet the special needs of the elderly, including turning spaces and clear spaces may affect their profitability. Hence, developers are reluctant to involve in PD buildings for specific elderly requirements and thus making purposely built developments for the elderly non-existent in the Hong Kong market. The PD flats in Hong Kong are often rectangular (see Fig. 1a and b) or diamond-shaped (see Fig. 1c and d). The buildings ordinance specifies the minimum facilities required in private dwellings (including a kitchen, a lavatory etc.) and sets environmental standards (regarding lighting and ventilation). There are various kinds of flats in PD buildings in Hong Kong – including studio flats, 1-bedroom units, 2-bedroom units, 3-bedroom units, and so on – and they are of different sizes (see Fig. 1). According to the regulations, the rooms in a flat (other than the lavatory) should provide both natural lighting and ventilation; and these should be provided by one or more windows that are between one-tenth and one-sixteenth of the floor area of the room (Hong Kong Buildings Department, 2015).

3. FM components in PD buildings

Facilities management (FM) involves the process by which an organization delivers/maintains support services within a certain environment to meet certain strategic needs (Centre for Facilities Management, 1992). This is best achieved by integrating end-users (in this context, the elderly), work process (e.g., the FM components) and workplace (i.e., the living environment) into a coherent, productive and holistic system (Eric, 2001; Leung, Chan, & Olomolaiye, 2013). The person-environment fit model can be adopted to help us understand the effect that PD buildings/flats

have on their elderly residents, as it considers the relationship between a person and his/her living environment (here, the facilities provided in his/her flat; Harrison, 1978). In the present study, it was assumed that the proper management of indoor FM components can improve the QoL of the elderly. FM components are generally divided into three major groups: architecture, building services and supporting facilities (Leung et al., 2013; Leung, Yu, Dongyu, & Yuan, 2014).

Architecture refers to building design and the layout/design of flats, including spaces, the distances between rooms, colour schemes and furniture and fixtures (Barnes, 2002; Cotts, 1999). Space planning involves the effective allocation of space for supporting the activities of daily life, thereby improving the physical functioning and overall health of elderly residents (Cutler, 2007). Due to the decline in elderly people's levels of tolerance for vigorous activities, short distances within PD units can help them to perform their daily activities (Mohit, Ibrahim, & Rashid, 2010; Simonsick, Fan, & Fleg, 2006). However, limited space may affect those who need to use a wheelchair to perform these activities. Moreover, the thoughtful use of colour in PD buildings/flats for the elderly can encourage activity and positively influence the occupants' feelings (i.e., can affect both their mood and behaviour; Schweitzer, Gilpin, & Frampton, 2004). The change in the height of the elderly, which is caused by curving of the spine, affects where furniture and fixtures should be located (Wang & Yang, 2012).

Building services refers to the provision of features that enhance the comfort of elderly people in their home environment; such features include lighting, ventilation, temperature control and the supply of water and electricity. Elderly people have to depend upon the performance of such services to compensate for their sensory disabilities (Lai, 2011). They rely on good lighting to make up for their poor vision and need good ventilation to provide fresh air, which is especially important for them because of their weak immune system (Hooymann & Kiyak, 2008). In addition, maintaining a constant temperature is essential in PD buildings in order to help the elderly residents to cope with the changes in their metabolism and the impaired defence mechanism of their skin (Robson, Nicholson, & Barker, 1997). Because of their poor response to changes in stimuli, extreme water temperatures (whether hot or cold) may constitute a health threat to the elderly.

Supporting facilities refers to additional facilities provided to improve the home environment of elderly people; for example, acoustic insulation, doors and windows, handrails and non-slip flooring (Duncan-Myers & Huebner, 2000; Mohit & Mahfoud, 2015). A change in the circadian rhythm (the cycle of sleeping and waking) and in the quality of sleep commonly affects the elderly. Poor acoustic insulation in their flats can contribute to sleep problems in PD buildings (Wu, 2006). The installation of handrails and non-slip flooring support mobility and reduce the risk of falls, while doors of sufficient width allow for easy access within the home environment of the elderly (Garvin, 1998; Mollenkopf & Walker, 2007).

4. Quality of life of elderly people

Quality of life (QoL) is a multi-dimensional construct for measuring the overall well-being of an individual (Doumit & Nasser, 2010; Mytko & Knight, 1999). It contains subjective and objective indicators covering all aspects of human life, making it widely acceptable for measuring the total satisfaction of an individual (Albouy, Godefroy, & Lollivier, 2010). Various factors affect the QoL of elderly individuals, including their physical health, psychological health, social relationships and living environment (WHO, 1996).

The *physical health* of the elderly has been viewed as the absence

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