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ICT Competency Model in Supporting Life-long Learner Towards Productive Aging

Natrah Abdullah* Anishariah Ramli* Haryani Haron* and Norisan Abd Karim*

Abstract : The role of ICT has proved to enable elderly to be productive at in technology-based society. However, the different in education background and professions, might create a gap in terms of ICT competency and this gap could be an obstacle in the development of productive aging. Thus, by knowing the level of ICT competency among middle adult, an appropriate ICT technology according to their capabilities can be provided. Therefore, this study intended to investigate the ICT competency for productive aging. In order to do that, this study will access the ICT competency that significant to productive aging by focusing on one of its component that is lifelong learner characteristics. In specific, there were three (3) objectives in this study as following: to identify the dimensions and elements of ICT competency that significant for productive aging; to identify the level of ICT competency that significant to productive aging; and to propose the ICT competency model for productive aging. A survey was conducted using questionnaire with 100 respondents within Arkib Negara Malaysia (ANM), one of government agency. The findings from related theory and literature review has identified three (3) dimensions of ICT competency that are Knowledge, Skill and Attitude and also lifelong learner characteristics as one of component of productive aging. The results showed that the level of Attitude dimension revealed as very competent and the other level of two dimensions which are Knowledge and Skill revealed as competent among respondents. Meanwhile, lifelong learner shows the medium tendency of lifelong learning towards productive aging. The results also show that most of the path, whether among ICT competency dimensions itself or between ICT competency dimension and lifelong learner characteristics, there are a strong positive correlation. Lastly, based on the results and findings, the ICT competency model for productive aging has proposed.
Keywords : ICT Competency, Lifelong Learner, Productive Aging.

1. INTRODUCTION

Social Welfare Department [1] reports that Malaysia has yet to reach aging population however; the number of elderly is increasing rapidly and this judgment has been supported by Yusoff and Buja [2] in their study. With the rise up of elderly people in Malaysia, it is shown that population in Malaysia will achieve population aging in another 10 to 15 years from now when the total population of elderly people has reached 10% or more. Then, some gerontologists began to shift their attention from older adults' dependence to productive aging which emphasizes of older people that continue to make contributions to their family and community through their accumulated knowledge, skills and experience even after they have left the labour market [3]. However, as the potential productive aging emanated from different education background and professions, there might be a gap in terms of knowledge and skill in ICT among them. It shows that fear among elder people in using ICT technology [4]. These perceptions can be changed by providing future elderly people with a relevant and useful ICT technology that enable them to be productive. Thus, by knowing the level of ICT competency among middle adult, an appropriate ICT technology according to their capabilities can be provided. "It is believed that the highest level of ICT

* Faculty of Computer and Mathematical Sciences Universiti Teknologi Mara Shah Alam Malaysia. *E-mail : natrah@tmsk.uitm.edu.my, zuanisha@gmail.com, haryani@tmsk.uitm.edu.my, norisan@tmsk.uitm.edu.my*

competency is being able to create changes in innovation and transformation in individuals" [5]. This shown that ICT competency are deemed as important role in this technology era and there is a need to identify these ICT competencies that are significant to productive aging. But, currently there are lacking of research in the field of ICT competency towards productive aging. Therefore, this study intended to investigate the ICT competency for productive aging. In order to do that, this study will access the ICT competency that significant to productive aging by focusing on one of its component that is lifelong learner characteristics. The selected target group will be middle adults ranging from 35 to 55 years old as determined by Petry [6], who will be potentially to become productive aging in few years ahead.

2. LITERATURE REVIEW

This section will discuss further on issues and challenges of population aging, explanation on ICT competency and the idea of productive aging.

A. ICT Competency

According to Kopaiboon et al. [7], ICT competency refers to knowledge, skills, and ability to take advantage of ICT for the purpose of gathering, processing and presenting information in support of activities among different groups of people for working, relaxing and communicating purposes. It also serves as a basic skill in the information-based society. Meanwhile Malanowski et al. [8] has defined ICT competency as the competency of knowledge, skill and attitude that are involving the use of information, communication and technology including its equipment. Many researchers have been conducted on ICT competency and commonly involved academicians and students as research participants. However, this previous studies on ICT competency have shown that the researches only focuses on determining ICT dimensions and measuring ICT competency in terms elements and level of skills. There is lacking of research in studying the competency in broader areas such as relationship of ICT competency and productive aging and how it significant to middle adults in the future. It is shown that there are no studies being conducted to link it with productive aging. As to start the foundation of the research, a synthesis of literature from two (2) theoretical perspectives – Social Learning Theory (SLT) and Self-Directed Learning Theory (SDLT) was done at the beginning of ICT competency dimensions determination.

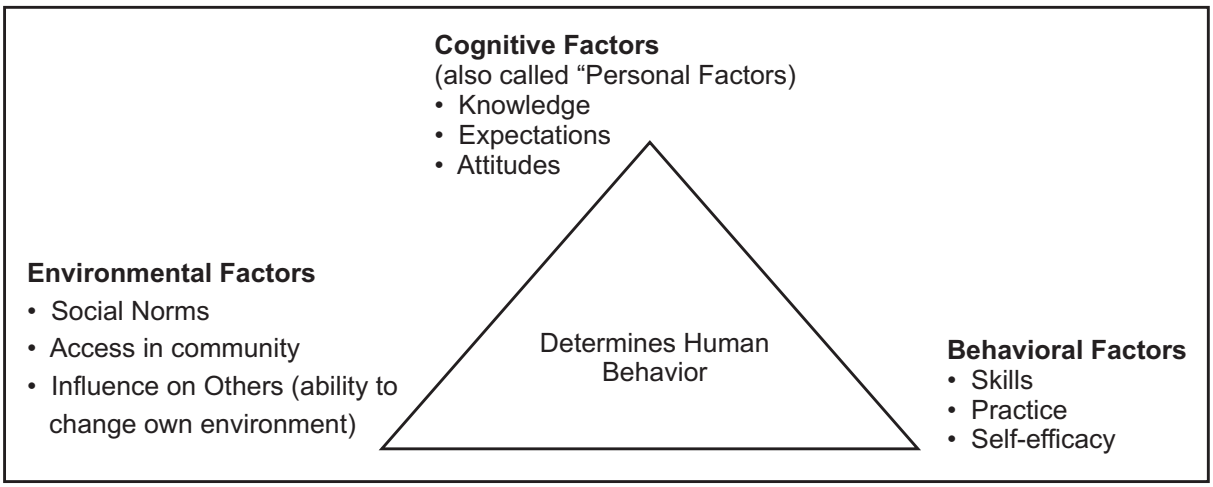

Figure 1: The three-way reciprocal relationship

Learning theory attempt to explain how people think and what factors determine their behaviour. SLT was defined by Smith and Berge [9] which combines behaviouristic reinforcement theory and cognitive psychology to describe the learning process in individuals. According to SLT, an individual has the power to influence their own learning process by controlling the three factors; (*i*) Cognitive Factors, (*ii*) Behavioural Factors and (*iii*) Environmental Factors as formulated in Figure 1. Another theory driven by the learner characteristic is SDLT which was introduced by Malcolm Knowles in 1975 as cited by Smith

[10] in his research. According to him, learning process of adults is the key to enable those improving competencies for their life-role in the community such as the role of learner will need the competencies like reading, writing, computing, perceiving, conceptualizing, imagining, inquiring, aspiring, diagnosing, planning, getting help, evaluating. Therefore, based on those definitions, study on related theory and also findings from literature, the ICT competency comprises of three (3) dimensions which are Knowledge, Skill and Attitude. Each dimension influence by it elements. A knowledge that users have in terms of ICT, the understanding of technology and the benefits of using it [7]. It consists of Hardware, Software, Operating System (OS) and Network. Skill refers to the ability to use capitalize on ICT knowledge and skills in performing processing of information through the following skills: information access and processing; information evaluation; information production; information management; information communication; and the use of the Internet network [7]. It elements are Approach; Evaluation; Creation; Management; and Communication. Attitude refers to the understanding of the benefits and consequences of the use of ICT and the understanding of the use of ICT in developing societies as well as the realization of the value and responsibility for communication and other purposes. It also involves the critically evaluative skills that lead to social and ethical competencies [7]. It elements are Ethic and Responsible. Table 1 shows the dimensions and elements of ICT competency that significant for productive aging. There are three dimensions of ICT competency with elements for each of it and also a lifelong learner characteristics as one of productive aging component that have been found from the study on related theory and literature review.

Productive aging is a concept where older people doing productive things that contributes their community and work for living health and well-being at their age. Butler [11] has defined a productive aging as "the capacity of an individual or a population to serve in the paid workforce, to serve in volunteer activities, to assist in the family and to maintain himself or herself as independent as possible". According to research done by Ranjizin [12], productive aging is refers to the productive contributions of older people to their own welfare, society and community. From the conceptual perspective according to Roupa et al. [13], productive aging among older adults focuses on dedication and elderly-led initiatives. In discussing productive aging, one of the most imperative approaches is to view it from the perspective of lifelong learning component. According to Smith And Kirsch [14], for a better understanding of lifelong learning, it is necessary to be able to measure its characteristics. The concept lifelong learning, as adopted by UNESCO, view learning as an inevitable human activity from birth till old age. Therefore, learning opportunities must be made available to all population demographics. Further, Smith And Kirsch [14] believed that lifelong leaning does not necessarily mean going back to school after graduation, but rather that an individual can continue to learn in a wide variety of setting (i.e. in the workplace). In fact, their [14] study has described that effective lifelong learner as having the ability to set goals, apply appropriate knowledge and skills, engage in self-direction, locate required information and adapt the learning strategies to different conditions. In their [14]study, they have developed 14 questions according to those abilities which adopted from [15] in order to measure the lifelong learners characteristics.

Table 1

The dimensions and elements of ICT competency and lifelong learner characteristics

Dimensions/Elements	*Sources*
ICT competency characteristics	
Knowledge: Hardware, Software, Operating System, Internet Connection	[7], [20], [8], [21], [22], [23],[24].
Skill: Definition, Approach, Evaluation, Creation, Management, Communication.	[7], [20], [8], [21], [22], [23], [5].
Attitude: Ethic, Responsible	[7], [20], [8], [21], [22], [23].
Lifelong learner characteristics	
Set goals, apply appropriate knowledge and skills, engage in self-direction, locate required information, and adapt the learning strategies to different conditions.	[14], [15]

C. ICT Competency and Productive Aging

ICT competencies are deemed as important in this technology era. The level of ICT competency and its usage will significant in developing productive aging in Malaysia. According to Smith [16], the two main aims in assessing ICT competency are (*i*) to produce information that would illustrate the performance of a particular group and (*ii*) to explain individual achievements that could be used to validate the ICT competency level of a person. It is believed that high competencies in ICT will bring transformation into individual life. Today, ICT competency proved that it enables older people to living independently by improving their skills and access to age-friendly ICT and adapted integrated social life. Meanwhile, productive aging are substantial in many aspects. As mentioned by [17], productive aging is beneficial to individual, family and nation that older people has the feeling of self-esteem, independent, less stressful and less financial burden. Even though the ICT competency is beneficial at the level of individual, family and community, the level of competency among middle adults may vary depending on education level and profession background. Middle adults who are not ICT competent could be lacking of confidence in using new technologies compared to those with ICT background. The most vital thing is to ensure that ICT competency can be developed consistently by lifelong learning process.

3. METHODOLOGY

The relationship between ICT competency and productive aging then be studied and clarified by statistical analysis involving a set of data. Questionnaire is a survey tool that used to collect data from the selected research participants with age range from 35 to 55 years old with no ICT background at Arkib Negara Malaysia (ANM).

A. Research Instruments

This study adapted with some changes the questionnaire from previous researches by Smith [14] in order to measure lifelong learner characteristics as stated in Table 1. The questionnaire was constructed in bilingual that are Bahasa Malaysia and English with the purpose to give more suitable terms and wording that are more meaningful to the respondents at Arkib Negara Malaysia (ANM). The items were measured based on 5-point Likert scale from 1 (“Not Competent”) to 5 (“Very Competent”). Meanwhile, the items under lifelong learner characteristics which consist of five (5) elements were measured using 5-point Likert scale from 1 (“Strongly Disagree”) to 5 (“Strongly Agree”). The total of 44 questions in this questionnaire was used to identify and evaluate the ICT competencies among respondents and lifelong learner characteristics that significant to productive aging. Data gathered from survey was first tested on its reliability and validity through a conducted of pilot study as to ensure the results from the statistical analyses are valid. Cronbach Alpha is used to test the reliability and validity of the questionnaire. According to Sun [18], the Cronbach’s Alpha with values 0.70 and above are considered a good reliability. The result shows that the research instrument used for this study has good reliability.

B. Participants and Sampling

The determination of participants has been done using combination of two non-probability sampling methods which are convenience sampling and purposive sampling. First, convenience sampling was used to determine the location of population that will involve in the survey. Convenience sampling refers to the collection of information from members of population who are convenient and easy to reach or willingness to response [19]. According to Sysoyez et al. [19], purposive sampling is confined to specific types of participants who can give the desired information, either they are the only ones who have it, or they are conform to some criteria set by researcher. Hence, the selected participants among Arkib Negara Malaysia (ANM) staff are those who met the criteria set up for this research; (*i*) age within 35 to 55 years old and (*ii*) no ICT background. The selected participants with age range from 35 to 55 years old are potentially to become a productive aging in 5 to 25 years from now. The sampling size was determined

according to Krejcie and Morgan [9]. The total number of staff in Arkib Negara Malaysia (ANM) is 538 however, only 136 staff met the criteria set up for this research; (i) age within 35 to 55 years old and (ii) no ICT background. Based on the Krejcie and Morgan table, the nearest number of population is 130, thus, the sample size of 97 would be needed to participate in the survey.

4. ANALYSIS AND FINDINGS

The collected data was then been processed and analysed using IBM SPSS Statistic 21 Software. Assessing Normality indicated the results as a non-normal distribution of scores for each variables. Based on this normality, a set of non-parametric statistical testing such as Mann-Whitney U, Spearman's Rank Order Correlation and Multiple Regression was then performed in identifying the level and relationship between ICT competency and lifelong learner characteristics among middle adults that significant to productive aging.

A. Measuring Level of ICT Competency and Lifelong Learner Characteristics

With the mean value 4.06 (after rounding up), Attitude is the only variables of ICT competency that achieved the level of very competent. Meanwhile, the rest of ICT competency variables indicates the level of competent with the mean value for Knowledge = 3.99 and Skill = 3.75. As for lifelong learner characteristics achieved medium level of tendency of lifelong learning with the mean value for Characteristic = 3.89.

B. Measuring the relationship between ICT Competency and Lifelong Learner Characteristics

The relationship between ICT competency variables and lifelong learner characteristics variable indicates a strong positive correlation (most of the path) except medium positive correlation for path between Attitude and Characteristic as shown in Table 3.

Table 3

Summary of Bivariate Spearman's rho correlation coefficients results

Relationship	*'p' Value*	*'r' Value*	*Strength of Relationship*
Knowledge → Skill	0.000	0.72	Strong, positive
Knowledge → Attitude	0.000	0.54	Strong, positive
Knowledge → Characteristic	0.000	0.54	Strong, positive
Skill → Attitude	0.000	0.59	Strong, positive
Skill → Characteristic	0.000	0.63	Strong, positive
Attitude → Characteristic	0.000	0.48	Medium, positive
'*p*' = Sig. (2-tailed) Significance (rounded) '*r*' = Spearman's rho correlation coefficients '*r*' (rounded)			

D. Measuring multiple regression between ICT Competency and Lifelong Learner Characteristics

The result shows 48.9% of the variance in Lifelong Learner Characteristics. Skill is the strongest unique, and statistically significant, contribution in explaining the Lifelong Learner Characteristics with Beta value = 0.481 and Sig. value = 0.000 as compared to Knowledge variable with Beta value = 0.111 and Sig. value = 0.368, and Attitude variable with Beta value = 0.177 and Sig. value = 0.061. Therefore, Knowledge and Attitude are made less, and statistically not significant contribution in explaining the Lifelong Learner Characteristics.

5. DISCUSSION AND CONCLUSION

Analysis result on the mean score have shown that Attitude dimension of ICT competency achieved the level of very competent as compared to the other two dimensions which are Knowledge and Skill achieved the level of competent. Meanwhile, lifelong learner characteristics mean score also achieved the medium

level which can be interpreted as having medium tendency of lifelong learning towards productive aging. Hence, by knowing the level of ICT competency will reflect the level of lifelong learner characteristics among middle adults. Based on the analysis, the relationship between ICT competency and lifelong learner characteristics shown that majority of path have strong positive relationship. Multiple regressions between ICT competency and lifelong learner characteristics shown that ICT competency contributed about 48.9% to the lifelong learner characteristics with Skill dimension is the main contributor. 'It is believed that the highest level of ICT competency is being able to create changes in innovation and transformation in individuals and the society' [5]. Hence, the development of productive aging can be realized by focusing in building up ICT competency especially on ICT skill development.

Then, a survey using questionnaire has been conducted in order to identify the level of ICT competency that significant to productive aging. The findings have shown that, the level of ICT competency will gives an effect on lifelong learner characteristics in determining the tendency level of lifelong learning and so forth contribute to the development of productive aging. Therefore, the ICT competency model for productive aging is shown in Figure 2.

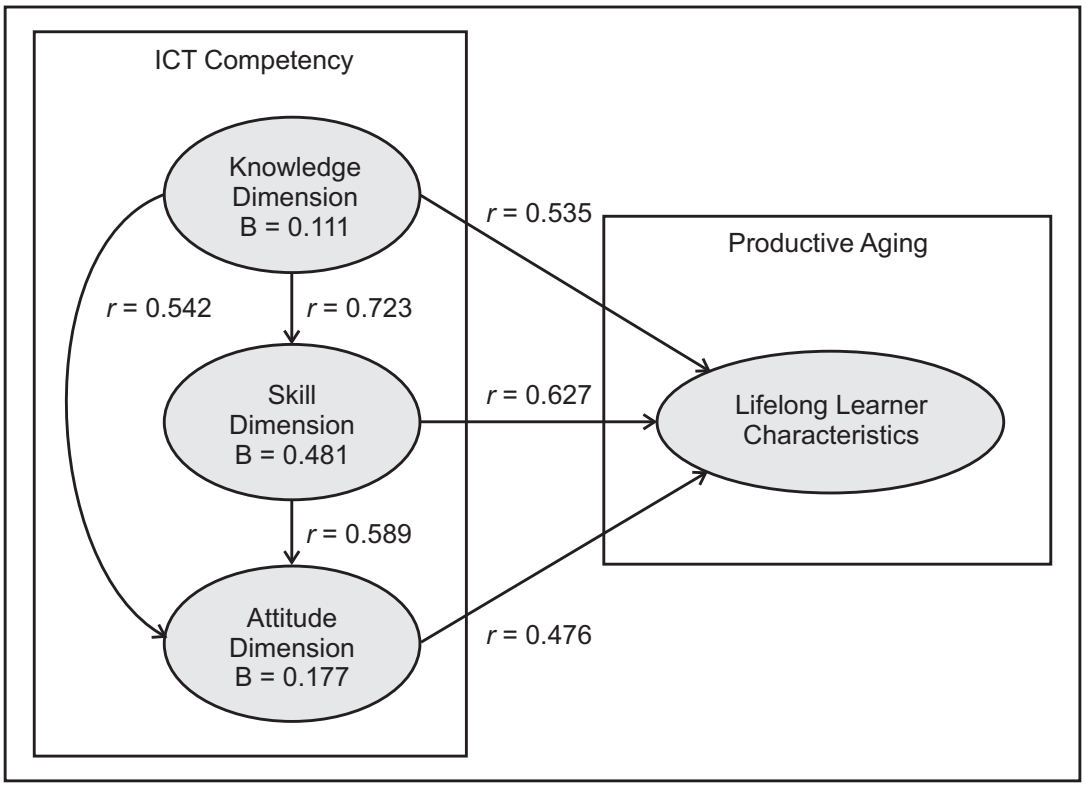

Figure 2: ICT Competency Model for Productive Aging

This study identified the linkage between these two factors and therefore, ICT competency and life-long learner characteristics factors were combined to established new conceptual model. The linkage establishment is an important finding because life-long learner characteristics as the drivers of lifelong learning process should not be isolated from productive aging as they are one of component that contributed to productive aging.

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