

# Opportunities of ICT Innovations to Enhance Eudaimonic Wellbeing among Middle-aged Adults

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**Abstract:** Facing the problems of economic downturn, peer competition and low life quality, modern people's well-being is getting low, especially middle-aged population. Middle-aged population has the responsibility of working and taking care family, these made them exposed under depress, pressure and then loss their life meaning (Arthur A. Stone, 2010). Though this problem is become serious, only few researches concerned well-being among middle-aged adults. Some researchers use Information and communication technology (ICT) as a tool to enhance well-being of middle-aged population because in 2012 market survey (The Central News Agency, 2012) , middle-aged population has the largest number of using of intelligent computers and tablet PC. In this study, we focus on these middle-aged adult, whom age are from 35 to 55, and conducted a questionnaire. The questionnaire uses nine well-being dimensions to analysis positive and negative events. According to the result, this study provides several opportunities and recommendations of ICT products; hope we can enhancing well-being among middle-aged adults from the aspect of ICT.

**Keywords :** *eudaimonic, well-being, middle-aged, design opportunity, ICT innovation*

## 1. Introduction

Well-being is an extensive and complex concept. According to the definition offered by the CDC, USA, well-being is a meaningful concept for people and society, because it expresses how people feel about their lives (CDC, USA, 2013). Shin and Johnson considered that well-being is the judgment of quality of life by personal criteria. Some researchers define well-being as the optimal psychological function and experience (Ryan & Deci, 2001). Although it seems like a very complex concept and no a consensus on a definition exists, all definitions are based on the core concept of living a satisfied life or being in a positive mental condition, such as being content, happy, healthy or comfortable

The concept of well-being has attracted more attention in recent decades. There are a lot of researches related to well-being in many domains up to the present. In the psychological domain, Ruuskanen studied the relationship between physical exercise and psychological well-being among older adults. The results of the study showed that exercising could improve psychological well-being among the elderly. In the behavioral domain, Steger studied whether human well-beings were influenced by different daily behaviors. The research found that well-being obtained from pleasure-seeking behaviors (such as getting drunk, watching TV) was more short-term than that obtained from meaningful behaviors (such as helping others, expressing gratitude) and didn't contribute to general well-being. In the music related domain, Laukka studied how musical activities impact well-being among older adults. The results of the research showed that listening to music was a common activity and a frequent source of positive affect for older adults.

To understand the relationships between well-being and daily lives, several well-being surveys have been done by researchers. These surveys show young people and the elderly have high well-being, and middle-aged adults have the lowest well-being. The relationship between well-being and age distribution is a U-shaped (Andrew E. Clark, 2006; Arthur A. Stone, 2010). Stress and worry (such as economic stress from keeping a family, work stress from employment) increasing with age and body function decreasing compared to young adults are the primary reasons that cause the lowest well-being to be land among middle-aged adults. However, due to a change in mental state and children's independence, well-being starts to rise again with age at about 50 years old.

Today, human daily life is tightly connected with information and communication technology (ICT). ICT products (such as cell phone and computers) are used by almost every person. In consideration of the importance of ICT in modern life, ICT should play an important role in human well-being. Thus, several researches have been conducted which explore the relationship between ICT and well-being. Zhang used a questionnaire to survey whether the relationship between online shopping is same as for realistic shopping. The results show that a number of people felt that well-being obtained from online shopping was as positive as from realistic shopping, but the others felt that it was negative. Patti M used questionnaire to search the relation between using Internet and well-being among teenagers. The result was that internet communication has a positive influence with well-being via the mediator closeness to friends, but has a negative influence by internet communication with strangers (Patti M., 2007). Shapira studied how the use of ICT was related with well-being among older adults. In this study, the

elderly were trained to use computers and interviewed. The results showed that elders' interpersonal activities and well-being could be enhanced by using internet (Patti M., 2007). Recently, some researches have paid attention to the relationship between well-being and the design of ICT products. Lim studied ICT design among older adults. Lim suggests that designers should consider the technology generation effect when designing ICT products for use by older adults.

## **2. Literature review**

### **2.1 Overview of well-being concepts**

Well-being is an extensive and complex concept. The basic idea of well-being is living with satisfaction, health and pleasure. There are many theories put forward to approach the concept of well-being. The most common perspectives are 'subjective,' and 'objective' perspective is the contrasting concept of the subjective perspective. The other two perspectives "Eudaimonic" and "Hedonic" are also studied in a lot of research in recent decades.

- Subjective well-being vs. Objective well-being

What Subjective well-being (SWB) concerned about is personal subjective judgment of satisfaction with life and self-emotion. On the other hand, Objective well-being (OWB) concern about objective factors which could influence one person's life such as income and environment. Diener defined and categorized SWB into three dimensions: high satisfaction with life, experiencing and obtaining of positive affects, and decreasing and avoiding of negative affects (Diener, 1984). SWB is judged by personal subjective perspective; that's why it is called "subjective well-being" (Anna Alexandrova, 2005). On the other side, OWB is judged by objective criteria (such as income, social environment). Many countries established their own well-being indexes. These indexes might be composed with GDP, health index, education level, and other objective indexes used to judge one's objective life condition.

- Eudaimonic well-being vs. Hedonic well-being

Many philosophers and religious people from Eastern and Western countries were exploring the concepts of Eudaimonic well-being (EWB) and hedonic well-being (HWB). Some psychologists defined EWB as "achieve self-fulfillment, sense of accomplishment and meaningful life" (Ryan & Deci, 2001; Ryff, 1989; Waterman, 1993). Normally, pursuing more meaningful goals or engage in more meaningful activities can enhance EWB. In personal behavior, eudaimonic behavior such as volunteering activities, expressing appreciation) are helping the improvement of EWB (Steger et al, 2008). From hedonic perspective, well-being is the pursuit of pleasure (Kubovy, 1999). HWB is a relatively short-term and immediate pleasure. The main concept of HWB is pursuing pleasant effect and avoiding unpleasant effect. In personal behaviors, hedonic behaviors (such as overeating, drinking, playing video games, or watching TV) are helping the improvement of HWB (Steger et al, 2008)

The influence on general well-being by well-being obtained from eudaimonic behavior is more durable whereas pleasure from hedonic behavior is more short-lived. Although two perspectives seemed very different, there is a small overlapping part between them (Richard M. Ryan & Edward L. Deci, 2001). From the finding of Steger's

studies, even people with different motivations for engaging in certain activities, such as exercising and playing the instruments, can enhance EWB and HWB simultaneously (Steger et al, 2008).

- Comparison of four well-being concepts

The concept of HWB is similar to SWB in term of experiencing positive effect and avoiding negative effect. But the positive affect mentioned in SWB is wider. It could be obtained by hedonic behaviors (such as pleasure from eating food) or eudaimonic behaviors (such as happiness from helping people). From the eudaimonic perspective, well-being means making efforts to achieve personal excellence and the development of individual potential. Sometimes negative affects couldn't be avoided in the pursuing process. On the other hand, the aforementioned positive effects make people obtain a sense of achievement and purpose.

The concept of OWB concerns about objective materials and external environment instead of psychological status. Thus, OWB does not overlap with other well-being concept but might influence other psychological well-being. For example, life satisfaction might be influenced by living environment and material pleasures might be influenced by income.

## **2.2 Research on lifestyle and well-being**

Every person has unique characteristics and lifestyle. Currently, a lot of research found that there are intense relationships between lifestyles and well-being. Some research focused on exploring how lifestyle influences well-being. For example, Dennerstein studied the influence on well-being by menopause and lifestyles among middle- aged females via telephone interview. The result showed that influences on well-being caused by lifestyle (such as smoking, exercising) are more intense than by endocrine changes of the menopause (L Dennerstein, 1994). On teenagers, Regina used a questionnaire to survey lifestyle behaviors and psychological well-being among Chinese teenagers and explored the factors that influence teenagers' well-being. The result showed that parental lifestyle intensely influence teenagers' lifestyle and well-being. Thus the study suggested that health-promoting and well- being-promoting efforts should based on family (RLT Lee, 2011).

On the other hand, Alexandra used the AIO schedule (Activities, Interests, Opinions) to survey the subjective well- being among the customers with different types of lifestyle. The result showed that well-being is indeed related to lifestyle. It seems that people with different lifestyles have different opinions and perspectives on well-being. Alexandra suggested that lifestyle segmentation should provide a more efficient way to subjective well-being promoting (Ganglmair Wooliscroft. A, 2011). Creech study the relationship between music creation and well-being among the elderly. The research conduct 3 studies, requesting those elders to engage in different levels of music activities, then examined the relations between well-being and music by questionnaires, interviews within a focused group. The result showed that music helped enhancing the elder's control, autonomy and provided a sense of purpose (Creech. A, 2013). According to these research studies, we found that we can enhance personal well-being through satisfying people with different lifestyles by several ways.

## **2.3 Research on enhancing well-being with ICT**

Recently, a lot of research of ICT focused on exploring whether activities could enhance well-being. For example, Ko studied whether self-disclosure behavior on blog enhances of well-being. The result showed self-disclose might improve bloggers' well-being such as satisfaction with social contact, interpersonal communication, and overall quality of life (HC Ko, 2009).

And several studies focused on the influence on well-being by ICT. For example, to figured out the potential relationship between Internet communication and well-being, Valkenburg tested two contrasting hypotheses “online communication reduces adolescents’ well-being” and ” online communication enhance adolescents’ well-being” by conducting an online survey of 17 years old adolescents. The result suggested that adolescents’ well-being is positively related to time spent in communicating with existing friends via Internet (PM Valkenburg, 2007).

In another study of the relationship between the Internet and well-being among teenagers, Selfhout surveyed the loneliness, social anxiety, depression and Internet use among 307 teenagers (average age of 15) by questionnaires. The result showed that Internet activities had no effect on well-being among teenagers with high quality friendship. On the other hand, well-being of teenagers with low quality friendship was indeed related to Internet activities. More internet communication activities had positive effects on depression and social anxiety. Also more internet non- communication activities had negative effects on depression.

In the other study on whether elders’ well-being could be enhanced by using the Internet. Older adults who participated in the experiment live in day-care centers or nursing houses. They were split into control and experimental group. The experimental group took the computer operation and Internet browsing course, and the control group engaged in other activities. The result of Individual semi-structured interviews showed that computer and Internet use seems to enhance older adults’ well-being (N. Shapira, 2007).

From these research, we found that ICT is indeed related to well-being closely. Through the design of ICT, there might be several opportunities of enhancing well-being.

## **3. Methodology**

### **3.1 Participant**

In this study, participants were found from public places such station, shops and fast-food restaurants in Tainan and Chiayi City, Taiwan. Effective sample are 99 out of 112. 99 participants recruited in this study were 50 males ( $M = 42.74$ ,  $SD = 5.5$ ) and 49 females ( $M = 42.55$ ,  $SD = 5.38$ ). The percentage of age was 35-39 (30%), 40-44 (36%), 45-49 (18%) and 50-55 (15%). 87 of them were married, 7 were single and 5 were divorce.

### **3.2 Procedure**

In this study, we used paper form questionnaire. The questionnaire were sent to middle-aged adult in Tainan, Chiayi City, Taiwan by graduate students.

There was a description of the investigation object and notation noticing that it was an anonymous survey and the information wouldn't be disclosed in the first page of questionnaire. Graduate student also did an oral explanation before participants responded and asked for consent. Each participants took about 10 minutes to finish the questionnaire.

120 samples had been collected after two weeks data collection. 99 effective samples left after removing invalid samples (such as unfinished and didn't conform to age requirement).

### 3.3 Instrument

The questionnaire used in this study included 3 parts: demographic characteristics, scales of subjective well-being and scale eudaimonic well-being.

- Demographic characteristics

Since the difference of characteristics and personality, people live different lifestyle. For example, men's and women's lifestyle must be different. In this part, gender, age, married status, occupation and hobbies were included to understand different lifestyles of middle-aged adults.

- Scales of subjective well-being

Scale of Positive and Negative Experience (SPANE; Diener, 2009) is a 12-item scale. Items are rated on a 5-point scale ranging from 1 (Very Rarely or Never) to 5 (Very Often or Always). It measures the frequency of affect experience the past four weeks. It includes 12 items, six of them are positive affects (such as pleasant, contented) and the others are negative affects (such as sad, angry).

- Satisfaction with Life Scale

Satisfaction with Life Scale (SWLS; Diener, 1985) is a 5-item scale. Items are rated on a 7-point scale ranging from 1 (absolutely untrue) to 7 (absolutely true), designed to measure individual life satisfaction. For example, "I am satisfied with my life", "The conditions of my life are excellent".

- Flourishing Scale

Flourishing Scale (FS; Diener, 2009) is an 8-item scale. Items are rated on a 7-point scale ranging from 1 (absolutely untrue) to 7 (absolutely true), designed to measure the individual self-perceived success in many area. Examples of item of FS are "My social relationships are supportive and rewarding." and "I am optimistic about my future".

- Scale of eudaimonic well-being.

Questionnaire of eudaimonic well-being (QEWB; Waterman, 2010) is an 21-item scale. Items are rated on a 5-point scale ranging from 0 (absolutely untrue) to 4 (absolutely true). Items are sorted in 6 different dimensions: Self-Discovery, Personal Growth, Purpose in life, Investment of significant effort in pursuit of excellence, Intense involvement in activities, Enjoyment of activities as personally expressive.

### 3.4 Data analysis

In this study, the Chi-square analysis was used to determine the relation between technology-related hobbies and other demographic variables. In the other hand, T test and Wilcoxon signed-rank test were used to determine whether scores of these scales differed by hobbies. And sorted the events responded to the open-ended questions

into some categories (such as family, static activities) by affinity diagram. Then determined the relations between these events and whether hobbies were related with technology.

## **4. Result**

### **4.1 Overview of well-being among middle-aged adult**

The mean score of each dimensions were: Positive Affect ( $M = 21.6$ ,  $SD = 4.1$ ); Negative Affect ( $M = 15.8$ ,  $SD = 3.5$ ); Affect Balance ( $M = 5.8$ ,  $SD = 6.7$ ); SWLS ( $M = 25$ ,  $SD = 6.5$ ); FS ( $M = 43.3$ ,  $SD = 7.8$ ); QEWB ( $M = 54.7$ ,  $SD = 8.1$ ). It showed that middle-aged adults are generally unhappy in each well-being dimensions.

### **4.2 Demographic comparisons**

- Gender

Mean scores of each scales for females were higher than males.

- Marriage

Marital status were single, married and divorced. Mean scores for married people were lower than single. And divorce people had the highest scores.

- Age

In this study, participants were divided in four aged ranges: 35-39, 40-44, 45-49 and 50-55. When getting older, frequency of positive affect increased and negative affect decreased. Affect balance is getting better with age. The mean score of SPANE-AB of 50-55 years ( $M = 9.6$ ,  $SD = 3.85$ ) is better than 45-49 years ( $M = 7.5$ ,  $SD = 5.48$ ) and 35-39 years ( $M = 4.8$ ,  $SD = 6.93$ ). In the other side, SWLS, FS AND QEWB scores did not significant differ by age among middle-aged adults.

- Occupation

63 of 99 participants reported their occupation. 24 of them had service trade job, 25 non-service and 14 did not have a job (includes house keeper and retired). The result showed that well-being scores did not significant differ by occupation.

- Hobbies

In this study, participants' hobbies were sorted into two categories : tech related/non-tech related and indoor/outdoor/both. 53 of respondents have technology-related habit (e.g., watching TV, taking photos). 52 people reported they have outdoor (e.g., playing tennis, jogging) and indoor habit (e.g., reading, using computer), 15 people have only outdoor habit, and 32 people have only indoor habit.

Participants reported with outdoor hobbies had the best performance in each scale. And participants with both of indoor and outdoor hobbies had worse in each scale.

### **4.3 Demographic characteristics of lifestyle with technology-related hobbies**

The study comparison of the characteristics (like gender, occupation and indoor/outdoor hobbies) of the middle-aged adults who had technology-related hobbies with others do not have technology-related hobbies. It showed that gender, occupation and indoor/outdoor hobbies did not differ by technology-related hobbies. The different characteristics among middle-aged adult who reported with technology-related hobbies. According to our study, man are higher proportion of lifestyle with technology-related hobbies than woman. People who occupation in services that their hobbies easier to mention tech than non-service people.

Chi-Square analysis In this study, we used Chi-square analysis to test the relation between technology-related hobbies and other demographic variables. The results showed that two categories of hobbies were significant related , $\chi^2(2, N = 99) = 21.97, p < .0001$ . But hobbies did not differ by other variables, such as gender,  $\chi^2(1, N = 99) = 0.508, p = .476$ , and occupations,  $\chi^2(2, N = 63) = 0.350, p < .839$ .

#### 4.4 The relation between well-being and technology-related hobbies

To test the relations between scale scores and hobbies related with technology or not, we used T test to test QEWB and SPANE (Table 1). And we used Wilcoxon Signed-Rank Test to test SWLS and FS because the scores were not normal distributions (Table 2). The scoring of each scale are different, so in this study we converted the scores to make analysis easier. We converted the full score of QEWB/FS from 84/56 to 100. And SPANE-AB was converted from range -24 to 24 to 0 to 48. The result showed that the relation did not significant differ between hobbies and well-being score in each scale. It meant that whether hobby was related with technology did not influence one's subjective and eudaimonic well-being.

Table 1. The comparison of scores of QEWB, SWLS and FS between Tech and Non-tech hobbies.

T Test									
Scale	Tech			Non-Tech			95% CI for Mean Difference	t	df
	M	SD	n	M	SD	n			
EWB_100	65.377	10.4	53	64.848	8.459	46	-4.349, 3.29	-0.28	97
SPANE+24	29.547	6.62	53	29.543	6.905	46	-2.705, 2.698	-0.00	97

Wilcoxon Signed-Rank Test						
Scale	Tech		Non-Tech		z	p
	N	Mean rank	N	Mean rank		
SWLS	53	45.11	46	55.63	1.817	0.0692
FS_100	53	46.17	46	54.41	1.422	0.1549

This study used Pearson Correlation Coefficients to determine the relations between age, Hobbies and score of four well-being scales (SPANE, SWLS, FS and QEWB). The results was showed in Table 2. There was a liner correlation between SPANE and (r = .245,  $p < .05$ ). Correlations were low to moderately (.381 to .716,  $p < .05$ ) between the scores of four well-being.

Table 2. Correlation between well-being scales and demographic variables

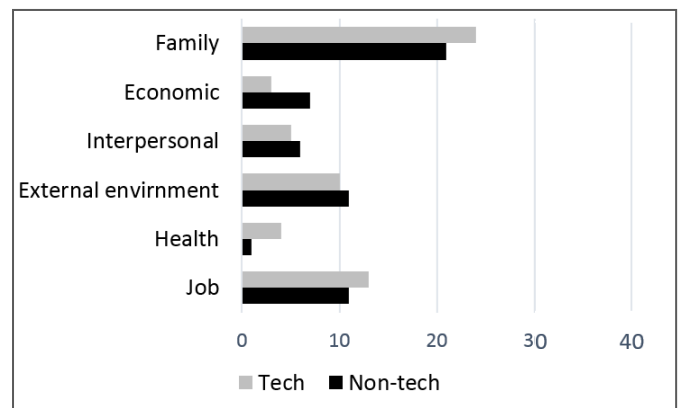
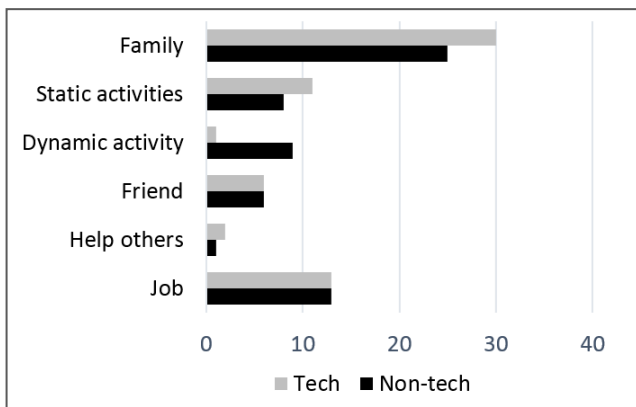
Variables	1	2	3	4	5	6
1 Age	-					
2 Tech_Non-tech	-.158*	-				
3 SPANE	.245*	.000	-			
4 SWLS	.096	-.118	.526*	-		
5 FS	.137	-.121	.535*	.678*	-	
6 QEWB	.077	.028	.381*	.415*	.716*	-

\* $p < 0.05$ , two-tailed



And the result of the open-ended questions showed that most positive affect were came from family, especially from children (such as children well performance on every aspects) and leisure activities (such as watching TV). And negative came from work (such as tired of job) and family (such as worry about parents' health). We sorted these events in to some categories ( positive event: job, helping others, friendship, statistic and dynamic activities, and family(Figure 3); negative event: job, health problem, external environment, interpersonal relationship, economic, and family)(Figure 4). It seems that the events and activities related to the well-being of a middle-aged adult is not apparent related with wether do he/she have technology-related hobby or not.. But from Figure 3 can find that

- Doing family activity and static activity have more opportunity to bring positive affect by tech. Figure 3 and figure 4 show that family is the most important part which influence middle-aged adults well-being most. And events related with job and also makes contribution on both of positive affect and negative. It also shows that leisure activities including static and dynamic activities, friendship and helping others create positive affect. In the other hand, economic stress, interpersonal problems and external envirnment condition create negative affects.



The result of questionnaire shows that generally middle-aged adults are not very happy. The average score in each dimension of well-being are below 73%. To study the relationship between the score of each dimensions of well-being and diffenret lifestyle, the data of participants are sorted by different demographic characteristics and compared.

- The result of score of well-being shows that middle-aged adults generally feel they do not understant themsleves every well. The do not know what are they good at and what is good for them. Some of them even think that others could understand themsleved much better.
- Middle-aged adults also feel fault on self-potential developement and do not satisfy with their self-expressiveness.
- The care about others judgment more than enjoyment of invloving activities which they like. They can not enjoy in expressing themselves very much in activites.
- Another phenomenon is that some of middle-aged adults feel losing meaning and did not find the goal of life. These people also not satisfied with their social relationship and feel worry about future, especially man or younger middle-aged.

- The result also shows difference between man and woman. Such as both of man's and woman's score of well-being on self-potential development, but man's (61/100) seems much better than woman's (49/100). And to make one keep doing something, the feedbacks from the thing he/she is doing are important to man than woman.
- In the understanding and the development of self-potential well-being, man slightly higher than woman.
- Even with different life style, the score of life satisfaction is generally higher than other well-being dimensions. But middle-aged adults generally think that if they can live their life over, they would want to change something. The result shows that middle-aged adults do not satisfy their current life very much, but 40 to 50 years old adults have higher satisfaction with their life.
- These people also not satisfied with their social relationship and feel worry about future, especially man or young woman of middle-aged.

## 5. Discussion

The results of well-being score showed that middle-aged adults were not very happy in each dimension. Means the design for enhancing well-being among middle-aged adults is necessary. This study assumed that well-being should be influenced by different demographic characteristics. The result showed that well-being of middle-aged adults did not significantly differ by some variables (such as gender, occupation). Overview of well-being on gender, females seem happier than males. And the divorced live better than the single and the married. But most of middle-aged adults were married, the sample of single and divorced were too small. But the score of different characteristics did not show significant difference. When design of ICT to enhance well-being, designer will not necessarily consider the differences. In past, many researches of ICT focused on exploring whether activities could enhance well-being. We know ICT is used in teenagers and older adults or through tech to enhance their well-being. According to our result that middle-aged adults' relation between well-being and tech, and it will be many opportunities of ICT innovations design.

### 5.1 Recommendation

From this study result, we know the middle-aged adult not feel very well-being. There are several recommendations of designing ICT products are provided for enhancing well-being among middle-aged adults.

- Middle-aged populations generally considered not very understanding of their own, and do not know what your talent is, what is their own good. In the understanding and the development of self-potential well-being, man slightly higher than woman. Even feel others more than own to understand themselves. About this, and the study provide idea about this situation. Constructing a system through net, and middle-aged adult can log in the system to share their skills and other can give them some words of praise. After about three months of using the system can receive information about the field of self-exploration and talent scale. To help them to understand themselves.
- This study also found that middle-aged adults feel dissatisfied on activities involving and self-expressiveness. They can't enjoy in expressing themselves very much in activity. According to the result,

the other recommendation is encouragement of involving into the activities they like could also enhance the well-being among middle-aged adults. There are many ways to encourage middle-aged adult such as the ICT product could provides social functions or interactive interface by using which users can assemble others with same hobby to join activities together. And users have more opportunity to express themselves vigorously in the activities with less limitation via the product using.

- In all aspects of well-being, middle-aged in the activities of their own individual performance was most dissatisfied, and they can't enjoy themselves in the performance of activities. We recommend that the ICT product can be designed to collect the event of activities, and perform the achievement for the middle-aged.
- Some of middle-aged adults feel losing meaning and did not find the goal of life. This study also suggests the ICT product design could include goal setting function. Users can setting their own goal and record anything they do for achieving it. For instance, the production like smart APP or system to record their goal and remind some of the information about their dreams to them. And the product should provide some feedback as achievement when users complete their goals. The daily events recording should be also important in this suggestion. Thus users can review their lives via reviewing those events from the product and some of them might figure out the goal or the meaning of life.
- Middle-aged adults do not satisfy their current life very much. For example, Memoto is a mini-camera, it can automatically take the photos and classified photos. It can also download the photos which were transferred by the App. It helps users to record, recalling the good things, and increase life satisfaction (Wikipedia, 2013).
- Middle-aged adult doing family activity have more opportunity to bring positive affect form the result. According to this, designer can design a 'wellbeing App' to adult. Providing interactive channel to adult with their family, and let them feel they be concerned from their family. For other example, Toast Messenger is a ICT product (Sasha Tseng, 2007), and it provide a chance to increase communication among the family numbers. It can leave the message on the toast to other numbers. And then, it will help middle-aged adults enhance the well-being in the family life.

There are some opportunities of recommendation to enhance middle-aged adult. Whether through interactive system or via the ICT product enables better understanding themselves. This research uses opportunities of ICT innovative to let middle-aged adult get more well-being.

## 5.2 Directions for future research

This study provided a new method of researching for design opportunities to enhancing well-being. This method could be used in different group of people or different product design in the future to figure out the best ways of enhancing well-being.

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