

Adoption of smart urban farming to enhance social and economic well-being of elderly: a qualitative content analysis

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Abstract

Urban farming has progressively gained attention as it promotes innovation and contributes to the modernisation of the agricultural sector. The inclusion of smart technologies helps to accomplish greater efficiency and sustainability in urban farming. Nevertheless, the knowledge of the relationship between population ageing and urban change and the demand to adopt urban farming with the inclusion of technologies from the perspectives of the elderly is still under-explored. This study aimed to investigate the role of social entrepreneurship and the adoption factors in accepting smart urban farming that led to the social and economic well-being of the elderly. The study uses the framework method, which is an excellent tool for qualitative content analysis. An interview was conducted to gather feedback from the elderly through the purposive sampling technique. This study employed the diffusion of innovation theory and the theory of planned behaviour to investigate the adoption behaviour of smart urban farming among the elderly. According to the findings, having a positive attitude and a positive social influence on urban farming help to increase the adoption of smart urban farming. It is also discovered that using technology in farming could help them survive in farming. Most importantly, the findings revealed that effective social entrepreneurship involvement provided them with information and technical advice that influenced smart urban farming adoption. Consequently, the adoption of smart urban farming enhances the elderly well-being. The ease of use of farming technology is the most important factor in the adoption of smart urban farming. Furthermore, the adoption of smart urban farming is influenced by both attitude and subjective norms. Social entrepreneurs could play a role in enhancing elderly knowledge and understanding of smart urban farming.

1. Introduction

The future of agriculture will include not only farmers but also players in technology. This will be particularly important in cities, where space is limited but demand for fresh food is high. The COVID-19 pandemic has demonstrated the importance of addressing our food supply chain in order to attain food security. This can be accomplished by building de-centralized farms and production centres closer to people's homes. Increasing the number of urban farms will help minimise the country's dependency on imported food (Yun, 2020). One of the states in Malaysia, Penang, inaugurated its first self-sustaining community urban farm, which has the capacity to feed up to 400 homes per harvest. Based on the urban farming concept, the plan is to establish 100

community farm hubs across the state, by 2023. Penang Chief Minister Chow Kon Yew believes that a sustainable urban farming program may empower societies to raise their own food, while at the same time providing employment, entrepreneurship, and social cohesion prospects (Mok, 2020).

Malaysia is moving towards an ageing nation. It is predicted that the country is progressing to become an ageing society by the year 2030, as the older population will account for 15% of the overall population (United Nations Department of Economic and Social Affairs, 2020). Malaysian government started several initiatives and programmes to assist the elderly to be involved in urban farming to promote their economic, social and physical well-being (Cindy, 2019). The elderly's

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decision to adopt smart urban farming will depend on their peculiarities. Several factors will influence the adoption behaviour of urban farmers. According to Ntshangase *et al.* (2018), lack of involvement of young people, elderly with limited education, perceptions and lack of community engagement are some of the factors that will hinder the adoption of urban farming. Urban farming allows city dwellers to eat fresh, locally grown food. On the other hand, it can only be successfully integrated into urban settings if customers accept urban farming as part of their community.

It is common these days for the elderly to live independently. Some of them could face loneliness and have financial difficulties. Urban farming has recently gained popularity because it has the potential to develop local communities, improve social harmony, and provide income to urban dwellers (Keum, 2010). Hence this study proposed that the adoption of urban farming could enhance the social and economic well-being of the elderly. According to Emerson and Twersky (1996), social entrepreneurship is described as change agents that give structural solutions to environmental and social challenges and plays a critical role in ensuring a more prosperous future. One of the possible ways to encourage sustainable farming is via social implications, which is a unique concept. It is still yet uncertain whether social implications such as social entrepreneurship will help meet the demand for urban farmers, especially among the elderly (Wang and Pryor, 2019).

While the concept itself is not well-established, Eastwood *et al.* (2019) proposed that researchers develop a framework for social entrepreneurship in an urban farming setting. Social entrepreneurship (SE) recently emerged as a practical response to social exclusion but still lacks research evidence on how SE fit into the overall theoretical context of adoption for smart urban farming to improve the social well-being of the elderly. To get a full picture of social entrepreneurship, more comparative study on this growing area is needed (Bansal *et al.*, 2019).

The answers to such questions are more than just an academic interest; carrying potentially important implications for the adoption of urban farming (Buić *et al.*, 2017). Hence, this research aimed to explore the role of social entrepreneurship as a market-driven mechanism for facilitating the adoption of smart urban farming among the elderly in Malaysia. The additional factors of adoption and the impact of smart urban farming adoption on the social and economic well-being of the elderly are also determined in this study.

2. Methodology

The research is based on the interpretivism philosophy. The population of the study is the elderly, who are estimated to be 3.5 million or 7% of the Malaysian population (Lee, 2021). This is a qualitative cross-sectional study and primary data were obtained. Respondents of this research are elderly who reside in Klang Valley, Malaysia. Through purposive sampling, respondents were chosen. Structure questionnaires were used to interview twelve elderly respondents.

In this study, the framework method was used, which is a great tool for qualitative content analysis because it offers a systematic model for managing and analysing qualitative data. It is also best suited for analysing interview data, where themes are expected to emerge through comparisons within and between cases (Gale *et al.*, 2013). This study aimed to identify factors of adoption and investigate the role of social entrepreneurship in adopting smart urban farming that enhances the social and economic well-being of the elderly. Data obtained were classified into consensus and opposite responses on the factors of adoption and social entrepreneurship impact on the adoption of smart urban farming. Data were analysed to determine how much the opinions differed from one another. Based on the framework shown in Figure 1, the following research questions were formulated:

- Do the factors of adoption relate to the adoption of smart urban farming?
- How does social entrepreneurship impact the adoption of smart urban farming?
- Does the adoption of smart urban farming impact the social and economic well-being of the elderly?

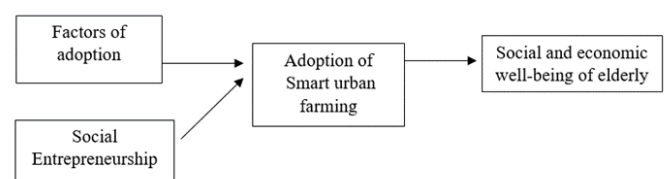


Figure 1. Framework of smart urban farming adoption among the elderly.

3. Results

In the study, the framework analysis approach was used to analyse and interpret the data based on consensus or opposing responses. The framework presented four major themes on which consensus and opposing opinions were discussed. Table 1 describes the framework analysis and the following are the four themes and their analyses:

Table 1. Framework analysis.

Variables in Framework	Consensus response	Opposite view
Factors of adoption based on diffusion of innovation theory on the characteristics of innovation i.e., Relative advantage, compatibility simplicity, tribality, observability,	When the respondents were asked which characteristics of innovation are the most significant in adopting smart urban farming, most respondents agreed that simplicity is the most significant factor that contributes to the adoption of smart urban farming.	Whereas most respondents disagree that relative advantage contributes to the adoption of smart urban farming.
Factors of adoption based on the theory of planned behaviour that focused on three variables (i.e., attitude, subjective norms, perceived behaviour control)	The majority of the respondents agree that attitude followed by subjective norms impacts the adoption of smart urban farming.	Few respondents disagree that perceived behaviour control influences the adoption of smart urban farming.
Role of social entrepreneurship in the adoption of smart urban farming	The majority of respondents favoured social entrepreneurship to aid in smart urban farming.	Very few respondents have specified that they are unsure how social entrepreneurs can assist in adopting the smart urban farming
Enhancing the social and economic well-being of the elderly due to the adoption of smart urban farming	All the respondents agree that their social and economic well-being can be improved due to the adoption of smart urban farming	.

3.1 Factors of adoption based on diffusion of innovation theory

Most of the respondents stated that simplicity is the most important characteristic of innovation that contributes to the adoption of smart urban farming. It means that the elderly prefers smart farming as long as it is not difficult for them to get started. However, the elderly does not believe that relative advantage influences the adoption of smart urban farming because they do not believe that farming with technology is more effective than traditional farming methods. In addition, most respondents believe that compatibility is the second most important characteristic of innovation, followed by trialability. It can also be interpreted that the elderly is more likely to adopt smart urban farming if communication technologies fit the way they want to do farming and if they can experiment with how technology can help them in farming.

3.2 Factors of adoption based on the theory of planned behaviour

The findings also revealed that having a positive attitude toward urban farming and having a positive social influence on urban farming contributes to the adoption of smart urban farming. It is also discovered that using technology in farming could help them survive in farming, and their family and close friends would influence them to adopt smart urban farming. The majority of the elderly believed that perceived behavioural control has no influence on the adoption of smart urban farming because they do not believe they could start smart urban farming on their own.

3.3 Role of social entrepreneurship in the adoption of smart urban farming

When the elderly was questioned further about the role of social entrepreneurs in assisting them in adopting smart urban farming, the majority of them strongly believe that social entrepreneurs can provide them with information and technical advice.

3.4 Social and economic well-being of the elderly due to the adoption of smart urban farming

All respondents believed that smart urban farming would improve social contacts, reduce loneliness, and generate additional income.

4. Discussion

Generally, a social entrepreneur acts as a value-creating change agent who always seeks new opportunities to do socially sustainable related work. Since the Malaysian government is taking steps to stimulate urban farming (Ivascu *et al.*, 2021), a smart urban farming system will include the types of food grown, issues on where to start an urban farm as well as the farming methods should meet the demands of health and environmental well-being. According to Ivascu *et al.* (2021), confidence, pleasantness, naturalness, and societal should be included in any campaign to allow people to grasp the idea of urban farming.

In the current research, social entrepreneur refers to an individual or firm that takes an interest in helping the elderly to start urban farming by assisting with innovative technologies. In other words, smart urban farming referred to the urban farming processes with the assistance of technologies such as the Internet of Things (IoT) which can monitor and control remotely. Elderly

customer involvement in the innovation process is an important input foundation at the stage of developing sustainable urban farming. Urban farming technology provides support in building healthy, self-sustaining cities through urban farming. Generally, the elderly tends to be slower to adopt new technologies as compared to the younger group (Czaja *et al.*, 2006), but they will be willing to get involved if those technologies appear to have value in maintaining their quality of life (Heinz *et al.*, 2012). Therefore, the elderly who is not very technology savvy and may not understand how some of those technologies can assist them in urban farming may hesitate and refuse to involve themselves in urban farming activities. Through the interview conducted in this study, it is essential to obtain the viewpoints from the elderly to gauge what would drive them to adopt the idea of practising smart urban farming, as they believed that smart urban farming helps to promote their well-being from the economic and social aspects. They agreed that social entrepreneurship's involvement and engagement in providing information, technical advice, training, as well as equipment and machinery support, could influence their intention to adopt smart urban farming initiatives.

Therefore, to move in the direction of sustainability innovation, the integrations between firms and external customers are the most crucial competency (Carrillo-Hermosilla *et al.*, 2010). In the context of smart urban farming, the implementation of open innovation concepts by social enterprises helps to define the best practices to be used by social entrepreneurs nowadays, especially with the aim to target the ageing population. According to Svirina *et al.* (2016), the primary characteristics of social entrepreneurship as outlined by scholars and practitioners are as follows: "(1) its main goal is to drive important societal change (social mission); (2) it implies exercising business processes and discipline, innovation, and determination in seeking business solutions to social problems; (3) it entails the pursuit of economic efficiency; (4) it is motivated by strong ethics; (5) it involves the creation of value beyond resources currently under the entrepreneur's control". Nevertheless, social entrepreneurs have to create more sustainable models as the profit rate is lower than in conventional sectors, so this leads to the need of creating the open innovation concept which allows them to seek opportunities at lower margins (Carillo, 2015; Yun *et al.*, 2016) indicated that social business seems to be an important element in the current network information economy.

5. Conclusion

The general lack of study on the adoption of smart urban farming among the elderly has been a key concern

for researchers. Several studies have been conducted to better recognize the factors that influence adoption from the perspective of rural farmers on a larger scale. Existing research has mostly focused on economic and technology drivers, with little attention on the behavioural factors affecting the elderly in smart urban farming in particular. This study adopted a consolidative approach, analysing how social, technological and behavioural factors affect the elderly adoption of smart urban farming in Malaysia. Urban farming requires special attention, and it should play a prominent role in government policies aimed at achieving sustainable development that meets present and future needs. Furthermore, education and training are the best ways to build policies that leverage agricultural investments. Social entrepreneurs could act as agents in empowering the elderly with expertise and understanding of smart urban farming. This study looks at the factors that influence the adoption of smart urban farming, as well as the role of social entrepreneurship in the adoption of smart urban farming among the elderly. Using the framework method to analyse the qualitative data collected from a sample of 12 respondents aged 60 and above, the solicited opinions from the elderly perspectives have been derived. All the respondents agreed that smart urban farming enhances their well-being and believed that effective social entrepreneurship provides them with information and technical advice that influences smart urban farming adoption. In addition, the simplicity of technology in farming is the most significant factor that contributes to the adoption of smart urban farming. Besides, both attitude and subjective norms determine the adoption of smart urban farming. On the other hand, a few of the respondents feel confident to start smart farming on their own, this reflected the insignificant relationship between perceived behavioural control and the adoption of smart urban farming. In addition, this research contributes towards government policy implications from the elderly viewpoint on smart urban farming with the possibility of being adopted nationwide.

Conflict of interest

The authors declare no conflict of interest.

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