

A Qualitative and Quantitative Study of Information Technology Usage and Quality of Life among Older Persons in Hong Kong

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Abstract—In this high technology era, rapid developments in information technology (IT) have the potential to transform the lives of older persons. Ageing tends to be associated with reduction in health status and resources, which may lead to adverse challenges to functional independence and social connectedness for older persons. However, the role of IT is becoming ever more influential in our daily living through the digital services such as email, e-banking and e-shopping. Therefore, older persons inevitably come across various IT-related products, especially computers and the Internet, in their everyday lives. Moreover, the quality of life of older persons is important and has been mentioned as an aspect of successful ageing. This study will explore the relationships between IT usage and the quality of life among older persons in order to determine the main reasons why they do or do not use IT and how they learned about IT. Both qualitative and quantitative approaches are employed in this study. An integrated model, which adopted the models and theories of Information system, is formed to investigate the major factors of IT acceptance and quality of life for older persons. The results showed that IT usage may promote social connectedness and improve quality of life for older persons. The research findings will contribute to the improvement of understanding of older persons' well being and attainment of successful ageing, especially in a rapidly ageing society such as Hong Kong.

I. INTRODUCTION

Recently, Information technology (IT) penetration and population ageing have become two notable global trends. It is therefore sensible to promote a balance between IT usage and older persons' well-being. This study aims to understand the relationship between IT usage and quality of life among older persons, and investigates the major reasons and barriers to use IT in the older persons' perspectives.

A. Ageing in Hong Kong

In Hong Kong, like many other developed countries in the West and in the Asia-Pacific, the increasing proportion of older persons is well established. According to the Hong Kong Census and Statistics Department, the median age of the HKSAR's population rose from 23 in 1961 to 39 in 2006. During the same period, the percentage of persons aged 65 and over increased sharply from 2.8% to 12.4% [1]. In the future, the proportion of population aged 65 and over is projected to rise markedly from 12% in 2006 to 26% in 2036 [2]. That means almost 1 out of 4 people is aged 65 and over in 2036. The considerable demographic ageing of the population, due to decreasing fertility rates and

increasing life expectancy, has raised interest in investigating the well-being of older persons, especially their quality of life which is important in the promotion of successful ageing.

B. Significance of IT usage among older persons

Whilst Hong Kong's (HK) population is ageing, as a modern society, the high IT penetration rate has also been noticed. The overall rate of persons who had knowledge of using computer was 69.3% among all persons aged 10 and over [3]. This high IT penetration rate in Hong Kong does not only affect the young, but also older persons, and includes email communication, passport renewal booking, online library search systems, cyber-banking services, online-shopping and settling payments online. Indeed, it is difficult in many ways for older persons to avoid IT because of its appearance in their daily lives. Therefore, more and more older persons interact with IT of various forms and some services are much more conveniently delivered electronically. This shows in the rapidly increasing percentage of persons aged 65 and over, from 0.6% (2000) to 6.7% (2007), who had used personal Computer (PC) in the twelve months before the official enumerations [4]& [3]. In particular, the percentage of people aged 65 and over who had used internet services in the twelve months before the enumeration increased sharply from 0.2% (2000) to 5.8% (2007) [4]& [3]. Furthermore, globally, there are many older persons in developed nations who have daily interactions with technology. In the U.S.A, for example, it is common for older persons to use IT, and there are 40% and 35% of people respectively over the age of 65 who use computers and access the internet [5]. In addition, the National Ageing Information Center reported a significant growth in information technology usage by older persons in several nations, and the number of older internet users in United Kingdom accounted for 13% of nation's online population. Moreover, the percentage of older internet users in Sweden and Denmark was recorded at 17% and 16% respectively [6].

II. METHODS

This study employed a combination of quantitative and qualitative approaches. Focus group discussions (FGD), in-depth interviews with key informants and face-to-face survey were used in this research project in order to obtain a comprehensive view of the impact of IT usage on older persons and their quality of life. A qualitative methodology is appropriate for studying in-depth reasons for, and barriers to use of, IT. A quantitative method is helpful for exploring statistically the relationships between IT usage and quality of life among older persons.

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A. Methods for qualitative research

In the qualitative approach, a purposive sample of twelve older persons was invited to participate in two focus group discussions. Respondents aged 60 or above who had participated in IT awareness course within one year were recruited from elderly community centres. In addition, nine in-depth interviews with key informants were then conducted with respondents from professional and older persons' groups. The professional groups involved experts in IT, ageing research and social workers, who were organizers and teachers of elderly people's computer learning. The older persons' group was selected via theoretical sampling. According to Strauss and Corbin, the theoretical sampling is gathering data from making comparisons, which uses to choose new research sites or research cases to compare with one that has already been studied [7]. Indeed, this research aims to explore the meaning and motivations of using or not using IT among older persons. Therefore, the theoretical sampling was worth to maximize the opportunities to discover more contexts. Four cases were selected purposively to understand the possible different intentions of older persons for using or not using IT. They were divided into four groups: people always, seldom (fewer than 3 times a month) and never using computer, as well as never using IT (including mobile phones). A semi-structured interview guide was used.

B. Methods for quantitative research

In the quantitative approach, a face-to-face survey was conducted by cluster sampling methods through which 166 respondents were recruited from nine Neighbourhood elderly centres (NECs) in four representative urban districts in HK, selected based on their population characteristics. The oldest district (Wong Tai Sin: median age (42)) and youngest (Yuen Long: median age (35)) were selected. HK's Central/Western District, which recorded the highest level of education in Hong Kong, was also selected, based on the idea that older persons with higher education levels might have greater motivation to learn computers [8]. Finally, Tuen Mun District, which is the area of the qualitative research, was also selected. In the next stage, NECs from each selected district were randomly chosen from the list of Neighborhood Elderly Centres issued by the Hong Kong Social Welfare Department (SWD) on 1st October 2007, the most recent list available. With the aim of looking at the relationship between IT usage and quality of life among older persons, two groups of older persons, which included ten older persons who have participated in computer courses and ten older persons who had not participated in computer courses, were invited and selected by the senior staff member at each selected centre to fill in or answer the questionnaire in the centre, in order to provide comparison. A questionnaire, using a 5-point Likert Scale (ranging from "1" = "totally disagree" to "5" = "totally agree"), was designed to investigate IT usage behaviour and quality of life among older persons, based on the integrated model (outlined in the qualitative results below). The questionnaire had four main parts: 1) IT usage and

behaviour, 2) Intentions of using IT, 3) IT and quality of life, and 4) Personal profiles of respondents.

III. RESULTS

A. Qualitative results

The analysis of the qualitative data showed that respondents from professional and older persons' groups held a consistent perspective regarding the major reasons for and main barriers to older persons using IT. In addition, although most respondents held a positive attitude toward IT, they reported different usage patterns, particularly in the in-depth case interviews. Indeed, perceived usefulness became relatively important in illustrating the most influential reason for using IT from the older persons' perspective. The findings provided new insight in developing a conceptual model and appropriate instrument for investigating the correlation between IT usage and quality of life among older persons.

1) Major reasons for using IT

The qualitative results showed that major reasons for IT usage among older persons were perceived usefulness, social trends, maintenance of family connections, self-enhancement and leisure activities, summarized in Fig. 1.

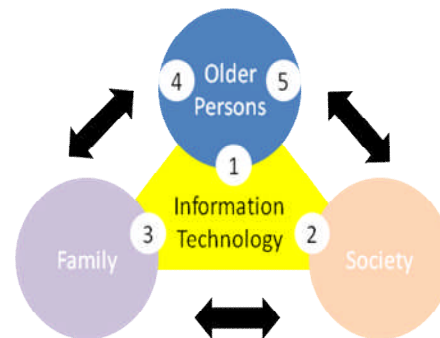


Fig. 1. Major reasons for using IT: 1) perceived usefulness, 2) a social trend, 3) maintenance of family connections, 4) self-enhancement, and 5) leisure activities.

Respondents from groups of older persons and professionals agreed that IT is used to diffuse information quickly and worldwide. They viewed IT as a new form of medium to communicate with family members and to maintain social connections in modern society. Older persons are sometimes at risk of social isolation, when they are out of step with social trends [9]. On the other hand, the popularization of IT also increases older persons' daily interaction with IT, and can raise their curiosity about using IT as their family members often use IT at home. In addition, older persons try to keep in touch with their family in foreign countries though the internet. Nowadays, the nuclear family is popular in Hong Kong. Therefore, some older persons do not live with their children and seldom meet their children because of their children's busy work and commitments. IT provides a convenient and simple platform of interaction among older persons and their children.

However, IT also provides information for life-long learning and relaxation, which can provide for self-enhancement and furnishes a platform for enjoyment and leisure.

Next, perceived usefulness is an important reason to explain the motivation for IT acceptance among older persons. According to Davis, perceived usefulness means the degree to which a person believes that using a particular system would enhance his or her job performance [10]. Because older persons are not generally very concerned with job performance, so their concept of perceived usefulness will tend to focus on their daily living; how older persons believe that using information technology would enhance their daily lives. Perceived usefulness is clearly important in explaining IT usage from an older person's perspective. Some respondents mentioned that the application of IT is useful for their daily living in terms of communicating and using e-service conveniently. By comparison, perceived usefulness does not only encourage older persons to use IT, but can also make older persons possibly likely to refrain from using IT as they might believe that IT usage is useless in their daily living. Thus, older persons sometimes do not desire to learn and use IT.

2) Main barriers

The main barriers were also important in understanding the IT using behavior among older persons. Four main barriers were identified based on qualitative data: physical deterioration, language barriers, and complications of use and lack of resources.

The common barriers to older persons use of IT are physical deterioration (health status), such as poor eyesight, shaking hands and forgetfulness. Moreover, older persons also lack for resources because of certain expensive IT products. In general, older persons have little or no income after retirement and therefore, they are not able to afford to purchase their own computers. Even if the older persons have access to a computer at home, they are sometimes reluctant to use it as such appliances are usually owned by their younger family members. Lack of practice makes them liable to forget the perceived complicated steps to use IT. It was felt that IT products are multi-function applications and not specifically designed for older persons, so they may be complicated for them to use. In Chinese society, language barriers are also one of the main barriers to older persons use of IT because of their problems with English. Older persons are often not good at the English alphabet and have difficulties in even using the keyboard.

3) Perceived relationships between IT usage and quality of life

Respondents from both professionals' and older persons' group accepted IT usage as positively related with older persons' quality of life; particularly when older persons know how to use IT and they can use IT in their daily life. In addition, respondents also gave their opinions on how IT affected quality of life among older persons. Six points were summarized for two aspects (social and psychological). With respect to the social aspect, quality of life will be improved in increasing social contacts, enhancing family relationship and acquiring information. On the other hand, in psychological aspect, using IT can enhance self-esteem, encourage positive feelings and achieve self enjoyment. It may also indirectly raise the image of older people who are often stereotyped as being IT-illiterate.

4) Integrated model and hypotheses

An integrated model (Fig. 2), which adopted aspects of the Technology Acceptance Model (TAM) [10], the Theory of Planned Behavior (TPB) [11] and Innovation Diffusion Theory (IDT) [12], was devised by analyzing the FGDs, in-depth interviews and following an extensive literature review, in order to understand the usage behavior of IT among selected older persons in Hong Kong. These models and theories are useful to illustrate the motivations of using IT. Next, a scale of IT-related quality of life was developed from the qualitative results and literature review. IT-related quality of life was an index, which based on IT-related domains from the famous WHOQOL-100[13]. This model contained two main parts: intention to use IT and IT-related quality of life. The hypotheses are shown in Table 1.

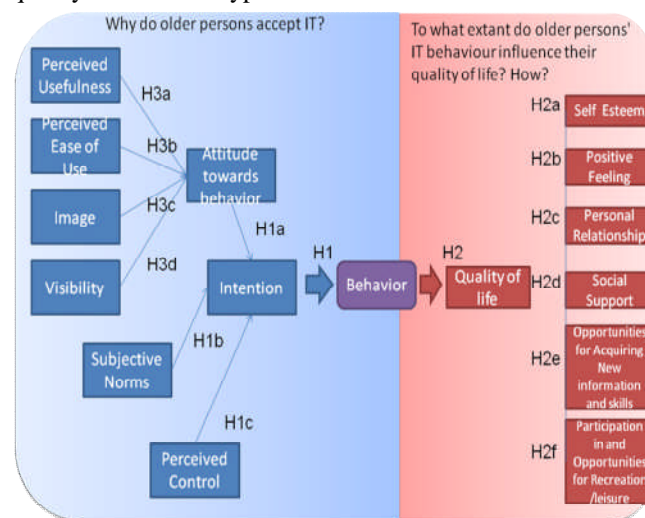


Fig. 2. Integrated model of IT acceptance and quality of life

	Hypothesis
H1	Older persons' behavioral Intention has a positive effect on behavior(IT usage)
H1a	Older persons' attitude towards behavior has a positive effect on behavioral Intention
H1b	Older persons' subjective norms has a positive effect on behavioral Intention
H1c	Older persons' perceived control has a positive effect on behavioral Intention
H2	Older persons' behavior (IT usage)has a positive effect on quality of life
H2a	Older persons' self esteem has a positive effect on quality of life
H2b	Older persons' positive feeling has a positive effect on quality of life
H2c	Older persons' personal relationship has a positive effect on quality of life
H2d	Older persons' social support has a positive effect on quality of life
H2e	Older persons' opportunities for acquiring new information and skills has a positive effect on quality of life
H2f	Older persons' participation in and opportunities for recreation /leisure has a positive effect on quality of life
H3a	Older persons' perceived usefulness has a positive effect on attitude towards behavior
H3b	Older persons' perceived ease of use has a positive effect on attitude towards behavior
H3c	Older persons' image has a positive effect on attitude towards behavior
H3d	Older persons' visibility has a positive effect on attitude towards behavior

Table. 1. Hypotheses of integrated model

B. Quantitative results

1) Demographic characteristics

There were a total of 166 respondents in this phase of the research. Older persons who participated in computer classes (57.8%, n=96) were slightly more than older persons who did not participate (42.2%, n=70). In general, more female respondents (66.3%, n=110) than males (33.7%, n=56) participated in the survey. Although female respondents are dominant in both groups (participated: 61.5%, n=59 and did not participate: 72.9%, n=51), more male respondents participated in computer classes (38.5%, n=37) than respondents who did not participate in computer classes (27.1%, n=19). Male older persons would apparently like to participate in computer class because of higher literacy rates.

The overall mean of age of respondents was 72.87. Age does appear to be a significant factor in explaining the reasons for IT usage for older persons. A lower average age (69.44) is recorded in the group of participants in computer class than group of non-participants (77.57). More young old (84.4%, n=81) (aged 60 to 74) than old old (15.6%, n=15) (aged 75 or above) participated in computer classes. In contrast, the group of respondents, who did not participate in computer classes, only had slight differences in the percentage of younger old (44.3%, n=31) and old old (55.7%, n=39).

Next, educational level is also an important element to illustrate the reasons for IT usage among older persons. The majority of non participants in computer class had no formal education (45.7%, n=32) whereas participants in computer classes mainly had primary (39.6%, n=38) and secondary (31.3%, n=30) levels of education.

2) Comparison of means

Comparing the means of the older persons who did and did not participate in computer classes, the findings of IT intention and IT-related Quality of life are summarized in Table 2 and 3. In table 2, significant higher means are recorded for participants in computer classes, which are in term of attitude, perceived usefulness, visibility, subjective norms, perceived control, and intentions. However, in Table 3, the respondents, who participated in computer class showed higher means in the following areas: IT-related quality of life, social support, new skills and knowledge, and leisure.

Mean Comparison	Participated in computer classes	Did not participate in computer classes	V.S.
Attitude	4.13	3.89	Higher
Perceived usefulness	3.64	3.21	Higher
Perceived Ease of Use	3.00	3.02	Lower
Image	3.31	3.49	Lower
Visibility	3.46	3.29	Higher
Subjective Norms	3.52	3.20	Higher
Perceived Control	3.39	2.91	Higher
Intentions	3.78	3.11	Higher

Table 2. Mean Comparisons for IT intention

Mean Comparison	Participated in computer classes	Did not participate in computer classes	V.S.
IT related Quality of life	3.59	3.45	Higher
Self esteem	3.40	3.52	Lower
Positive feeling	3.47	3.49	Lower
Personal relationship	3.40	3.46	Lower
Social Support	3.54	3.14	Higher

New skills and knowledge	4.02	3.34	Higher
Leisure	3.76	3.54	Higher

Table 3. Mean Comparisons for IT-related Quality of life

3) Testing the Hypotheses

Fourteen of fifteen structural paths are significant in the hypothesized direction; hypothesis support is recorded in H1, H1a, H1b, H1c, H2, H2a, H2b, H2c, H2d, H2e, H2f, H3a, H3b, and H3d. The estimated path coefficients and hypothesis testing results are summarized in Table 4.

Structural Path	Path Coefficient	Hypothesis	Hypothesis Support
Behavioral Intention→Behavior	.435**	H1	Yes
Attitude→Behavioral Intention	.437**	H1a	Yes
Subjective Norms→ Behavioral Intention	.478**	H1b	Yes
Perceived Control→ Behavioral Intention	.551**	H1c	Yes
Behavior→Quality of life	.203**	H2	Yes
Self esteem→Quality of life	.742**	H2a	Yes
Positive Feeling→Quality of life	.744**	H2b	Yes
Personal Relationship→Quality of life	.683**	H2c	Yes
Social Support→Quality of life	.514**	H2d	Yes
New information and skills→Quality of life	.654**	H2e	Yes
Recreation/Leisure→Quality of life	.722**	H2f	Yes
Perceived Usefulness→Attitude	.590**	H3a	Yes
Perceived Ease of Use→Attitude	.315**	H3b	Yes
Image→Attitude	.142	H3c	No
Visibility→Attitude	.382**	H3d	Yes

Note: *p<.05;**p<.001

Table 4. Summary of Estimated Path Coefficients and Hypothesis Testing

IV. DISCUSSION

Both qualitative and quantitative findings suggest that IT usage is positively related to quality of life among older persons. It appears that computer learning can improve the quality of life among older persons in term of increasing their life satisfaction, enhancing their self-confidence, and improving their communications with others [7]. The information technologies make the elderly more active and allow them match with the society easily, in order to improve their quality of life [12]. However, interesting, somewhat unexpected results are shown in Table 3, indicating that non participants in computer class have a higher score on means than participants in computer class in term of self esteem, positive feeling and personal relationship.

The integrated model is useful to understand and explain IT usage behavior among older persons. However, participants in computer classes record lower means than the non participants in the area of perceived ease of use and self-image. This suggests that image is not an important factor to illustrate IT acceptance behavior for older persons. This also shows in the failure of image in the hypothesis tests perhaps because of the humble characteristics in Chinese culture. Next, perceived ease of use is a not significant factor to explain IT usage behavior, since it is related to design of IT products. Older persons will try their best to overcome this barrier when they seem IT is useful and indispensable for their daily lives.

V. CONCLUSIONS

This study has attempted to construct an integrated model to understand IT usage behavior among older persons. Further studies are planned that will focus on large scale surveys and cross cultural surveys employing this model.

The findings also suggested that policies and practices on IT learning and support, and, for example, providing free wireless services as is currently being introduced in HK, should be encouraged to enhance the social connectedness and quality of life among older persons.

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