AGING USERS' EXPECTATION OF TECHNOLOGICAL DESIGN

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ABSTRACT

This paper attempts to identify the key factors of the expectations of technology usage from the perspective of aging adults in Thailand. Data collection was carried out by questionnaires, which were distributed offline. The study found the common expectation factors of technology usage from perspectives of aging adults in Bangkok area. This study also prioritizes key success factors of innovative technology for aging society.

KEYWORDS: aging / technology / technology for aging adults / aging adults in Thailand

25 pages

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CHAPTER I
INTRODUCTION

Technology is beneficial for adults to age easily. However, there are many factors that cause aging adults to resist technology. People are aging every day. Every year sees an increasing number of people (millions) who are older than 65. According to Czaja and Schulz (2006), it is estimated that by 2030, people over the age of 65 will represent about 24% of the overall population in Europe and about 12% of that in Asia and Latin America. Similar trends can be seen worldwide. Technology has been an integral part in this. As technology advances, better healthcare & research are found to make life healthier, safer, and longer. Technology does not only effect how people live their everyday lives; in work, education, communication, and entertainment, but it also plays numerous roles in how people can live a better and healthier life. Through statistics, the average age of people in different countries has been going up every year. This is due to technology advances in healthcare annually. In-home monitoring systems, transfer of healthcare information, and interactive communications are just a few examples of how elders can use technology to support their life. Also, more and more elders are interested in using technology for their everyday life. ATMs and mobile phone are example of this (Czaja et al., 2006).

To investigate senior citizens' perception and acceptance of technology, it is beneficial to know their expectations in technology design and function. This enables technology design to add greater value and to ultimately gain the acceptance of senior citizens. Supporting this, there has also been much research done regarding reasons & factors why senior citizens reject technology. One major factor that causes senior citizens to reject technology is irrelevance. They do not need to have computers and more technology to communicate with numerous people. Based on their lifestyle at their age, they are much more satisfied staying at home and being with their families. Furthermore, they are not aware of a computer's capabilities. Some technology designs are too complicated to encourage older people understanding

(Wandke, Sengpiel, and Sonksen, 2012). There are also health supports which can make life easier for aging people. Technology also includes computer and information communication and technology (ICT) equipment.

Personal computers (PC) have existed for more than 20 years and are used both in the workplace and at home. The main function of computer is not only calculation but it can be used for communication, transfer of information, and also can support everyday tasks. If we backtracked 20 years from today, elderly people who are currently 65 and older would be about 45 or more around that time. There was less technology compared to today and some of them did not have a chance to work with any computer. They may not know how to use it at all, thus older people, at this time, may not be familiar with these technologies.

More recent technologies such as mobile phones, was developed many years after computer. The development of mobile phones evolved from the home telephone. Early development of the mobile phone was bulky and difficult to use. Earlier versions of mobile communication devices were designed for only voice service, but today, the capabilities of a mobile phone are vast. Data usage becomes more important than ever before. Mobile devices may seem to be more complicated than ever for many senior adults. Some mobile phones today have bigger screens or even touch-screen capabilities. As mobile phones are now developed to do more than calling and using text messaging, they are now called 'smart- phones'. Applications can now be installed in order to enhance/maximize smart phones to do more than a voice call. Chatting, playing games, documentation work or even watching television are just a few examples of a smart-phone's applications. This may affect elders who want to use mobile phone but do not have the capability or the need to use these smart-phones.

However, the situation of the technology industry regarding the special needs of the elderly in residential settings is unknown. It seems that this situation might have occurred, because relatively little information about this market segment targeting older adults is available (Moschis, 2003). The Center for Aging Services Technologies (2005) focused on the baby-boomer generation who were impressed by the possibilities of technology to alleviate the challenges of daily life, and they reported that they would be willing to pay for technology that assists their independent

living. Wandke et al. (2012) discussed myths about older people's use of ICT; as future generations of aging adults and senior citizens who use technology without problems thus solving the problem. Another perspective is that technology changes exponentially. Innovation is getting better day-by-day, and while innovation can occur incrementally, radical innovation is more complicated and may be difficult to use without suitable skills. Aging people will undoubtedly face difficult situations.

Currently, it can be concluded that technology and ICT is potentially beneficial to senior citizens and aging adults despite high barriers to their usage. Elders in Thailand are following the trend of those worldwide. Although it is difficult for those elders who are lesser educated, less fortunate, or who are a minority in Thailand to have access to technology. It would be interesting to know the expectations of technology usage from the perspective of an aging adult; as such this report will show the expectations of technology usage by aging adults. The research is enclosed to the healthcare, communications, and entertainment industries. The objective of this paper is to study the expectations of technology use by aging adults.

CHAPTER II
LITERATURE REVIEW

2.1 Definition of an ‘older’ or ‘elderly person’

"The aging process is of course a biological reality which has its own dynamic, largely beyond human control. However, it is also subject to the constructions by which each society makes sense of old age. In the developed world, chronological time plays a paramount role. The age of 60 or 65, roughly equivalent to retirement ages in most developed countries is said to be the beginning of old age. In many parts of the developing world, chronological time has little or no importance in the meaning of old age. Other socially constructed meanings of age are more significant such as the roles assigned to older people; in some cases it is the loss of roles accompanying physical decline which is significant in defining old age. Thus, in contrast to the chronological milestones which mark life stages in the developed world, old age in many developing countries is seen to begin at the point when active contribution is no longer possible." (Gorman, 1999)

Although there is no exact definition for ‘old age’ since there is no agreement on the age that a person becomes old. However, the common use of a calendar age to mark out old age, which assumes the equivalence of biological age, may not be synonymous. (WHO, 2013) Also, according to Coughlin (1999), aging people are defined by the characteristic of the natural aging process that affects vision, physical strength & flexibility, cognitive ability, and for much susceptibility to illness & injury. These changes greatly affect an individual’s capacity to interact with and manipulate the physical environment.

2.2 Aging population in Thailand

Since the National Statistical Office (2010) conducts a population survey every ten years, it seems that the older population has increased exponentially since

thirty years ago. Figure 1 shows the differences between populations through population pyramids. This is due to the “baby boomer” period in which more than one-million babies were born each year during 1963-1983 (Prasartkul, 2013). Within the next 30 years, the population in Thailand is projected to be stable at around 65 million, with an aging population of around 25%.

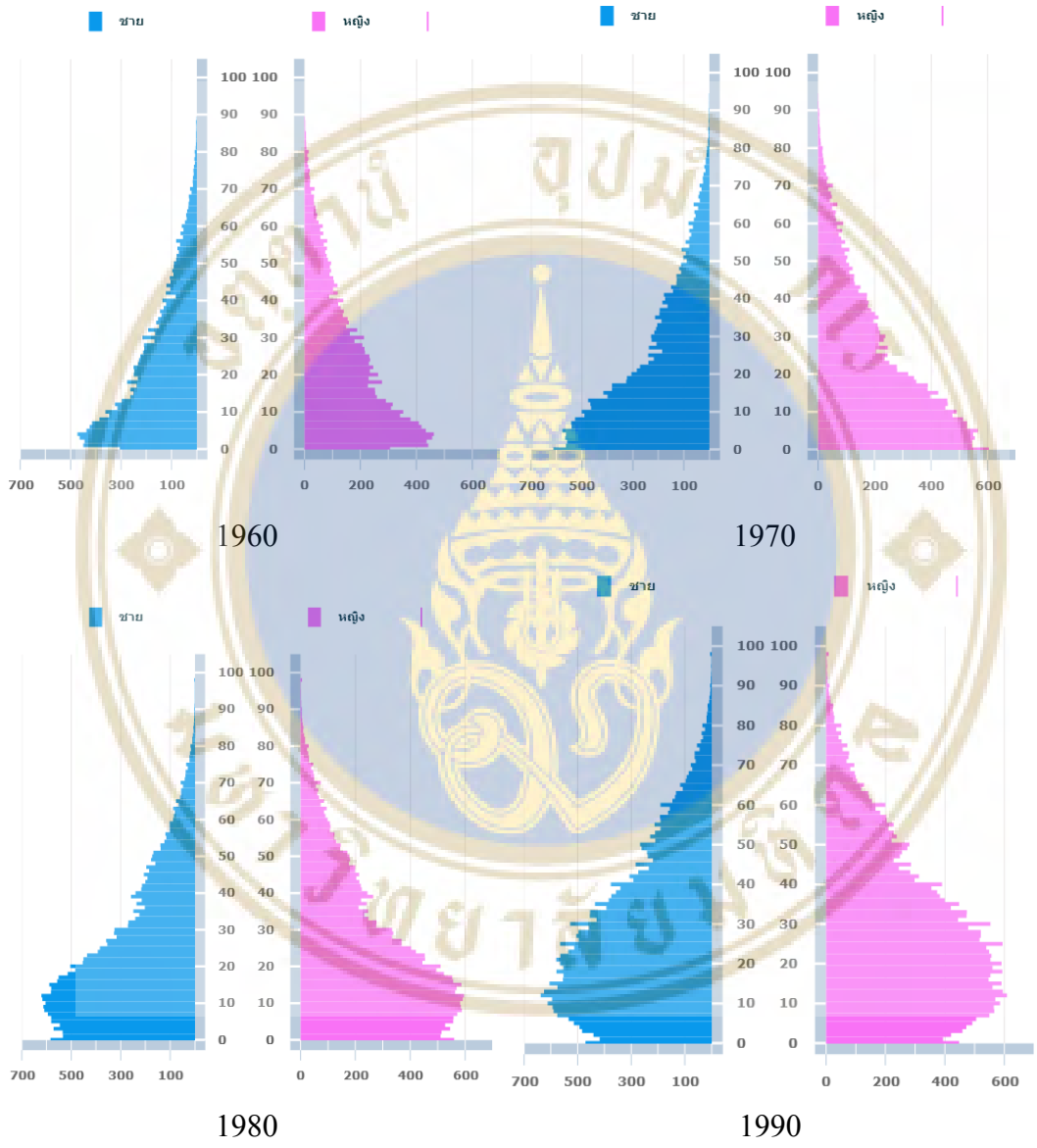

Figure 1 Population Pyramid in Thailand from 1960 to 2010 (NSO, 2010) http://popcensus.nso.go.th/PopPyramid/ABSPopulationPyramid.swf

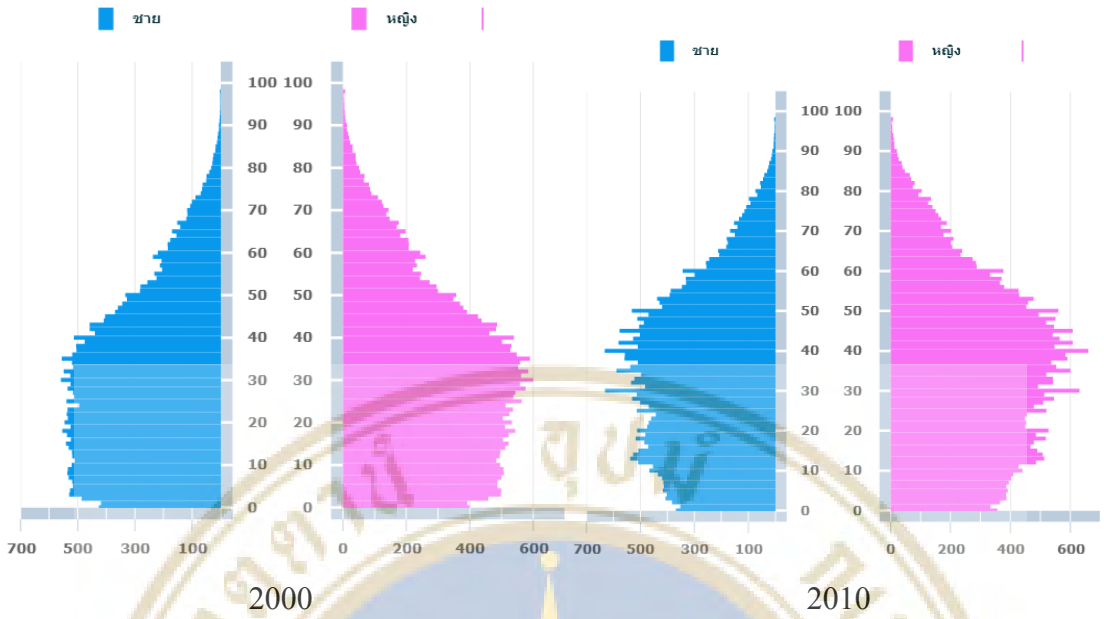

Figure 1 Population Pyramid in Thailand from 1960 to 2010 (NSO, 2010)
http://popcensus.nso.go.th/PopPyramid/ABSPopulationPyramid.swf (Cont.)

2.3 Definition of Technology

Technology is formed by something involving the technical aspects of arts and crafts, with the suffix word logy, meaning theory, doctrine, and science. In general knowledge, technology is the things that make life easier, more safety. There are many definitions of technology that are drawn from writers with various backgrounds and perspectives. Wiens and Wiens (1996) defined technology as not just a machine, but a body of knowledge. It is the method of thinking; an approach to problem solving that presupposes both ends and means. Another definition of technology is that it is a system of tool-using behavior, and can be understood in four ways; (a) a process; (b) knowledge; (c) an object; and (d) a volition. Technology has become an integral component of everyday life, working, education, communication, and entertainment. It is being increasingly used in health care, interactive communication, and creating convenient living. Technology improves fast and becomes increasingly complex in order to serve the wellbeing-life for the unlimited wants of human beings.

2.4 Technology for Aging Persons

Aging adults form a huge group of population who spend a lot of time on television and are willing to receive news in many ways (Hilt and Lipschultz, 2004). Moreover, the majorities of computer users are married men with high education, and are already retired. Much research done is focused on assistive technologies and computer use amongst elderly people. Currently, the range of assistive technology has exceeded the traditional categories with many trends such as universal design (Hammel, 2004). One research compares elders with Alzheimer's disease whom have spouse as caregivers and receive environmental intervention to ones with the usual care services. The result is that the group receiving home environmental intervention reported fewer decline in self-care and fewer behavior problems after three months of treatment (Gitlen, Corcoran, Winter, Boyce, and Hauck, 2001).

In Wandke et al. (2012) research, there are six common myths in a field of human-computer interaction (HCI) and older people. One of myths mentioned is that elderly people are interested in using technology, but are unaware of a computer's capabilities. Another myth is that older people lack the physical capability to use ICT. Individuals who are responsible for the development, design, and introduction & marketing of ICT are responsible for creating interactive devices which can be easily used by every group of users.

Haber (1988) categorizes technology for older adult into three levels. The first category is high technology. High technology uses physical and chemical principles to report and define on the state of health of the elderly. The second category, middle technology, uses advanced principles in every-day equipment around home such as televisions, refrigerators, and stereos. The last category, low technology, includes devices such as furniture in bedrooms, bathrooms, mobile phones, and clothing. Research done by Selwyn, Gorard, Furlong and Madden, 2003; Selwyn, 2004; Eastman and Iyer, 2004; Lam and Lee, 2005; Reisenwitz, Iyer, Kuhlmeier, and Eastman, 2007; Wardt, Bandelow, and Hogervorst, 2011, shows many benefits for elderly people who use technology.

The benefits can be categorized into four categories. The first category is quality of life; technology can improve the quality of elderly people's living. For example, technology provides shortcut for older adults to access health information. It

will help encourage elders to realize their potential, to be less dependent and to take care of themselves. Technology will rehabilitate elderly people by moving their hands to use computers. Moreover, technology can also compensate for an older adult's limitations.

The second category is learning. Technology can stimulate older adults to learn, read, memorize, and think. These activities help to slow down early Alzheimer's symptoms.

The third category is communication. Technology provides an easy way to contact others, especially those who live far away. It is another way for older adults to communicate with society, even when they are at home.

The last category is psychology and mental health. Technology enables older adults with a better understanding of themselves and society. This can also decrease depression amongst older adults as well.

2.5 Motivations for Aging Adults to adopt Technology

Technology is a tool that meets specific functional goals. In order for a given technology to be employed successfully and thus realize instrumental goals, the user must have the necessary knowledge as to how the technology can be utilized, have the ability to cope with technological demands, and actually use technology to meet specific functional needs. To educate older adults, Saunders (2004) mentioned that they prefer to learn in individual class. It is more effective than learning by reading manual books and it should be slowly step by step due to elderly seeing and moving limitation. We need to understand the limitation of elderly to develop the information communication technology for elderly (Saunders, 2004; Lam et al., 2005; Abbey and Hude, 2009).

2.6 The Nature of Technology's Impact

The idea that technology can confer both benefits and losses to the user is not new. Some researchers argued that mass adoption of technology could lead to unanticipated consequences for society. A considerable body of literature has

developed in the last twenty years regarding the social effects of the computer in large organizations. Several empirical studies have suggested that, in certain circumstances, computer technology can alter task structures, roles, interpersonal relationships, and organizational structures. Broadly speaking, microcomputer technology can be evaluated in terms of its technological, economic, and social impacts (Venkatesh and Vitalari, 1985).

2.7 Categorization of Technology

There are different ways to categorize technology. Wylde (1995) pointed out the need to define a market for a technology. In order to understand the nature of the market, the following factors should be understood; type of technology, its context -the practical application and where, when, and by whom it will be used, and the orientation of presenting the product. It is also mentioned that the market for a technology depends on its definition. There are five broad areas of technology within the context of our everyday lives: telecommunication technologies, medical technologies, environmental interface technologies, personal technologies, and assistive technologies (Wylde, 1995). Others reported the major feature of this scientific approach is its focus on all day-to-day life domains of older people, not exclusively in illness and chronic conditions (Mollenkopf and Fozard, 2003). Fozard, Rietsema, Bouma, and Graafmans (2000) mentioned the application includes housing, personal mobility, transportation, communication, health, work, recreation, and self-fulfillment.

2.8 Attitudes of Aging Adults towards Technology

The barriers are a lack of knowledge about how to use the device, poor fit between the device and older adult's home environment, or the experience that the item is too cumbersome or painful (Luborsky, 1993). Older adults are resisting change and believe that technology is meant for the young (Rickettes, 2002; Saunders, 2004; Lam et al., 2005; Abbey et al., 2009). Learning how to use technology is important at every age. There are fewer elders who learn and adopt technology. Rickettes (2002)

found that 21% of older adult have computers in their home and about 8.8% who are able to use computers to connect to the internet. Although older people have limited capabilities of using technology, they are living longer and healthier lives. Thus, older adults should start to use technology more than others. Technology can make an elderly person's life more convenient. Moreover, it will make society more effective (Selwyn, 2004). Older adults are less capable of work due to their limitations. Thus, they have to rely on their families, thus affecting their mental health. Half of the elderly in India can't read. They are undereducated. 48% of older adults are unhappy in their elderly lives. Most of them have problems with their health such as high blood pressure, cataract, diabetes, arthritis, et cetera (Lena, Ashok, Padma, and Kamath, 2009). Another factor that causes older adults to resist adopting technology is their adaptation towards technology. The difficulty of using technology, no/minimal experience using technology, and also the innovation of technology are barriers for aging people to adopt technology (Loipha, 2011).

CHAPTER III
DATA COLLECTION

3.1 Research Methodology

This study's objective is to study the factors that cause aging people to resist technology, and to develop effective technology for aging people that can increase the quality of life of aging in the long term. The global aging population is increasing. Besides, technology can provide better lives for aging people by communication, health, entertainment, etc. Therefore, the key of developing effective technology for aging users is the way to support an aging society in the future.

Rogers (1995) researched that the innovation-decision process is the process an individual passes through from the initial knowledge stage to persuasion stage to decision stage then implementation stage and last step is confirmation stage. This process takes a long time to pass through a series of actions where an individual evaluates a new idea and decides whether or not to adopt the technology. This process could be probed for research because it is the mental process of an individual respondent. He concludes the evidence is the most clear-cut for the knowledge and decision stage and little for the persuasion stage. Another previous research, suggested that homogeneous in terms of education, gender, and income are also factors that cause aging adults to resist adopting technology. If aging adult has a high-income level, they would be willing to try new things (Ahn, 2008).

To find factors that affect the expectation of technology usage from aging adults in areas of healthcare, communication, and entertainment, according to Wandke et al. (2012), they propose a myth about aging's use of information and communication technology. They conclude that there are 6 main myths that cause aging adults to resist using technology. One of them is that aging adults who resist change are too old to learn new thing. Moreover, aging adults perceive that current design technology is designed for teenagers through size of fonts, colors, lay outs and also the method of using technology (Wandke et al., 2012).

3.2 Data Collection

The sample for this study is derived from quantitative research that measures the rating scale of 11 variables. The questionnaire has 11 questions, which are included with the demographic question, technology daily use, attitude in using technology, usage frequency of type of technology. These questions will benefit the Marketing Manager, Technology Innovator for knowing the expectations of technology usage in Thailand by aging adults to understand the future market of technology for aging adult users. Measurements include the pattern of using manuals in aging, the way that aging people learn new technology, the type of technology which aging adults usually use in everyday life, the level of their capability to use technology, who aging people stays with, and also, who supports their expenses.

CHAPTER IV
RESEARCH FINDINGS

Data Collection and Analysis

The sample of this study comprises people in Bangkok and the surrounding area who were of the ages 55 and older. There were 30 (13 males, 17 females) people who answered the questionnaire.

Table 4.1 Gender of respondents

Gender	Number of Respondents	Percentage of Respondents
Male	13	43.33%
Female	17	56.67%
Total	**30**	**100.00%**

Therefore, the data collected from the 30 respondents will be analyzed about their demography and their use of technology in detail.

From the education data in table 4.2 shown below, the information indicates that the majority are those who graduated only from primary school (46.67%); seven respondents have a Bachelor's Degree or higher (23.33%) and 20% of all respondents graduated from high school. As we have analyzed the education of Thai people who are aged 55 or older, about 66.67% of the respondents do not have a high school education. About 33.33% had received education at college level. However, this does not reflect the proportion of Thai people who are 55 or older in the whole country. Since this survey was conducted only around the Bangkok area, where there is a cultural emphasis on education, rather than working.

Table 4.2 Education of respondents

Education	Number of Respondents	Percentage of Respondents
Primary School	14	46.67%
High School	6	20.00%
Associates Degree	3	10.00%
Bachelor Degree	7	23.33%
Total	**30**	**100.00%**

After the education part of the sample had been analyzed, it is also important to understand how education would impact their expenses. In the Thai society, technology may not have a significant impact on their lives, but the amount of expense versus the level of education would reflect that education may or may not have a role in these older adults using technology. Table 4.3 shows the education versus the expense in each month (Baht).

Table 4.3 Education versus expense per month (Baht)

Expense (Baht)	Education				Total	Percentage
	Primary School	High School	Associate Degree	Bachelor Degree		
Less than 5,000	2	1	0	0	3	10.00%
5,000-9,999	4	0	0	0	4	13.33%
10,000-14,999	1	0	1	1	3	10.00%
15,000-19,999	3	0	0	0	3	10.00%
20,000-24,999	2	0	0	1	3	10.00%
More than 25,000	2	5	2	5	14	46.67%
Total	**14**	**6**	**3**	**7**	**30**	**100.00%**

It is also critical who takes care of expenses for these aging adults. Since some of them are living with their families or married couples, some may have more independence to spend than others. Table 4.4 shows various persons who take care of these expenses for the respondents.

Table 4.4 Who take care of expense?

Take Care of Expense	Number of Respondents	Percentage of Respondents
Self	11	36.67%
Husband/Wife	7	23.33%
Family	5	16.67%
Son/Daughter	6	20.00%
Relative	1	3.33%
Total	**30**	**100.00%**

Expense is not only important, but whom these aging adults are residing with may also influence how these aging adults use technology. Table 4.5 shows who are respondents are living with.

Table 4.5 Who are these aging adults living with?

Living With?	Number of Respondents	Percentage of Respondents
Self	1	3.33%
Husband/Wife	7	23.33%
Family	13	43.33%
Son/Daughter	8	26.67%
Relative	1	3.33%
Total	**30**	**100.00%**

After the demographic data has been exploited, the technical capability of these adults will be discussed next. The questionnaire asked respondents to rank the ability to use eight devices, smart phone, television, telephone, tablet, computer, MP3 player, CD/DVD player, and credit/debit card. The ability to use one device the most would be given the score of eight while the least capable would be given a score of one. Table 4.6, below, shows the number of respondents and their respective capabilities for each device.

Table 4.6 Technical devices capability for respondents

Scoring	Devices							
	Smart Phone	TV	Telephone	Tablet	Computer	MP3 Player	CD/ DVD Player	Credit/ Debit Card
8	4	15	10	0	1	0	0	0
7	2	11	12	2	1	1	0	1
6	4	1	4	4	5	1	7	4
5	2	0	1	1	2	7	11	6
4	2	1	2	1	1	8	8	7
3	2	1	0	4	7	5	2	9
2	4	0	1	9	9	3	2	2
1	10	1	0	9	4	5	0	1
Total	**30**	**30**	**30**	**30**	**30**	**30**	**30**	**30**
Score	**112**	**211**	**203**	**86**	**102**	**106**	**139**	**121**
Ranked	**5**	**1**	**2**	**8**	**7**	**6**	**3**	**4**

From table 4.6, it shows that the ability to use the television by aging adults is the highest; followed by the telephone, CD/DVD player, credit/debit card, smart phone, MP3 player, computer and tablet. This maybe so because the television was available a long time ago compared to others. The telephone comes in at second place where there are still a lot of people who use it. The CD/DVD player is at third place where it is widely used along with the television. Since money has to be used every day, credit/debit card is also necessary. Smart-phones is another device that is now necessary in life. However, it is interesting to see that MP3 players are ranked ahead of computers. Many aging adults may use MP3 players more than computers since MP3 is portable data that can be used anywhere that a computer cannot. And lastly, tablet, which may seem to be quite new, but the popularity is also gaining since there are two scores of 7.

Focusing on health and other technologies. By dividing technologies into four groups, health, communication, entertainment, and education, respondents put

their preferences of how they use these technologies. With four being most used and one as less used, the result is shown on table 4.7 below.

Table 4.7 Use of technology for different purpose

Scoring	Use of Technology for …			
	Health	Communication	Entertainment	Education
4	1	19	9	1
3	6	8	14	2
2	21	1	6	2
1	2	2	1	25
Total	**30**	**30**	**30**	**30**
Score	**66**	**104**	**91**	**39**
Ranked	**3**	**1**	**2**	**4**

From the survey data, it shows that technology is used most for communication. Second ranked is entertainment. It is very interesting to see that technology for health and education are ranked third and fourth respectively. For those over 55 years old, they may not think about education as their main purpose for using technology since they are already well established (as shown in table 4.3 that shows the amount of monthly expenses). Almost 50% are spending more than 25,000 Baht per month.

So, after the uses of technology were investigated, the questionnaire asked further if these adults are using any technology in regards to their health. The response received is as follows in table 4.8.

Table 4.8 Use of health technology

Use of Health Technology	Number of Respondents	Percentage of Respondents
Yes	3	10.00%
No	27	90.00%

Total	**30**	**100.00%**

This shows that only 10% of respondents are using some health related technology. Breathing devices, electric wheelchairs, and treadmills are some of the responses received from the survey. Others may not require technology for health, as they do not have any disease or illness.

Since technology development moves rapidly and exponentially, the survey also asked whether aging adults are reading the instruction manuals prior to using any technology device and if they find it easy to understand. Table 4.9 and 4.10 below show the results of the survey.

Table 4.9 Reading instruction manual prior to using devices

Study Manual prior to using	Number of Respondents	Percentage of Respondents
Yes	12	40.00%
No	18	60.00%
Total	**30**	**100.00%**

The result from table above shows that 60% does not read the instruction manual for various reasons. Most of them responded that it is quite difficult to understand and may have other people to teach it to them. However, the other 40% responded that they would study the instruction manual prior to using the devices. Reasons provided were it has large fonts and they would want to understand how to use it before actually using it.

Table 4.10 Instruction manual is easy to understand

Easy to understand	Number of Respondents	Percentage of Respondents
Yes	13	43.33%

No	17	56.67%
Total	**30**	**100.00%**

From the survey, 13 out of 30 responded that the instruction manual is easy to understand because it may have large text and there are pictures provided to help. While the other 17 said that it may be difficult because small text and technical terms.

The last question that asked in the survey was to rate their own ability in using technology to help make their life more comfortable. The ratings given on the scale of zero to five, with zero is not using any technology in daily life, and five is using technology fluently in every day's living.

Table 4.11 Ability of using technology in daily life

Using Technology Ranking	Number of Respondents	Percentage of Respondents
5	0	0.00%
4	6	20.00%
3	12	40.00%
2	9	30.00%
1	2	6.67%
0	1	3.33%
Total	**30**	**100.00%**

The results in table 4.11 show that 60% of the respondents have more than medium capability in using technology. This shows that technology is playing bigger roles in aging adults' life.

CHAPTER V
DISCUSSION & CONCLUSION

Suggestions and Recommendations

To be able to convince aging adults to use technology more, technology manufacturers should focus on providing the most user-friendly experience for users of all ages. The technology front should not only be more user-friendly, but customer service must be provided to help as well. Price is also a factor. Most aging adults are either semi-working or retired. Their savings might be low so they may not be able to afford expensive new technologies. Instruction manuals are also important. If instruction manuals are made with full text, it might not be interesting as animated or pictures. Also, the size of text is very important. Many aging adults will have a hard time reading small size texts. Also, technology that can do many things in one device may confuse the target group, as it is better to do one task at a time rather than many things at once.

Conclusion

As seen in the survey's result, there's not much technology used with regards to health. Only 10% of the respondents use any type of technology for health at all. However, once the population gets older, technology towards health would be more of a concern. Also, the results also show that technology for technology is used most for communication. This is because aging adults may not have many places to go to. They may not work since they are retired, but they still want to get connected to other people as well. Elders are often left at home with a lot of free time as well. They would want to stay entertained without being bored. This is why they use technology

for entertainment as well. Watching television and listening to the radio are just a few examples of how they use these technologies.

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