Chapter 12
Research Methodology for Cost Modelling Development on Smart Living Features Implementation in Malaysian Housing

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ABSTRACT

The development of smart living housing in Malaysia, despite its 'people-centric' concept that focuses on resident well-being, faces implementation challenges. Notably, uncertainties related to the monetary implications of integrating smart living features into conventional houses. Consequently, such a situation highlights the need for a decision-making tool – a cost model, to address these uncertainties during feasibility studies. Thus, this chapter proposes the research methodology through a PRISMA-guided literature review to develop the cost model per se. By employing the interpretivism constructivism paradigm, the study utilizes a sequential explanatory mix-method. Quantitatively, an open-ended questionnaire survey identifies the cost drivers, while qualitatively a case studies document survey gathers the cost data. The content analysis legitimizes the claims of both findings for cost modeling development. The research establishes relationships between the cost drivers and cost data, facilitating a monetary implication study to manage uncertainties in Smart Living development.

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INTRODUCTION TO SMART LIVING HOUSING DEVELOPMENT IN SMART CITY

Smart City is an innovative concept of sustainable town planning initiated through Agenda 2023 Decade of Action (Sharifi et al., 2024). It consists of 6 elements – Smart Governance, Smart Economy, Smart Mobility, Smart Infrastructure, Smart Social, and Smart Living (Giffinger & Gudrun, 2010). Each of the elements carries its roles and complements one another in promoting Smart City. Among the elements, the Smart Living deem to be more important as it focuses in building a shelter that prioritizes in accommodating residents' well-being (Ministry of Housing & Local Government, 2019; Visutsak & Daoudi, 2017) and comply to the fundamental Maslow's Hierarchy of Human Needs (Trivedi & Mehta, 2014). Interestingly, Smart Living concept houses are proposed to cater national issues like aging population and empty nest syndrome (B & B, 2023; Creaney et al., 2021; Khazanah Research Institute, 2021; Leeraphong et al., 2015; Visutsak & Daoudi, 2017a). The initiative deems relevant as the example of Smart Living houses that adhere to the well-being are equipped with assisted washrooms in universal design, water-saving sanitary fittings and motion sensor detectors that allows elderly convenience independence. Unlike the Green buildings, Smart Living concept covers all social, economic, and environmental as the 3 pillars of sustainability. Thus, it is desirable to develop Smart houses as more than just shelters capable of meeting the safety, tranquility, contentment, and well-being of the occupants compared to what can be provided by conventional houses (Wu et al., 2023).

Problem Statement: Action Research Development and the Gap Pertains

Many recent studies from developed countries have proven the workability of Smart Living through their Smart City initiative (Creaney et al., 2021; Visutsak & Daoudi, 2017b; Wahab et al., 2018). Thus, more developing countries have been incorporating the Smart Living concept aggressively with their fiscal planning in the spirit of balanced national growth (Organisation for Economic Co-operation and Development (OECD), 2022), which includes Malaysia. Considering the advantages, the Malaysian policy makers have been proactive in promoting Smart Living development to participate with the revolution of the global housing market (Creaney et al., 2021; Sabrina Abdul Latif et al., 2020). Therefore, while various execution plans and frameworks have been published since 2018, these efforts primarily stem from policy making and development standards. However, achieving successful implementation will necessitate incorporating insights from action research findings. Integrating practical observations and outcomes from action-oriented research can bridge the gap between theoretical frameworks and real-world application, leading to more effective and sustainable outcomes in practice.

From the research standpoint, the research pertaining to Smart Living is still surface (Creaney et al., 2021; Foo, 2018; Ha et al., 2020; Michele Koch, 2021; Sabrina Abdul Latif et al., 2020). Mainly regarding the market's perspective, obstacles, and expectations, theoretical suggestions and implementation, technical aspects of smart features (such as software and hardware for the Internet of Things), a comparison of the green and smart concepts, and conceptual touches on design solutions were all heavily discussed. Moreover, since 2012, local setbacks have persisted due to several reasons, including role overlaps between government agencies leading to gaps in enforcement and policing, limited industry participation in government initiatives, absence of clear guidance modes, and a focus on comparing relative costs and advantages of different technologies. These factors have collectively hindered the smooth progress and effective implementation of initiatives in the relevant sectors. (Che Maznah et al., 2021; Ma et al., 2016; Morozova & Yatsechko, 2022; Wahab et al., 2018). In summary, there is a clear pattern of issues