

# A Study on Technology Acceptance Model of Smart Homes for Future Elderly: From the Perspective of Perceived Value and Perceived Risk

劉, 玉琪

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## Summary of Dissertation

Smart home, as one of the most prosperous industries of the Internet of Things, has tremendous potential in helping the elderly aging in place, shaping life with all-around wellbeing, and dealing with the aging society challenges. However, compared with the optimistic estimates of related industry and academia, currently, the acceptance and market penetration of smart homes for the elderly stays extremely low. The essential problem is that the existing smart home products and services for older adults could not meet their core value demand, and the application of technology and service delivery have not been able to eliminate or reduce their worries and perceived risks. How to understand the core needs of the future elders and create a smart home environment that can provide the elderly with all-around happiness, reduce and avoid relevant risks as much as possible, and improve the acceptance and adoption of smart homes for future elders, has become a very valuable topic in the research field of aging society. As the most populous country in the world, China is one of the countries with the fastest aging process in the world. In the upcoming future, China will become the country with the most aging population globally, which could bring a huge burden to the Chinese government and society. This fact also reveals that there is an enormous blue ocean of business opportunities in the Chinese aging industry. Targeted on the future elderly population aged from 45-60 in China, this research develops the perceived value and perceived risk scales of smart homes for future elders by following the standard scale development process. In addition, based on the development of perceived value and perceived risk scales, the study further develops a smart home technology acceptance model for the elderly by using perceived value and perceived risk as the core variables through structural equation modeling (SEM) in Amos 25.0. The following is the main content of this study.

First, the perceived value scale development of smart homes for the elderly. The development of the perceived value scale takes the PERMA-V well-being model as theory basis. It reveals the core value needs of the elderly deeply and comprehensively and explores how smart homes could bring all-around well-being to older adults from the physical, psychological, and cognitive perspectives. Happiness is an eternal goal pursued by human beings no matter how time changes and how technology advances. Thus, the value of technology application in aging field should aim at shaping all-around happiness to the elderly, especially for technology integration systems like smart homes. The perceived value scale is consisted of perceived benefit and perceived cost scale, among which the perceived benefit scale contains eight factors, they are independence(5), healthcare(5), safety(3), positive emotion(7), engagement(5), relationship(5), meaning(5) and achievement(3), in total 38 measurement items; the perceived cost scale consists of three factors, namely monetary cost(5), study cost(6) and space cost(4), in total 15 items. It can help related industries to fully and accurately grasp the core value demands of older adults and reduce their perceived cost as much as possible. The scale provides important guidance and evaluation criteria for the development of related enterprises and industries in the future.

Second, the perceived risk scale development of smart homes for the elderly. The development of perceived risk scale comprehensively analyzes and presents the risk factors affecting the elderly's perception and acceptance of smart homes from the macro to the micro perspective in China. Consumer's purchase behavior always company with uncertainty even serious and harmful consequence, they could not know whether their consumption decision is correct and whether the products and service could meet their expectation. Therefore, the perception toward this kind of uncertainty and implicit result in consumption decision is the source of perceived risk. In order to clarify and evaluate relevant factors, the scale development study has been carried out. With regard to the result, the perceived value scale of smart homes for older adults is made up of ten factors, namely privacy & security risk(7), physical risk(7), technological risk(9), performance risk(7), service risk(9), financial risk(5), psychological risk(7), industry & market risk(6), social support risk(7), policy & law risk(6), in total 70 items. It covers national policy and law, industry and market standard, social support, services responsiveness, technology uncertainty, privacy and security, etc., which contains the potential risk factors from the government to society, industry to individual. Our research presents a comprehensive perceived risk measurement scale for the application of relevant smart technologies in dealing with aging challenges and issues in smart home environments which providing important guidance for controlling, reducing, and avoiding relevant risk from a customer-oriented perspective.

Third, construction of the technology acceptance model of smart homes for the elderly based on perceived value and perceived risk. Smart home is an integrated system of smart technology which is different from conventional single intelligent technology product or service so that its acceptance and adoption should be considered on a systematic level rather than perceived usability and perceived ease of use. The ultimate reason for users to accept the relevant products and services of smart homes depends on to what kind of extent these technologies can satisfy their value demands as well as reducing and controlling the potential risks. This research breaks through the limitation of the conventional technology acceptance model, which could not respond to the diverse value needs of customers and ignore the technology uncertainty and negative effects, replaces the variables perceived usefulness and perceived ease of use with perceived value and perceived risk. The whole technology acceptance model consists of five variables, namely perceived benefit, perceived cost, perceived risk, attitude toward using, behavioral intention to use, among which the perceived benefit and perceived cost is the key component variable of perceived value. Seven hypotheses have been proposed, and an empirical study has been conducted through structural equation modeling (SEM). All the hypotheses have been verified, and the model fitness reached the threshold. The result shows that the perceived benefit has a significantly positive effect on the attitude of future elders toward smart home using, which will further affect their behavioral intention to use. In contrast, the perceived cost and perceived risk exert a mainly negative effect in the model. Thus, maximizing the perceived benefit in the eight dimensions mentioned above, as well as controlling, reducing, or eliminating perceived risk and perceived cost, is the core principle to improve the acceptance and adoption of smart homes for future elders.

To sum up, the research breaks through the limitation of the conventional technology acceptance model and makes the value evaluation and risk assessment of high-tech applications for the elderly group much more precise and profound. The results of this research can provide guidelines and help corresponding designers, developers, industry practitioners, and policymakers to accurately grasp the value needs of the elderly and clarify the potential risks that should be avoided during the products and service development and delivery process. So that the maturity and market penetration of the smart home industry for older adults could be improved, the social pension burden could be relieved, and the all-around wellbeing of the elderly could be promoted, which endow the research with crucial theory and practice value.