THE DIGITAL SKILLS FRAMEWORK MODEL DEVELOPMENT FOR DIGITAL UNIVERSITY MANPOWER

Nutthapat Kaewrattanapat, Jarumon Nookhong, Martusorn Khaengkhan, Sittichai Pintuma

Suan Sunandha Rajabhat University, Thailand
Email: nutthapat.ke@ssru.ac.th; jarumon.no@ssru.ac.th; martusorn.kh@ssru.ac.th; sittichai.pi@ssru.ac.th

ABSTRACT

This research article aimed to: 1) investigate the digital skills necessary for personnel working in a digital university; 2) develop a digital skills framework model for the digital university manpower; 3) certify the model by consensus from digital university experts. The researcher has studied research papers related to digital skills required for digital manpower from international research databases. The study results will be used to synthesize and develop a digital skills framework model for the digital university manpower. After that, the researcher developed a questionnaire for the certification of the developed model. The questionnaire was evaluated by content validity index (CVI) from 5 experts in Human Resource Information Management (HRIS). The questionnaire was then evaluated overall using the CVI of the questionnaire with an average approach (S-CVI/Ave). This was the average of the precision index of the questionnaire, measured by applying the item - content validity index (I-CVI) of each item to the sum and dividing it by the total number of questions. There are 4 levels of content validity index: level 1 (Irrelevant), level 2 (somewhat relevant), level 3 (Quite relevant), and level 4 (Absolute relevant). The content validity was then evaluated by the number of experts who determined the content consistency to be at level 3 (Quite relevant) and level 4 (Absolute relevant) only and divided by the total number of experts. The 5 point-Likert scale was used to identify the level of agreement of the skill set model for digital university manpower. Seventeen experts in Human Resource Information Management (HRIS); Management Information System (MIS); and Information Technology (IT) were used to verify all of the components to validate the model by analyzing consensus from statistical values: Mean, Standard Deviation: S.D., Median (or Quartile 2), Interquartile Range: I.R. (the difference between Quartile 3 and Quartile 1), and Quartile Deviation: Q.D (using the formula Interquartile Range/2) . The results show that the developed model consists of skills for 1) collaboration working on digital workspace, 2) skills for data analytics and data visualization, 3) skills for presentation and interaction design, 4) skills for information retrieval from digital data sources, 5) skills for knowledge management with digital technology, 6) skills for using artificial intelligence in performing duties. The digital skills framework model development for digital university manpower has passed the digital university expert certification assessment (Mean = 4.98, S.D. = 0.06, Median = 5.00, I.R. = 0.00, Q.R. = 0.00). The developed digital skills framework model can be used to develop key manpower to support the digital convergence university of higher education administration.

Keywords: Digital Skill Set, Digital University, Digital University Manpower, Digital Convergence University.

INTRODUCTION

Nowadays, digital technology and communication are very important in all activities in both public and private organizations. The digital technology allows people to connect with people such as friends and family and to be able to work remotely. It is now possible to communicate using speech, audio, video, and other media. All software, websites and application have been developed to help users socialize. In the operation of private business organizations, digital technology is used for communication, social network working, content management system: CMS, data analytics, data mining, data visualization as well as empowering employees and meeting customer expectations and satisfaction, all benefit from digital technology. Successful businesses are adopting technology to create a digital workspace that helps them promote their business more effectively.

The education sector is one of the last business operations to begin to change as it adheres to old methods and practices (Kamal Kerro et al., 2020). However, the university is currently transforming its organization by incorporating digital technology into the mission of the university. Enhancing the university's potential with digital technology is very important because digital technology will bring the mission of the university closer to achieving its vision. In addition to digital technology that is important to administration in higher education universities, another important aspect is the personnel working in the university. Universities are striving to converge on digital technology into academic work activities, and it's important to make this integration successful sooner or later, depending on the university's manpower and organization’s culture.

Therefore, this research paper aims to investigate, synthesize, and develop a skill set model for digital university to declare that the digital skill set is essential for university manpower. The digital skill sets that appear in the model reveal thinking skills and skills in using digital technology tools to enhance university activities, for example, using digital skills in data mining to examine behaviors using learning management systems on smartphones, etc (Kularbphettong & Tongsiri, 2012). Therefore, to be a university that integrates digitally, it is necessary to determine qualifications for recruiting personnel and planning for personnel competency development. The university's transformation to a digital convergence university requires setting a vision, strategy, metrics, policies, process management, risk management, digital infrastructure, innovations, and university manpower. The universities should determine the qualifications for recruiting personnel and develop personnel competency plans in order to effectively drive the digital university and enable the university to compete at national and international levels. Universities with highly digital competency will enhance teaching, academic, research activities, serving higher education students, and universities will be able to deliver quality academic output or academic services to community.

RESEARCH OBJECTIVES

This research study was aimed to

1) Investigate and synthesis the model of a skill set for digital university manpower.
2) Develop the model of a skill set for digital university manpower.
3) Assess and certify the model of a skill set for digital university manpower by using consensus from seventeen experts.

CONCEPTUAL FRAMEWORK

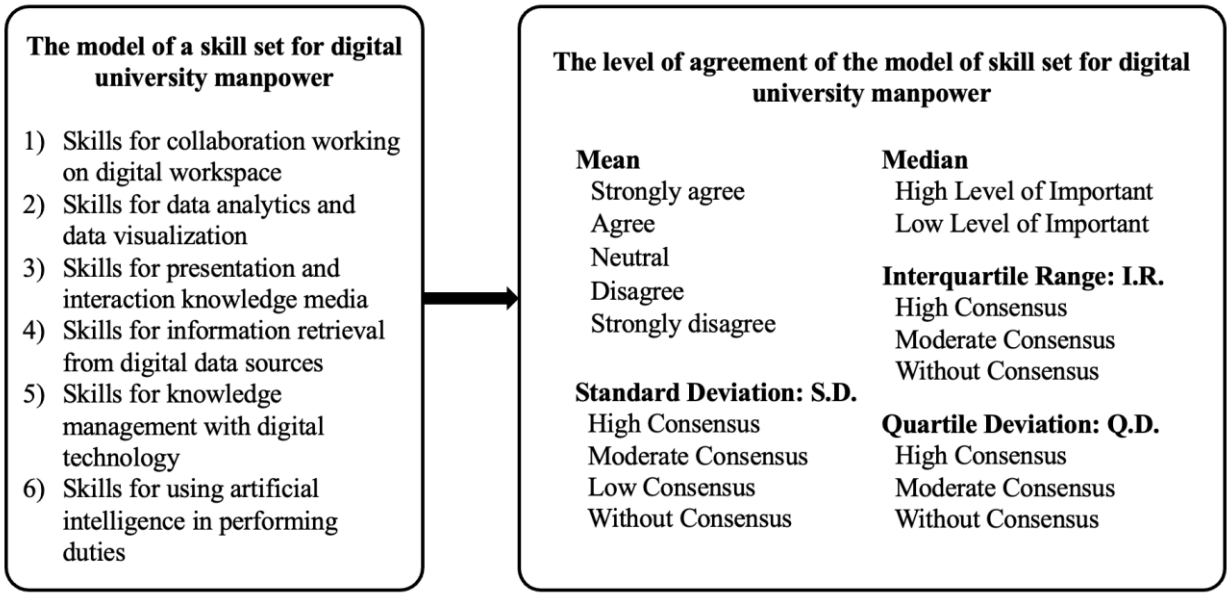

Figure 1. The Conceptual Framework of a Skill Set Model for Digital University Manpower

From Figure 1 is a conceptual framework derived from interviews with qualified experts who are professors and administrators of the university. This interview is one of the conceptualization processes, which is an open-ended interview with the following questions:

1) What do you think are the goals of university administration?

2) What do you think will be the key to the administration of the university?

3) Do you think digital technology can be integrated into university administration? How?

4) What characteristics do you expect university officer to support the university's transition to a sustainable digital university?

Based on the interview questionnaire, the researcher interviewed ten experts who are professors and administrators to analyze and conceptualize the digital skills that university officer or digital university manpower should have. Therefore, the digital skills that employees should have will enhance the administration and affairs of the university in the age of digital and transformative universities.

In interviewing experts who were professors and university administrators, the researchers found interviews of interest and labeled the words or phrases derived from the interviews with QDA Miner Lite (Qualitative Data Analysis Software) show in Figure 2.

	Count	% Codes	Cases	% Cases	Nb Words	% Words
university administration						
vision	34	7.7%	10	100.0%	282	11.3%
strategy	32	7.2%	10	100.0%	104	4.2%
metrics	14	3.2%	10	100.0%	26	1.0%
process management	34	7.7%	10	100.0%	276	11.1%
risk management	22	5.0%	10	100.0%	80	3.2%
infrasturcture	16	3.6%	10	100.0%	66	2.6%
innovation	26	5.9%	10	100.0%	174	7.0%
policy	26	5.9%	10	100.0%	138	5.5%
digital skills						
digital workspace / workflow / cloud technology	62	14.0%	10	100.0%	456	18.3%
AI / Deep Learning / Agent	38	8.6%	10	100.0%	286	11.5%
data analytic / data visualization	34	7.7%	10	100.0%	238	9.5%
creativity / presentation / interactive media	52	11.7%	10	100.0%	404	16.2%
information retrieval / data sources	14	3.2%	10	100.0%	134	5.4%
knowledge management	40	9.0%	10	100.0%	140	5.6%

Figure 2. The Results of Coding from Expert Interviews

METHODOLOGY

This research is a study based on quantitative research. The researcher has investigated and analyzed relevant documents and research from the international academic database and developing tools for interviewing samples and evaluating by 5 experts using the content validity index (CVI) evaluation, which consists of 4 levels as follows Level 1 Irrelevant, Level 2 Somewhat relevant, Level 3 (Quite relevant) and Level 4 (Absolute relevant).

Then, the Content Validity Index (CVI) was evaluated by the Item Content Validity Index (I-CVI) from the number of experts evaluating content consistency at level 3 (Quite relevant) and level 4 are consistent (Absolute relevant) only and divided by the total number of experts. As the following equation

$$ICVI = \frac{N_c}{N}$$

$ICVI$ is a content-based accuracy index each of question item.

N_c is the number of experts who evaluate content consistency at level 3 and level 4 only.

N is the total number of experts.

The questionnaire was then evaluated overall using the content validity index of the questionnaire with an average approach (S-CVI/Ave). This was the average of the precision index of the instrument, measured by applying the content validity index (I-CVI) of each item to the sum and dividing it by the total number of questions.

$$SCVI = \frac{\sum ICVI_i}{P}$$

$SCVI$ is overall using the I-CVI of the instrument with an average approach.

$\sum ICVI$ is sum of content validity index (I-CVI) of each item.
P is the total number of item.

Table 1: Numbers and proportion of experts whose endorsement is required to establish content beyond the .05 of significance (Lynn, 1986)

Number of Experts	Number of experts who agree with quite relevant or absolute relevant	Proportion of experts who agree
2-5	All	1.00
6	At least 5	0.88
7	At least 6	0.86
8	At least 7	0.88
9	At least 7	0.78
10	At least 8	0.80

The instrument was then evaluated overall using the content validity index of the instrument with an average approach (S-CVI). This was the average of the precision index of the instrument, measured by applying the content validity index (I-CVI) of each item to the sum and dividing it by the total number of questions. It was found that the item content validity index obtained from the experts was more than 0.8 regarding all items, while the content validity index of the instrument with an average approach was 0.99. It can be concluded that the experts agree that the questionnaire created by the researcher is accurate and can be used for further data collection.

Seventeen experts in Human Resource Information Management (HRIS); Management Information System (MIS); and Information Technology (IT) were used to verify all of the components to validate the model by analyzing consensus from statistical values: Mean, Standard Deviation: S.D., Median (or Quartile 2), Interquartile Range: I.R. (the difference between Quartile 3 and Quartile 1), and Quartile Deviation: Q.D (using the formula Interquartile Range/2)

The evaluation was concluded by consensus from seventeen experts. The 5 point-Likert scale:

5 = Strongly agree
4 = Agree
3 = Neutral
2 = Disagree and
1 = Strongly disagree

The 5 point-Likert scale was employed to identify the level of agreement of the skill set for digital university manpower model.

Table 2: Statistics and expert group consensus assessments

Statistics	Definition of Consensus	Reference
Mean		
4.50 – 5.00	Strongly agree	Best, J. W., 1981
3.50 – 4.49	Agree	
2.50 – 3.49	Neutral	
1.50 - 2.49	Disagree	
1.00 – 1.49	Strongly disagree	
Median		

Statistics	Definition of Consensus	Reference
≥ 4.00	High Level of Important	Ab Latif R, Dahlan A, Ab Mulud Z, Mat Nor MZ., 2017
≤ 3.50	Low Level of Important	
Standard Deviation: S.D.		
0.00 – 1.00	High Consensus	Johannes I. F. Henning & Henry Jordaan., 2016
1.01 – 1.49	Moderate Consensus	
1.50 – 2.00	Low Consensus	
> 2.00	Without Consensus	
Interquartile Range: I.R.		
0.00 – 1.00	High Consensus	Saedah Siraj, & Azdalila Ali., 2008
1.01 – 1.99	Moderate Consensus	
> 2.00	Without Consensus	
Quartile Deviation: Q.D.		
0.00 - 0.50	High Consensus	Soon Fook Fong, Pei Eng Ch'ng, Fei Ping Por., 2013
0.51 – 1.00	Moderate Consensus	
> 1.00	Without Consensus	

RESULTS

The conceptual framework (Figure 1.) that had been assessed by the experts was studied and synthesized for developing the model of a skill set for digital university manpower.

Figure 3. shows the model development of a skill set for digital university manpower. The model comprised 2 components as follows

1) University's strategic element: Vision, Strategy, Metrics, Policies, Process Management, Risk Management, Digital Infrastructure, and Innovations

2) Digital skill set for university manpower:

2.1) Skills for collaboration working on digital workspace: Cloud Storage Management, Digital Workspace, SharePoint, and Digital Workflow.

2.2) Skills for data analytics and data visualization: Data Thinking, Data Pre-Processing, Data Analytics, and Data Visualization.

2.3) Skills for presentation and interaction design: Visual Thinking & Visual Doing, Creativity Thinking, Digital Story-telling, and Interactive Knowledge Media.

2.4) Skills for information retrieval from digital data sources: Advanced Search, Image Retrieval, Voice Retrieval, and Cross Language Searching.

2.5) Skills for knowledge management with digital technology: Knowledge Storing, Knowledge Discovery, Knowledge Retrieval, and Knowledge Repository

2.6) Skills for using artificial intelligence in performing duties: Data Classification, Data Clustering, Conversational Agent, Sentiment Analysis, and Hyper-automation.

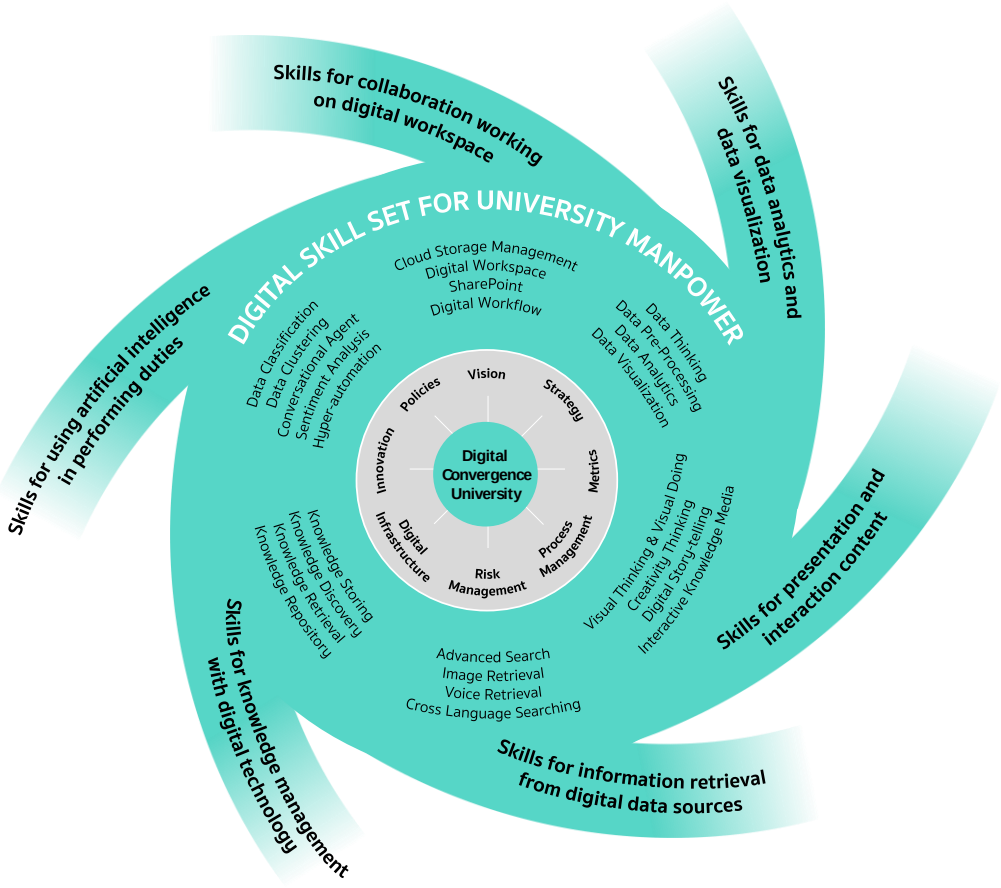

Figure 3. The Digital Skills Framework Model Development for Digital University Manpower

The developed model was evaluated and certified by seventeen experts based on consensus. The assessment results are shown in Table 3 and Table 4.

Table 3: The evaluation consensus results from 17 experts: university's strategic element

Indicators	Mean	S.D.	Quartiles			Interquartile Range	Quartile Deviation
			Q1	Median	Q3		
Vision	4.94	0.24	5	5	5	0.00	0.00
Strategy	4.82	0.39	5	5	5	0.00	0.00
Metrics	4.82	0.39	5	5	5	0.00	0.00
Policies	4.88	0.33	5	5	5	0.00	0.00
Process Management	4.88	0.33	5	5	5	0.00	0.00
Risk Management	4.88	0.33	5	5	5	0.00	0.00
Digital Infrastructure	4.94	0.24	5	5	5	0.00	0.00
Innovations	4.94	0.24	5	5	5	0.00	0.00
Summary	4.89	0.31					

Table 4: The evaluation consensus results from 17 experts: digital skill set for university manpower

Indicators	Mean	S.D.	Quartiles			Interquartile Range	Quartile Deviation
			Q1	Median	Q3		
Skills for collaboration working on digital workspace							
Cloud Storage Management	4.94	0.24	5	5	5	0.00	0.00
Digital Workspace	5.00	0.00	5	5	5	0.00	0.00
SharePoint	5.00	0.00	5	5	5	0.00	0.00
Digital Workflow	5.00	0.00	5	5	5	0.00	0.00
Sum	4.99	0.06					
Skills for data analytics and data visualization							
Data Thinking	4.94	0.24	5	5	5	0.00	0.00
Data Pre-Processing	4.82	0.39	5	5	5	0.00	0.00
Data Analytics	4.94	0.24	5	5	5	0.00	0.00
Data Visualization	4.82	0.39	5	5	5	0.00	0.00
Sum	4.88	0.32					
Skills for presentation and interaction design							
Visual Thinking & Visual Doing	4.94	0.24	5	5	5	0.00	0.00
Creativity Thinking	4.94	0.24	5	5	5	0.00	0.00
Digital Story-telling	4.82	0.39	5	5	5	0.00	0.00
Interactive Knowledge Media	4.88	0.33	5	5	5	0.00	0.00
Sum	4.90	0.30					
Skills for information retrieval from digital data sources							
Advanced Search	5.00	0.00	5	5	5	0.00	0.00
Image Retrieval	4.82	0.39	5	5	5	0.00	0.00
Voice Retrieval	4.82	0.39	5	5	5	0.00	0.00
Cross Language Searching	4.82	0.39	5	5	5	0.00	0.00
Sum	4.87	0.29					
Skills for knowledge management with digital technology							
Knowledge Storing	4.94	0.24	5	5	5	0.00	0.00

Indicators	Mean	S.D.	Quartiles			Interquartile Range	Quartile Deviation
			Q1	Median	Q3		
Knowledge Discovery	4.94	0.24	5	5	5	0.00	0.00
Knowledge Retrieval	4.94	0.24	5	5	5	0.00	0.00
Knowledge Repository	4.82	0.39	5	5	5	0.00	0.00
Sum	4.91	0.28					
Skills for using artificial intelligence in performing duties							
Data Classification	4.82	0.39	5	5	5	0.00	0.00
Data Clustering	4.82	0.39	5	5	5	0.00	0.00
Conversational Agent	4.82	0.39	5	5	5	0.00	0.00
Sentiment Analysis	4.82	0.39	5	5	5	0.00	0.00
Hyper-automation	4.82	0.39	5	5	5	0.00	0.00
Sum	4.82	0.39					
Summary	**4.89**	**0.28**					

CONCLUSION AND DISCUSSION

The conceptual framework was synthesized for the model development of a skill set for digital university manpower. The assessment of the developed model was certified by seventeen experts with a 5-point Likert scale of level of agreement. The results revealed that the experts had a consensus on model developed based on the conceptual framework, including the skill set of 1) Skills for collaboration working on digital workspace 2) Skills for data analytics and data visualization 3) Skills for presentation and interaction design 4) Skills for information retrieval from digital data sources 5) Skills for knowledge management with digital technology and 6) Skills for using artificial intelligence in performing duties. The developed for the model development of a skill set for digital university manpower represent the capacity and important future directions of higher educational institutions seeking to develop a university manpower and digital university transformation. This capacity is important in enabling higher educational institutions to provide the university for academic competition. Therefore, the digital skills that employees should have will enhance the administration and affairs of the university in the age of digital and transformative universities. These key skills will provide a guideline for developing the skills of university personnel to lead a sustainable digital university.

ACKNOLEDGMENTS

The authors would like to thank Suan Sunandha Rajabhat University, Bangkok, Thailand (http://www.ssru.ac.th/) to provide funding support to attend the dissemination of research on this and thank family, friends, colleagues and students in the field of Digital Innovation Management and Content and Digital Technology for Education for cooperation in research, all of you.

REFFERENCES

Ab Latif R, Dahlan A, Ab Mulud Z, Mat Nor MZ. (2017). The Delphi technique as a method to obtain consensus in health care education research. Education in Medicine Journal, 9(3), 89–102. https://doi.org/10.21315/eimj2017.9.3.10

Best, J. W. (1981). Research in education. New Jersey: Prentice Hall. https://doi.org/10.1177/001316447103100326

Johannes I. F. Henning & Henry Jordaan. (2016). Determinants of Financial Sustainability for Farm Credit Applications—A Delphi Study. Sustainability, MDPI, Open Access Journal, 8(1), 1-15. https://doi.org/10.3390/su8010077

Kamal Kerroum, Azeddine Khiat, Ayoub Bahnasse, Es-Saadia Aoula, Yousaf khiat. (2020). The proposal of an agile model for the digital transformation of the University Hassan II of Casablanca 4.0, Procedia Computer Science, Volume 175, 2020, 403-410, ISSN 1877-0509, https://doi.org/10.1016/j.procs.2020.07.057.

Kerdpitak, C. (2022). The effects of innovative management, digital marketing, service quality and supply chain management on performance in cultural tourism business. Uncertain Supply Chain Management. 10(2), 771-778.

Kularbphettong, K., Tongsiri, C. (2012). Mining Educational Data to Analyze the Student Motivation Behavior. World Academy of Science, Engineering and Technology, Open Science Index 68, International Journal of Information and Communication Engineering, 6(8), 1032 - 1036. https://doi.org/10.5281/zenodo.1079926

Lynn, M. (1986). Determination and Quantification of Content Validity Index. Nursing Research, 35, 382-386. https://doi.org/10.1097/00006199-198611000-00017

Saedah Siraj, & Azdalila Ali. (2008). Principals projections on the Malaysian secondary school future curriculum. International Education Studies, 1(4), 61-78. https://doi.org/10.5539/ies.v1n4p61

Soon Fook Fong, Pei Eng Ch'ng, Fei Ping Por. (2013). Development of ICT Competency Standard Using the Delphi Technique, Procedia - Social and Behavioral Sciences, 103(1), 299-314. https://doi.org/10.1016/j.sbspro.2013.10.338