DIGITAL INCLUSION AND QUALITY OF LIFE: A CASE STUDY OF ELDERLY CITIZENS LIVING IN AN ERA OF DISRUPTION

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ABSTRACT

Investigating the quality of life in the elderly citizens, personal and digital inclusion factors were evaluated to determine the level of influence these play on overcoming problems and obstacles faced by senior citizens. In this research, data collection was obtained through the use of in-depth interviews with 3 government officers and questionnaires from 380 senior citizens. Statistical analysis included the use of percentage, mean, standard deviation, t-test, One-way ANOVA, multiple regression, and LSD. Qualitative finding indicated that Government staffs' viewed online public services as problematic rather than beneficial for the elderly; and that they are short of online service provision. Quantitative data showed four out of five digital inclusion factors, including accessibility, use, skills, limitations, and the source of literacy, influenced the quality of life of the elderly at 65.1 %. Also, that the level of digital inclusion was high, while the quality of life was at a medium level. While 'access' was considerably high, 'usage' was limited to only one application, therefore, they indicated a limit level of functional 'skills' and literacy in elderly. It is recommended that integrative and innovative approach should be formulated at event, process, and system levels, in order to deliver public services for all citizens anytime, anywhere, regardless of time, place, and other geographical barriers.

Keywords: Digital Inclusion, Quality of Life, Elderly, Intergenerational Family, Era of Disruption, Aging Society

INTRODUCTION

Twenty years ago, no one would have thought digital communication would have changed the way we navigate through the world entirely. During the twenty years period, "half of Fortune 500 companies have gone out of business" (Schrock, 2019). Blockbuster and Polaroid Corporation, for example, were the ones of the million dollars companies that went bankrupted as a result of disruptive innovation. In this era, countless of companies have tried to invent and reinvent themselves in order to survive. In an era of disruption, nothing is ever predictable as uncertainty and unpredictability became part of our everyday lives. Today, it is all about speed, not size, and those who adapt quickly are the new winners.

Success in an era of disruption depends on organisations', whether public or private, ability to evolve while maintaining equilibrium between achieving short-term financial results and the dexterity to capture new opportunities. In this strikingly competitive era, organisations must engage in an actual change as the past success is no longer a justification of its future (Haseeb, Hussain, Kot, Androniceanu & Jermsittiparsert, 2019). Technology-driven disruption has opened up market to global competitions, and market changes can occur overnight. Nowadays, technological investments are the key for transformation. Those who have an ability to invest and those who have more resources, have higher chance of survival in an era of disruption.

Although the magnitude of such impact can be difficult to interpret, but, undeniably, governments everywhere are facing colossal amount of un-payable debt as they struggled to successfully navigate through disruptive challenges. Governments are also under enormous tension as they tried to overcome the complexity between stipulating new innovation while fostering effective regulations. Today, citizens everywhere demand for better products and services as they, also as consumers, became accustomed to price reduction and fast-paced services throughout industries. As governments are trying to grapple between the past and the future reform, digitalisation had already enabled a tremendous power transition from governments to its citizens. In the past, governments' role was to deliver a forced cooperation, but today it is all about mutual collaboration. We have progressed from an era where citizen being under control to citizen in control, and instead of placing trust in a strong leader, we chose to trust in each other and not in a 'servant' leader (Suarez & Abdallah, 2019).

Despite the shift in power, the role of governments is greater amplified more than ever as they are the key performer to stipulate national changes and deliver a high quality of life to its citizens and residents (Suarez & Abdallah, 2019). Relatively, The World Government Summit 2019 outlined an ADAPT framework to help organisations strive through disruptive challenges. Correspondingly, the PwC initiated the Government and Public Sector Readiness Imperatives in an Age of Disruption guideline comprised of seven principles, which included governments 'being digital' and 'building citizen-centered organisational performance'.

Undeniably, digital inclusion is, therefore, a key to social inclusion in the 21st century which "ensures individuals and disadvantaged groups have access to, and skills to use, Information and Communication Technologies (ICT) and are therefore able to participate in and benefit from today's growing knowledge and information society" (Twenty-twenty Trust, 2021). In this light, the 2020 Trust created by the New Zealand Government referred to the UK Government's Digital Inclusion Strategy which stated that digital inclusion is defined by digital skills, connectivity, as well as accessibility which designed to "meet all users' needs including those dependent on assistive technology to access the services" (Twenty-twenty Trust, 2021).

Respectively, 'meeting all users' needs' included an ability to respond to elderly's accessibility. Various research conducted by authors such as Bernard, et al., (2001); Chadwick-Dias, et al., (2002); Chadwick-Dias et al., (2004); Fidgeon (2006); Zhou, et al., (2012); Wagner, et al., (2014); Sonderegger, et al., (2016); Castilla et al., (2018); Chua et al., (1999); Gitlow (2014); Hargue & Payton, (2010); Shively (2017) indicated how senior citizens were left out of the equation and barred from the accessibility.

These findings are a major concern that needs to be addressed globally, in particularly as the world progressed towards a full-fledge aging society. Relatively, this study aims to investigate: 1) the level of digital inclusion in elderly citizens; 2) the problems and obstacles associated with digital inclusion in elderly citizens; 3) the level of quality of life in elderly citizens based on personal factors such as gender, age, occupation, level of income, marital status, level of education, and family structure; and 4) the quality of life in elderly citizens influenced by digital inclusion factors such as use, accessibility, attitudes, skills and limitations, and source of literacy.

LITERATURE REVIEW

Digital Inclusion

The independent variable used in this study comprised of personal variables and contributing variables. Contributing variables are digital inclusion variables comprised of use, accessibility, attitudes, skills and limitations, and source of literacy. These 'digital inclusion' variables were extensively studied and accepted throughout international research conducted by government entity such as the United Kingdom and the New Zealand governments, as well as other researchers such as

Bernard, et al., (2001); Chadwick-Dias, et al., (2002); Chadwick-Dias et al., (2004); Fidgeon (2006); Zhou, et al., (2012); Wagner, et al., (2014); Sonderegger, et al., (2016); Castilla et al., (2018); Chua et al., (1999); Gitlow (2014); Hargue & Payton, (2010); Shively (2017). Digital inclusion, by definition, refers to accessibility and literacy in digital technology. Helsper (2008) stated that digital inclusion, in general terms, is determined by use, access, attitudes, and skills of users.

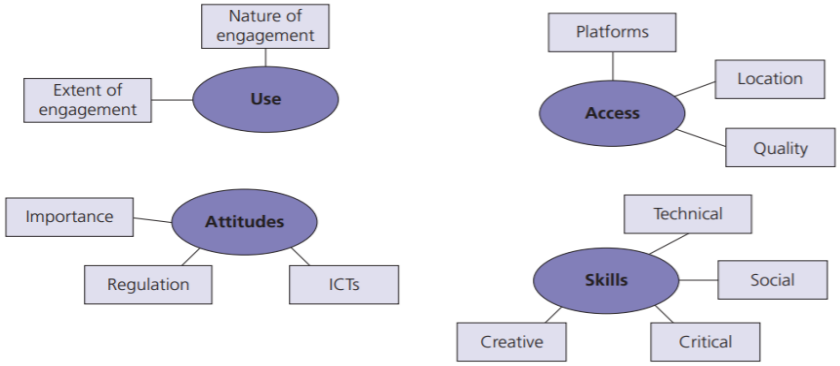

FIGURE 1
DIGITAL INCLUSION MODEL (HELSPER, 2008, P.29)

However, in elderly citizens, there are significant physical and mental limitations associated with lower body dexterity and emotional stability (Castilla et al., 2018; Gitlow, 2014). Other factors may include fear in learning new skills, fear of embarrassment, and a fear of a breech in privacy. Therefore, it is important for these citizens to be digitally literate so as to overcome such barriers (Hargue & Payton, 2010; Shively, 2017).

Intergenerational Family

Research showed the level of digital inclusion increased significantly in intergenerational or multigenerational family. Intergenerational family, by definition, refers to a family consisted of more than three generations living together. These members are usually comprised of grandparent, parent, and child generations, in which they tend to be codependent financially and emotionally (Shelia, 2014, p.435). Patricio (2016) reported that seniors are more digitally motivated due to the higher levels of interaction with other family members and higher knowledge exchanges between generations. As such, the intergenerational family model may be an important factor towards digital inclusion, as a senior citizen living alone is less likely to be digitally literate. Elderly are also found to be less prone to depression as they are less isolated and more productive when they live with younger generations (Chambers et al., 2017; Dunifon & Kowaleski-Jones, 2007; Hayslip & Kaminski, 2005; Kreidl & Hubatkova, 2014; Mutchler & Baker, 2009; Pittman & Boswell, 2008; Szinovacz et al., 1999; Tanskanen, 2013; Glaser et al., 2018). To date, the numbers of intergenerational families in some of the most powerful countries like the United States has increased dramatically (Casper & Bryson, 1998; Dunifon et al., 2014; Pew Research Center, 2010; Pew Research Center, 2013; Pew Research Center, 2014; Glaser, 2018). The same situation also occurred in Thailand, in which the number of multigenerational family increased significantly throughout the past 25 years (UNFA, 2017).

Digital Organisation

The PwC's Government and Public Sector Readiness Imperatives in an Age of Disruption proposed that governments in an age of disruption are entitled to: enable trust and transparency, build disruptive public-private partnerships, balance innovation and regulations, make decisions enabled by big data, be digital, build 'renaissance' talent, and build holistic citizen centered organisational performance (Suarez & Abdallah, 2019). To achieve such transformation, Shapiro (2006). Burapha University, p.32) stated that there are three levels of innovation for organisations, and the level at which an organisation is innovative, will determine the success of that organisation. These are at the event, process, and system levels. For an organisation to be truly successful, innovation must come at a system level, meaning innovative changes are continuous and consistent in policy and implementation. Like other leading governments, the Thai government has undergone a major digital transition as it strived to achieve innovative, value-based economy using the Thailand 4.0 strategy.

Quality of Life in Elderly Citizens

Quality of life in elderly citizens can be assessed in multiple ways. Shalock & Verdugo (2002); Lubkina (2013) claimed quality of life can be evaluated based on measurements of independence, social participation, and general health well-being. World Health Organization, however, has developed a more sophisticated assessment tool for assessing quality of life. The two widely used questionnaires are WHOQOL-BREF and WHOQOL-OLD. While WHOQOL-BREF is a shorter version of WHOQOL-100, WHOQOL-OLD is developed specifically to measure the quality of life in elderly citizens, thus, deemed an appropriate form of assessment for this study. The questionnaire is a measuring tool evaluating 'sensory abilities', 'autonomy', 'past, present, and future activities', 'social participation', 'death and dying', and 'intimacy.'
From literature review, the conceptual framework for this research is outlined as follows:

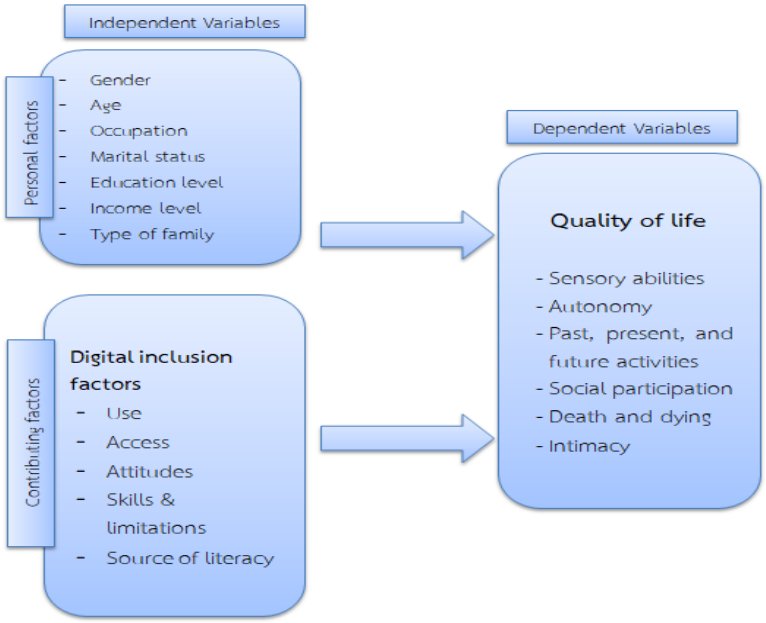

FIGURE 2
CONCEPTUAL FRAMEWORK

RESEARCH METHODOLOGY

This case study employs both qualitative and quantitative methods. In-depth interviews were conducted with three Nakhonpathom City Municipality officers, one from the executive level and two from an operational level, and a deductive approach was employed for qualitative data analysis. Close-ended questionnaires were used for quantitative data collection. The population for this research was 12,836 senior citizens aged 60 years and older living in the Nakhonpathom Municipality. Following Krejcie & Morgan's technique (1970), 380 samples were selected using the purposive sampling method. Interview questions and close-ended questionnaires were constructed based on research objectives. Data collection as per its objective could be illustrated as follows (Table 1):

Table 1
DATA COLLECTION

Tools / Objectives	In-depth interviews	Questionnaires
No.1	✓	✓
No.2	✓	✓
No.3		✓
No.4		✓

Questionnaires were constructed based upon the following reviews and in testing content accuracy. Three qualified personnel were appointed to perform IOC. Reliability and validity testing were performed *via* the try-out method. The questionnaire consisted of three components with questions about personal factors, contributing factors, and quality of life. The 13 questions in regard to quality of life were obtained from WHOQOL-OLD and analysed using the Likert Scale. Analytical testing included T-test, One-way ANOVA, multiple regression, and Least Significant Difference (LSD).

RESEARCH RESULTS

The findings obtained in this study are based on qualitative and quantitative data. Quantitative data revealed that elderly citizens in Nakhonpathom City Municipality had 'high' digital inclusion level overall. The level of 'access' and 'usage' were high while 'source of literacy', 'attitudes', and 'skills and limitations' were at a medium level (Table 2).

Table 2
DIGITAL INCLUSION IN ELDERLY CITIZENS

Digital inclusion	**Capability level**			
	X	**S.D**	**Level**	**Rank**
Use	3.43	1.152	High	2
Access	3.71	1.112	High	1
Attitude	3.28	1.288	Medium	4
Skill & limitation	3.24	0.997	Medium	5
Source of literacy	3.4	0.981	Medium	3
Total	3.41	0.858	High	

The level of 'access' was the highest of five digital inclusion factors, followed by 'usage' at the second, and 'skills and limitations' at the last. In this light, in-depth interviews with the Municipality officers confirmed that elderly citizens in the Nakhonpathom City Municipality had high 'access' to smartphones and frequently made 'use' of the LINE application for communication and information dissemination. However, the 'skills' of the elderly citizens were limited to only one form of social media as the majority did not have 'skills' to operate other applications or how to perform basic online searches. Throughout the past, any public services assistance obtained online was *via* LINE direct messages with the Municipality staffs. Furthermore, the interview also indicated that the City Municipality only provides one form of online public service platform through the Municipality website. Following a documentary review on the matter, a report by the Department of Local Administration showed that only approximately seven percent of elderly citizens ever made use of it (Nakhonpathom City Municipality, 2019). The following finding strongly indicated how short of online platform provision was a crucial factor contributed as barrier and limitations preventing an increase in online public service uptake in elderly.

Relatively, both qualitative and quantitative results jointly indicated that Municipality elderly citizens had high 'accessibility' and sufficient resources to go online; therefore, infrastructure was not a problem to achieving higher access in this situation. Contradictorily, our research found that only 0.5 of the 66.6 % of these claimed Internet users had made use of online public services and 0 % tried online banking. Evidently, they were discouraged by a lack of confidence and a lack of digital literacy (Gitlow, 2014; Hargue & Payton, 2010). Shively (2017) To solve this problem, aside from increasing online service platform, the City Municipality should also educate people through 'specific training needs' and provide user friendly interface content in order to escalate users' skills and self-assurance (Loureiro & Barbas, 2011).

On a bright side, this figure also illustrated that there is some capacity and opportunities for innovative development. With the right strategy, the Municipality could divert and train as high as 66.1% of existing Internet users to use Municipality's online public services, providing they have one. Aside from this, in-depth interviews further revealed that the Nakhonpathom City Municipality did not have a direct unit responsible for online public service technology. This was a major factor prohibiting innovative transformation to take place in the Municipality. Additional information showed, the Municipality staffs perceived online services as problematic, rather than beneficial, for the elderly. From the officers' perspectives, it would appear that the elderly are more comfortable receiving news and information through the Public Announcement system or during monthly subsistence allowance sessions, rather than through other means. However, they also commented that information dissemination through these means was difficult during COVID-19 outbreak due to city lockdown and prohibition of face-to-face meeting.

A documentary review of The Department of Local Administration report (2019) provided evidence supporting the following claim. The report stated that almost 40% of the people that resided in the Nakhonpathom City Municipality still use the Municipality's Public Announcement (PA) System as a primary source of information. Nonetheless, contradictorily to the officers' point of view, the same report concluded that the people living in the City Municipality demand a more contemporary method of communication, ones that can support equality and increase participation, such as a development of a single application which can be used as a primary channel for public service information. Therefore, it is evident that the Municipality's officers failed to observe underlying needs of its residents in this aspect.

On the next objective, results revealed that the quality of life of the elderly citizens was at a medium level. 'Social participation' was rated at a high level and was ranked the highest of the six aspects evaluated, followed by 'past, present, and future activities', 'autonomy', 'death and dying', 'sensory abilities', and 'intimacy', respectively (Table 3).

Table 3 QUALITY OF LIFE IN ELDERLY CITIZENS				
Quality of life		**Opinion level**		
	X	**S.D**	**Level**	**Rank**
Sensory abilities	3.32	1.228	Medium	5
Autonomy	3.41	1.189	High	3
Death & dying	3.33	1.252	Medium	4
Past, present, & future activities	3.58	1.068	High	2
Social participation	3.58	1.188	High	1
Intimacy	2.91	1.103	Medium	6
Total	3.35		Medium	

The analysis showed the result accepted the null hypothesis in terms of gender, age, occupation, monthly income, and marital status, but rejected the null hypothesis in terms of education level and type of family. That is, elderly citizens with different gender, age, occupation, monthly income, and marital status do not have a different level of quality of life. However, elderly people with different educational backgrounds and type of family were shown to have different quality of life level (Table 4).

Table 4 NULL HYPOTHESIS TESTING		
Personal factors	**Accepted null hypothesis**	**Rejected Null hypothesis**
Gender	✓	
Age	✓	
Occupation	✓	
Monthly income	✓	
Marital status	✓	
Education level		✓
Type of family		✓

For education level, the P-value showed the results of 0.005, 0.008, and 0.017 for ‘past, present, and future activities’, ‘social participation’, and ‘intimacy’, respectively. Therefore, LSD was performed and the analysis suggested that the elderly with grade 1-grade 7 education had different levels of quality of life compared to those graduated from grade 8-grade 12, and those with bachelor degree and higher.

For type of family, P-value showed the results of 0.024, 0.005, 0.038, 0.005, 0.013 for ‘sensory abilities’, ‘autonomy’, ‘death and dying’, ‘past-present and future activities’, and ‘social participation’, respectively. LSD was also performed and the analysis showed that elderly citizens, who live with intergenerational family, had different level of quality of life compared to those who were living alone, those who were living with partner, and those who were living with children ($\alpha<0.05$). Such finding indicated that intergenerational family living can be a contributing factor to higher digital inclusion, which creates a significant difference determining a level of quality of life in

elderly. Intergenerational living can be beneficial, as various research have shown that young family members are the major 'source of literacy' for technology adoption in senior citizens (Patricio, 2016).

On the last part, multiple regression analysis showed that digital inclusion factor has an ability to influence the level of quality of life in elderly at 65.1%. It further indicated that change in 'skills and limitations', 'source of literacy', 'usage', 'access' were four out of five predictors that were able to predict changes in the quality of life. They have coefficient values of 0.443, 0.219, 0.144, and 0.121, respectively (Table 5).

Table 5
MULTIPLE REGRESSION ANALYSIS

Digital inclusion factors	B	Std. Error	Beta	t	Sig.
Use	0.119	0.035	0.144	3.39	0.00
Access	0.104	0.030	0.121	3.39	0.00
Attitudes	0.009	0.030	0.012	0.29	0.77
Skills and limitations	0.422	0.061	0.443	6.89	0.00
Source of literacy	0.212	0.060	0.219	3.55	0.00
(Constant)	0.443	0.126		3.50	0.00
$R=0.807^{a}$, $R^{2=}0.651$, $R^{2}_{Adiusted}=0.647$, Sig=0.564					

DISCUSSION AND CONCLUSION

Senior citizens of a different 'gender' did not have a different quality of life. Senior people with a different 'age' also did not have a different quality of life, which could be due to; 1) a majority of senior citizens living with their family, and only 23.4% living alone, therefore, no matter how old they were, they were able to receive assistance from family members; 2) the City Municipality is located around the city center and the seniors could easily gain public service access; 3) readily available and free medical services as part of government welfare can prolong life and delay old age health related effects; and 4) medical advancement helped delay retirement, reduce generation gaps as well as the age gap within senior citizens of 60-80 years (Sasanapitak, 2017).

Senior citizens with different 'income' levels were found to have no difference in their quality of life due to similar reasons, partly because living as a family reduces the financial burden, and also because they are also given various forms of government welfare which includes subsistence allowance (Sangthongsuk, 2020). Additionally, senior citizens with a different 'marital status' did not have a different quality of life because with or without their partners, the seniors had physical and emotional support from family members as the majority of them did not live in isolation. This finding is in line with Maslow's study (2483 edition). Lubkina (2013) where the seniors had a higher level of satisfaction. In contrast, different educational backgrounds and 'family structure' had a bearing on the quality of life in senior citizens. Different educational backgrounds affect literacy, reading and critical thinking skills required for online activities (Khumwong et al., 2011). Additionally, living in an intergenerational family may enable senior citizens to have a different quality of life as they are less isolated.

Four out of the five digital inclusion variables, excluding 'attitudes', were found to have an impact on quality of life in senior citizens living in the Nakhonpathom City Municipality. This result was inconsistent with a report by Helsper (2008), which suggested that 'attitudes' had an influence on the quality of life, but the same research also indicated that authorities should be attentive to 'access', 'use', skills, limitations', and 'source of literacy', lead to an increase in the uptake of online public services.

Apart from 'access' or provision of online service infrastructure, the Municipality should formulate innovative measures from event and process, up to a system level, for the organisation to consistently and continuously deliver technological innovation for the citizens (Shapiro, 2006), Burapha University, p.29). In this light, a responsible unit must be established to organise employee training, as they are the key persons to assist seniors break through their technological barriers, organise public campaigns and specific needs training for users, as well as user friendly content such as a one-stop-service application. The Municipality, and other similar organisations, should also promote intergenerational family structure as younger generations are a major source of technological literacy (Patricio, 2016), hence, a higher tendency to stipulate active aging in senior members.

Through the following indications, government organisations all over the world will be able to take innovative approach in fostering online public service adoption in elderly, increase the level of digital inclusion and the level of quality of life among the seniors, lessen the digital and social divide, while encouraging the equality and equity among all citizens as we continue to progress into a full-fledged aging society.

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