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TECHNOLOGY ADOPTION FACTORS FOR OLDER ADULTS: AN EXPLORATORY GERONTECHNOLOGY STUDY

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ABSTRACT

This study aims to explore the underlying factors of older adults' technology resistance through qualitative exploratory method. A total of 139 older adults in Malaysia have been interviewed. The findings of this study shed light into these older adults' experiences with new technology and factors affecting their technology adoption. The preliminary findings are reported and discussed.

Keywords: Gerontechnology, technology adoption, near field communication, quality of life, Malaysia

INTRODUCTION

Ageing is a worldwide phenomenon. The ageing population has increased in both the developed and developing countries. According to Östlund [10], the proportion of older adults over 60 year-old is projected to double from 11 percent to 22 percent between 2000 and 2050. It was also reported that 80 percent of the world's ageing population will live in developing countries by 2050 [7]. This is placing pressures on the families, government, institutions and organizations. Increasingly, urban and international migration has resulted in more people leaving the rural areas for better job opportunities. This leaves a large number of the older adults living independently in the rural areas. In addition, the family structure is changing and moving away from the traditional family structure to a situation where the older adults are having to live alone. In this situation, older adults suffer a consequence of age-related incapacity.

There is surfacing evidence, as advocated by research (e.g. [1], [2], [17]) that indicates technology holds great potential for supporting the older adults' vitality and independence at home. Gerontechnology is a technology domain that integrates existing and developing technologies to the needs of both ageing and aged people, with the goal of increasing quality of life of older adults [15]. Although gerontechnology and assistive technology have great potential usage in ageing population, successful technology adoption is dependent on the technology acceptance behavior of older adults. In most instances, the older adults appear to be resistant to technology adoption. This notion is further supported by Marschollek et al. [9] which posit that older adults' reluctance (behavior) is the major barrier to technology adoption. A number of factors such as age, computer-related self-efficacy, anxiety and inadequate technical experience, perceived technological complexity have been identified as reasons of older adults' resistance to new technology [1], [5], [8], [14],[16], [17]. However, problems faced by older adults in using new technology are not confined to these cognitive factors [4]. To address this research gap, this study aims to explore the underlying factors of older adults' technology adoption (or resistance) through qualitative exploratory method.

LITERATURE REVIEW

Technology Adoption in Older Adults

Gerontechnology is regarded as "an interdisciplinary field of research and application involving gerontology, the scientific study of ageing, and technology, the development and distribution of technologically based products, environments and service [3, p.331]. Within the gerontechnology literature, there have been many published studies on older people's technology adoption using quantitative approach such as surveys and structural equation models [12]. While a plethora of scholarly publications (see: [6] [13] [17]) concerning technology adoption of older adults have increased over the last decade, extant studies have not provided insights into the elderly-specific factors influencing the technology adoption of older adults. Therefore, this study is framed to examine elderly-specific factors of older adults' technology adoption (or resistance) through qualitative approach. These factors include product, person and economic aspects.

NearField Communication (NFC) Home System

In this study, we applied the NFC-enabled technology and Bluetooth-enabled Raspberry-PI to design and develop the NFC home system. The NFC home system is designed using a set-top-box as a convergence platform to integrate different home appliances for home automation. In this system, home appliances are operated using tap-to-connect mechanism where users tap an NFC card on the set-top-box to activate a specified digital appliance. The set-top-box can read multiple NFC cards for different home devices. Internet connection is not required for the entire operations. Given that this NFC home system is portable and easy-to-use, we regard the system as an assistive technology because it provides a convenient way for older adults to improve their independence at home. Many products are not tested with older people before they were classified as technologies for older adults [10]. It is likely that an older adult's direct experience of a technology influences their evaluation of the technology. In this study,

an experiment was conducted, allowing participants to have a direct experience with the NFC home system. Interviews were then performed to understand the participants' perception of and their experience with the technology. This is important to understand the key factors influencing technology adoption in older adults.

RESEARCH METHODOLOGY

This research obtained approval from the university's Human Research Ethics Committee. The target sample for this study was older adults living in Malaysia. A total of 139 older adults (i.e., 65 males and 74 females) participated in the experiment, survey questionnaires and interviews. The breakdown of age group is as follows: 48 participants (between 55-64 years old), 57 participants (between 65-74 years old), 29 participants (between 75-84 years old), and 5 participants (above 85 years old). The demographic details are shown in Table 1.

Before the experiment session, the participants were briefed on the research objectives, the experimental tasks and precautions. Participation was voluntary and prior consent was obtained. All participants were assured of anonymity. During the experiment session, the participants were required to provide their demographic information before they were introduced to the NFC home system. All participants were given a set-top-box and a NFC card to operate the home appliance (in this experiment, it was a lamp). After completing the experiment, each participant was asked to answer a questionnaire. Face-to-face interviews were then conducted. During the interview, semi-structured and open ended questions were asked, allowing the older adults to articulate their experiences and desires towards the NFC home system. The open ended questions asked about the participants' feelings and experience of using the home system, difficulties using the home system, their attitude towards the home systems, the role of new technology in their lives, and their attitudes towards new technology. The interview was audio-taped and then transcribed. Common insights were identified and coded in a code book. Themes and subthemes were identified from the coded data.

Table 1 Participants' Demographic

| Variables | | Frequency (n=139) | Percentage (100%) |
|-----------|--------------------------------------------|-------------------|-------------------|
| Gender | Females | 74 | 53.2 |
| | Males | 65 | 46.8 |
| Age | 55-64 | 48 | 34.5 |
| | 65-74 | 57 | 41.0 |
| | 75-84 | 29 | 20.9 |
| | Above 85 | 5 | 3.6 |
| Education | Informal | 12 | 8.6 |
| | Pre-primary school | 15 | 10.8 |
| | Primary school | 34 | 24.5 |
| | High school | 39 | 28.0 |
| | Diploma | 11 | 7.9 |
| | Bachelor degree/professional qualification | 13 | 9.4 |
| | Master/PhD degree | 15 | 10.8 |

DISCUSSIONS AND CONCLUSION

The primary goal of this study is to explore the underlying factors of older adults' technology adoption (or resistance) through qualitative exploratory approach. The qualitative evidence underscores four meta-themes namely, product, person, economic and desired outcome/benefit (see Table 2). As shown in Figure 1, the product factors such as easy-to-use (i.e., simple and practical) and security (i.e., misplacement of peripheral devices) are main predictors of older adults' desired outcomes (e.g., enhance quality of life, happiness, independence and convenience). This relationship is jointly influenced by person factors (i.e., fear of use and personality) and economic factor (i.e., cost). From a practical aspect, this study provides a new insight for technological manufacturers and developers to focus on the product design, particularly on simplicity, practicality and security that are desired by older adults. In addition, the industrial practitioners should look into ways to target their products/services based on different person factors and economic factor.

Table 2 Themes and Sub-themes

| No | Themes | Sub-themes | Selected statements by participants |
|----|-----------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 1 | Product Factors | <ul style="list-style-type: none"> • Easy to use <ul style="list-style-type: none"> ○ Simple ○ Practical • Security <ul style="list-style-type: none"> ○ Misplacement of | <p>It's pretty simple. All you have to do is take the card and tap it on the box and it's done. (P1029)</p> <p>It is not necessary to walk towards the switch and on it and it is easy to off it as well. Overall, it is a very good appliances. (P2003)</p> <p>Difficulty to me as an aged person is ...maybe the lost of</p> |

| | | | |
|---|-----------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| | | peripheral device (card) | the card. I may misplace the card. I don't know how many cards we need or just one card. Sometimes, we tend to forget where we put the card. That's our challenge. (P2007) |
| 2 | Person Factors | <ul style="list-style-type: none"> • Fear of use <ul style="list-style-type: none"> ○ Positive <p>It's not scary as it is not dangerous. Why would I be scared? It's just a card and it's convenient. Even though it's raining heavily with thunder you won't be afraid to get electrocuted with the card. (P1012)</p> ○ Negative <p>Yes, I'm afraid I did not touch the point (on the box) properly and light cannot be turned on/off. Just have a thought about it and worry at the same time. (P1019)</p> • Personality <ul style="list-style-type: none"> ○ Passive <p>If you teach me and I understand, then I will use it. If you don't teach me then I can't use it. (P1004)</p> ○ Active <p>If everyone is using it you must adapt to the current flow of society. Whichever is more convenient and most suitable then I would use. (P1029)</p> | |
| 3 | Economic Factor | • Cost | The only thing you worry is for senior citizen that it's very costly. The cost to acquire one. That is the b-b-big question mark. (P2006) |
| 4 | Desired Outcome/ Benefit | <ul style="list-style-type: none"> • Enhance quality of life <ul style="list-style-type: none"> ○ Happiness <p>Sure, it can help me to become happier. (P1001)</p> ○ Independence <p>Ah... it will help most of the people to live a better life... Like older people, they don't like walking distance to on the switch. They want them to be near them, so that when they touch it the light is on. They don't have to walk to "on" the light. (P1014)</p> ○ Convenience <p>Convenient and easy la... What should I say? Ah... Like in the hotel they use cards to open the door, easy, you don't have to search for the keys. For example, you don't have to search for which switch to on the light you want. Here you have the card ready, when you tap it on, it's open. (P1014)</p> | |

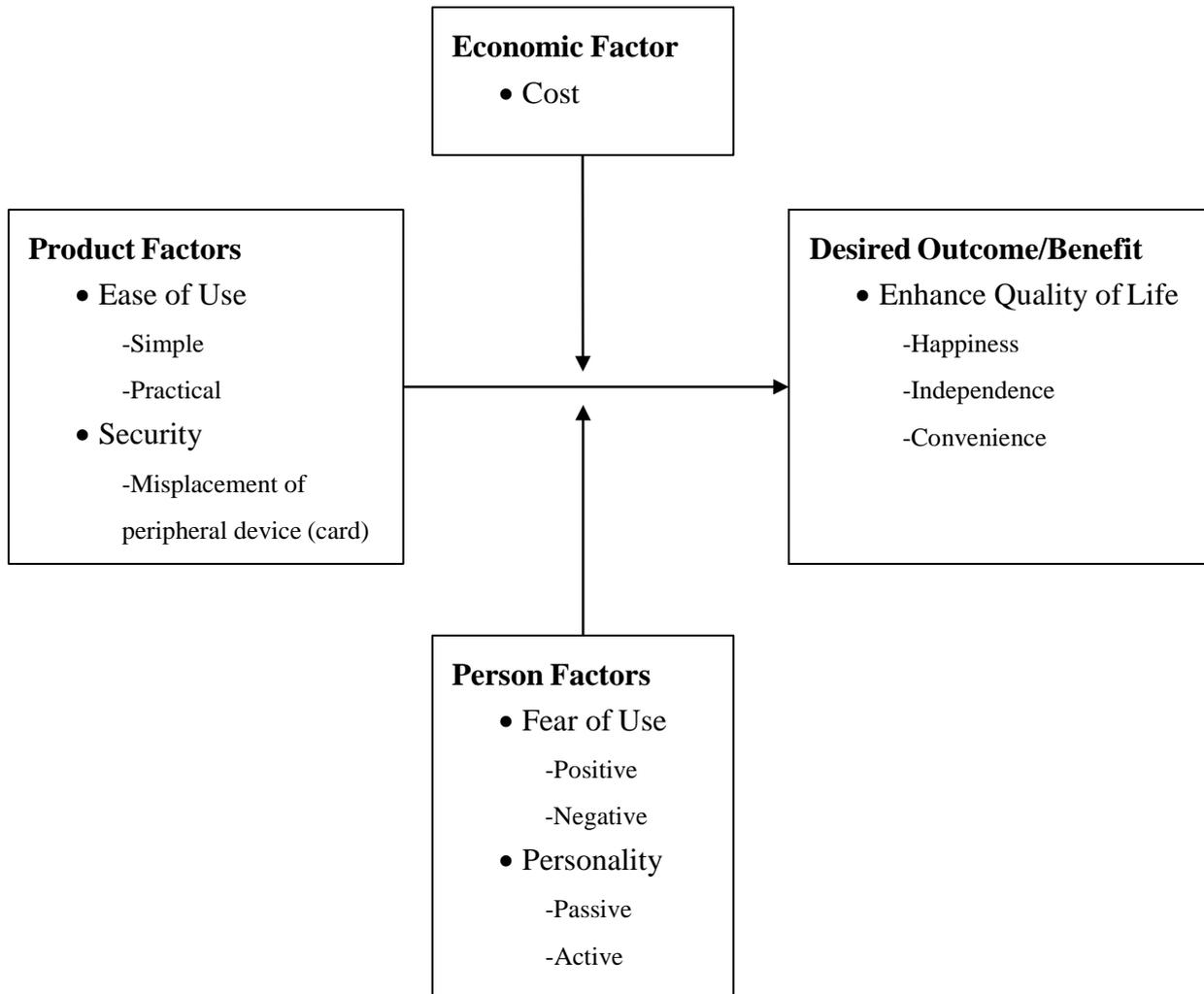


Figure 1: The Relationship of Four Meta-Themes

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