### Factors Affecting The Readiness Of Thai Universities To Organize Learning Activities In The Metaverse Era

Vichian Puncreobutr<sup>1\*</sup>, Ampon Dhamacharoen<sup>2</sup>, and Wannee Tapaneeyakorn<sup>3</sup>

<sup>1,2</sup>Faculty of Education, St Theresa International College Nakhon Nayok, Thailand.

<sup>3</sup>Faculty of Nursing, St Theresa International College Nakhon Nayok, Thailand.

\*Corresponding Author, Email: vichian@stic.ac.th

Received on 2 January 2022, Revised and Accepted on 5 February 2022, and Published 26 February 2022

#### ABSTRACT

This research aims to study the measures used in assessing the readiness of Thai universities to organize learning activities in the Metaverse era, the readiness of Thai universities in organizing learning activities, and the factors affecting the readiness of Thai universities in organizing learning activities. This research consisted of 2 stages; the first stage was qualitative research constructed through in-depth interviews, the second stage was quantitative research using the statistical analysis tools of Mean, S.D., t-Test, and Multiple Regression Analysis. Study results showed that: 1) Measures used in assessing the readiness in organizing learning activities in the Metaverse era consisted of 2 technological measures and 4 measures relating to knowledge building and learning management processes, totaling up to 6 measures. 2) The overall readiness of Thai universities in organizing learning activities in the Metaverse era is at a very high level. 3) Public universities are better equipped, in general and in 5 individual aspects, than private universities with the exception on the use of Augmented Reality Technology, where it was found that both public universities and private universities are equally equipped. 4) Factors affecting readiness of Thai universities to organize learning activities in the Metaverse era comprises of human development supporting digital competitiveness, internet availability supporting the metaverse, transaction availability on the metaverse, and opportunities to access metaverse technologies. The predictive efficiency coefficient is 49.6% ( $R^2 = 0.496$ ). It can be written in the form of a linear equation as: Readiness of Thai universities = 1.347 + .292(Human development) + .147(Internet) +.159(Transaction availability) +.104(Access opportunities)

Keywords: Metaverse, Higher Education Administration, Readiness of Thai Universities

#### **Background Information**

Metaverse is a virtual world, with a homogeneous connection between Virtual Reality and Augmented Reality. The users are not just viewers, but they can roam around the virtual world, making real-world-like interactions including talking, greeting, and having face-to-face conversations as if everybody were actually talking at the office, even though they were all sitting at home. Interactions can also be made with contents in the virtual world, such as online shopping virtually in famous shopping malls around the world. Users would feel as though they were walking in an actual shopping mall, talking to sales employees, or testing out products, even though their actual self would still be sitting at home. For instance, users can watch concerts of world-class artists, singing and dancing with people next to the stage, even when they are sitting at home (Danthamrongkul, 2021; Efinancethai, 2021; Flood, 2021).

Metaverse creates a Metaverse Economy, which will completely disrupt the current lifestyles of people, initiating many changes in the economy, society, politics, and business sectors, such as remote working replacing current jobs (Thaipost, 2021; Cirulisa and Brigmanis, 2013). Education will also change, children will have more fun while learning since they are able to create an avatar representing themselves to study in a virtual classroom (Danthamrongkul, 2021), upon graduation from universities, they can also receive a degree in a virtual conference room (Prachachat, 2021).

The development is based on the theory of University-Industry-Government: The Triple Helix Model of Innovation (Etzkowitz, 2008; Razak, 2015), which is a suitable theory for the era where technology is changing rapidly (Tubtiang, 2021). It is also suitable for the development of Thai people into the Metaverse era since Thailand retains strengths in all three sectors, namely the government sector - having a national strategy (2018-2037), setting goals for the development of future industries and services (Office of the National Economics and Social Development Council, 2021). For the industry or private sectors in Thailand, there are increasing New Forces in the context of metaverse, such as Blockchain, AI, Digital Platform, and up to 4 unicorn-level startups (Thairath online, 2021). For Thai universities, several universities have begun to develop their workforce in the metaverse era, such as the Smart Community-Based Tourism Program with AR (Graduate School of Management and Innovation, 2020).

It is therefore inevitable for the education management in Thailand to urgently develop people into the metaverse era (Prachachat, 2021), especially in higher education management. Education has to be managed in a way where learners are able to keep up with the fast-paced technology of the world (Yen, Tsai, and Wu, 2013), and keep up with technological advancements in the metaverse era (Collins, 2008).

In order to follow up on the implementation of the development of higher education institutions by university administrators in Thailand, to observe the human development into the metaverse era, the researcher believes that the factors affecting the readiness of Thai universities to organize learning activities in the metaverse era should be studied. This would be beneficial towards those involved in developing the quality of education management, or improving the educational development plan, for human development in the metaverse and elevating Thailand's Digital Competitiveness in the world henceforward.

### **Research Objectives**

- 1. To study the measures used to assess the readiness of Thai universities in organizing learning activities in the metaverse era.
- 2. To study the readiness level of Thai universities to organize learning activities in the metaverse era.
- 3. To compare the readiness of Thai universities to organize learning activities in the metaverse era, classified by the type of universities.
- 4. To study the factors affecting the readiness of Thai universities to organize learning activities in the metaverse era.

### **Research Methodology**

This research consists of 2 stages.

### Stage 1: Measures used to assess the readiness of Thai universities to organize learning activities in the metaverse era.

This stage is a qualitative research to study the measures used in assessing the readiness of Thai universities to organize learning activities in the metaverse era. The sample group comprises of metaverse specialists, university administrators and program administrators who have experience in the field of Communication, Information & Technology.

The researcher collected data from in-depth interviews with 9 metaverse specialists, and 17 university administrators and program administrators for majors in Communication, Information & Technology, totaling up to 26 key informants. The sample group was obtained through the snowballing method and triangulated data validation, the data was further analyzed.

### Stage 2: A study on factors affecting the readiness of Thai universities to organize learning activities in the metaverse era.

This stage is a quantitative research.

The population includes lecturers of higher education institutions, from public and private sectors, working full-time and part-time, totaling up to 100,000 people. The sample group was selected from university lecturers offering courses associated with Communication, Information & Technology in the academic year 2021. According to Krejcie & Morgan table, a total of 384 samples were obtained through stratified sampling, by using the types of university as a criterion for classification.

The variables studied are the following:

1. Independent variables

1.1 Types of universities, divided into two types: private universities and public universities.

1.2 Factors affecting the readiness of Thai universities to organize learning activities in the metaverse era (Office of the National Economics and Social Development Council, 2021), consisting of 5 factors, namely, human development supporting digital competitiveness, opportunities to access metaverse technologies, internet availability supporting the metaverse, the development of transaction availability on the metaverse, and confidence in data protection of digital systems.

2. The dependent variables are the readiness of Thai universities in organizing learning activities in the metaverse era, obtained from the study constructed in Stage 1 which found that there were 6 measures used to assess the readiness of Thai universities, including 1) The use of Augmented Reality Technology, 2) The use of Virtual Reality Technology, 3) Building the fundamental knowledge for metaverse, 4) Program development supporting metaverse, 5) The use of metaverse platforms, and 6) The use of metaverse studio.

Research tools and statistics - the instrument used was a questionnaire created by the researcher, with a discriminant index between .367-.882, and a reliability index of .88. The statistics used in the research were Mean, S.D., t-Test, and Multiple Regression Analysis. The study period was between January 2021 – December 2021.

#### **Research Results**

The results obtained from the study are as follows:

# Stage 1: A study on the measures used to assess the readiness of Thai universities in organizing learning activities in the metaverse era.

The study for this stage yielded to following results.

Metaverse specialists, university administrators and program administrators for majors associated with Communication, Information & Technology provided consistent opinions expressing that the key to assessing readiness in education management for the metaverse consists of two main components: technology and learning management knowledge and processes.

The aspect of technology consists of two important technologies, which are Augmented Reality Technology and Virtual Reality Technology. Universities must possess appropriate and sufficient equipment which should be applied in learning management. For knowledge and learning management processes, universities must implement a comprehensive and processive learning experience, starting from building the fundamental knowledge of metaverse, developing/having a metaverse-related curriculum or major, using the metaverse platform within the university, and using the metaverse studio within the university. These are the 6 measures used to assess the readiness of Thai universities.

### Step 2: A study on factors affecting the readiness of Thai universities to organize learning activities in the metaverse era.

The study for this stage yielded to following results.

### 1. The readiness level of Thai universities in organizing learning activities in the metaverse era

The study on the readiness level of Thai universities in organizing learning activities in the metaverse era have applied the 6 measures used to assess the readiness of Thai universities from Stage 1 in the study. The results are shown in the table 1.

Table 1. Readiness of	Thai universities to	o organize lear	rning activities	in the metaverse er
(N=384)		-	-	

Measures	Mean	S.D.	Influence Level
The use of Augmented Reality Technology	4.51	.5004	Very high
The use of Virtual Reality Technology	4.49	.5006	High
Building the fundamental knowledge for metaverse	4.50	.5006	High
Program development to support metaverse	4.45	.4979	High
The use of metaverse platforms within the university	4.57	.4960	Very high
The use of metaverse studio within the university	4.52	.5001	Very high
Overall readiness for learning management of Thai universities in the metaverse	4.51	.3171	Very high

As shown in Table 1, the overall readiness of Thai universities in organizing learning activities in the metaverse era is at a very high level. When considering each individual aspect, it was found that the measures in which Thai universities has a very high level of readiness consisted of 3 aspects: 1) The use of metaverse platforms within the university, 2) The use of metaverse studio within the university, and 3) The use of Augmented Reality Technology, respectively. The 3 measures in which Thai universities has a high level of readiness are 1) Building the fundamental knowledge for metaverse, 2) The use of Virtual Reality Technology, and 3) Program development to support metaverse, in the respective order.

## 2. Comparing the readiness of Thai universities in organizing learning activities in the metaverse era

The comparison of the readiness of Thai Universities to organize learning activities in the metaverse era, classified by the type of universities, is a comparison of the readiness between private universities and public universities, as shown in Table 2.

Maannaa	Private	e (187)	Public	(197)	4	n	
Measures	Mean	S.D.	Mean	S.D.	l	р	
The use of Augmented Reality Technology	4.47	.5001	4.56	.4978	1.828	.068	
The use of Virtual Reality Technology	4.44	.4975	4.55	.4989	2.157*	.032	
Building the fundamental knowledge for metaverse	4.38	.4866	4.61	.4880	4.714**	.000	
Program development to support metaverse	4.33	.4720	4.56	.4978	4.577**	.000	
The use of metaverse platforms within the university	4.49	.5011	4.64	.4798	3.153**	.002	
The use of metaverse studio within the university	4.43	.4960	4.61	.4880	3.711**	.000	
Overall readiness for learning management in the metaverse era	4.42	.2651	4.59	.3406	5.412**	.000	

**Table 2**. Comparison of the readiness of Thai universities to organize learning activities in the metaverse era, classified by the type of university (N=341)

\* p<.05, \*\* p<.01

According to Table 2, the comparison of the readiness of Thai universities to organize learning activities in the metaverse era, classified by the type of university, it was found that public universities had a higher overall readiness level in organizing learning activities in the metaverse era compared to private universities, with a statistical significance level of .01. When considering each individual aspect, it was found that public universities had a higher readiness level in organizing learning activities in the metaverse era than private universities, with the statistical significance level of .01, in 4 aspects, including 1) Building the fundamental knowledge for metaverse, 2) Program development to support metaverse, 3) The use of metaverse studio within the university, and 4) The use of metaverse platforms within the university. For the use of Virtual Reality Technology, it was discovered that public universities had a higher readiness level as opposed to private universities, with statistical significance at the .05 level. For the use of Augmented Reality Technology, public universities had a higher readiness level than private universities, with no statistical significance.

### **3.** A study on the factors affecting the readiness of Thai universities to organize learning activities in the metaverse era

A study of factors affecting readiness of Thai universities to organize learning activities in the metaverse era yielded the following results:

3.1 Study of human development to support digital competitiveness

The influence level of the human development factors supporting digital competitiveness on the readiness of Thai universities to organize learning activities in the metaverse era is shown in Table 3.

**Table 3.** Influence levels of human development factors supporting digital competitiveness (N=384)

Specifications		S.D.	Influence
	moun	5.D.	Level
Ability to train personnel regarding Information Technology	4.51	.5006	Very high
Ability to train personnel regarding Digital Literacy	4.35	.4780	High
Ability to manage education regarding AI & Data	4.45	.4979	High
Ability to manage education regarding Engineering and the	1 17	1008	High
Cloud System	4.47	.4990	
Ability to manage education regarding Software & Application	1 52	4000	Very high
developers	4.55	.4999	
Overall human development to support Digital	1 16	3604	High
Competitiveness	4.40	.3094	

As shown in Table 3, the overall human development to support digital competitiveness was found to have a high influence level on the readiness of Thai universities in organizing learning activities in the metaverse era. When considering each individual aspect, it was found that human development to increase the ability to manage education regarding Software & Application developers, and the ability to train personnel on Information Technology had a very high level of influence. For the remaining human development factors, including the ability to manage education regarding Engineering and the Cloud System, the ability to manage education regarding AI & Data, and the ability to train personnel regarding Digital Literacy, had a high level of influence respectively.

3.2 The study on opportunities to access metaverse technologies

Influence levels of opportunities to access metaverse technologies on the readiness of Thai universities to organize learning activities in the metaverse era, as shown in Table 4.

<b>Tuble Winnuchee</b> levels of opportunities to decess inetaverse technologies (1) be i)					
Specifications	Mean	S.D.	Influence Level		
Lecturers' access to VR and AR devices	4.61	.4891	Very high		
Students' access to VR and AR devices	4.54	.4986	Very high		
Enterprises' access to VR and AR devices	4.51	.5004	Very high		
VR and AR devices development trends for lower prices	4.51	.5005	Very high		
Entrepreneurial technology capabilities	4.51	.5005	Very high		
Overall access opportunities to metaverse technologies	4.54	.3871	Very high		

**Table 4.** Influence levels of opportunities to access metaverse technologies (N=384)

As observed on Table 4, the overall access opportunities to metaverse technologies were shown to have a very high influence level on the readiness of Thai universities to organize learning activities in the metaverse era. When considering each individual aspect, it was found that all aspects had a very high level of influence, which is lecturers' access to VR and AR devices, students' access to VR and AR devices, enterprises' access to VR and AR devices, VR and AR device development trends for lower prices, and entrepreneurial technology capabilities, in the respective order.

3.3 The study on internet availability to support the metaverse

The level of influence of internet availability to support the metaverse on the readiness of Thai universities to organize learning activities in the metaverse era, as shown in Table 5.

Table 5. Influence levels of internet availability to support the metaverse (N=384)

Specifications	Moon	5 D	Influence
	Wiean	5.D.	Level
5G internet system	4.51	.5006	Very high
The coverage and thoroughness of 5G internet service areas	4.49	.5006	High
Applications in the 5G internet system	4.53	.4995	Very high
Application usage in the 5G internet system	4.52	.5004	Very high
Internet speed to support real-time 3D images	4.60	.4902	Very high
Overall internet availability to support the metaverse	4.53	.3879	Very high

According to Table 5, the overall internet availability to support the metaverse was found to have a very high level of influence on the readiness of Thai universities to organize learning activities in the metaverse era. When considering each individual aspect, it was revealed that almost all aspects had a very high level of influence, namely the internet speed to support real-time 3D images, applications in the 5G internet system, application usage in the 5G internet system, 5G internet systems, in the respective order. With the exception of the coverage and thoroughness of 5G internet service areas, this had a high level of influence.

3.4 The study on the development of transaction availability on the metaverse

The influence level for the development of transaction availability on the metaverse on the readiness of Thai universities to organize learning activities in the metaverse era, as shown in Table 6.

(11-30+)			
Specifications	Mean	S.D.	Influence Level
Virtual Office	4.61	.4885	Very high
Virtual Space	4.51	.5005	Very high
Virtual Playground	4.61	.4879	Very high
Virtual Bank	4.52	.5004	Very high
Virtual Business	4.46	.4986	High
Overall development of transaction availability on the metaverse	4.54	.3242	Very high

Table 6.	Influence	levels	of th	e deve	lopment	of	transaction	availability	on	the	metaverse
(N=384)											

As shown on Table 6, the overall development of transaction availability was found to have a very high level of influence on the readiness of Thai universities to organize learning activities in the metaverse era. When considering each aspect, it was discovered that almost all aspects had a very high level of influence, including the virtual playground, virtual office, virtual bank, and virtual space, respectively. With the exception of the virtual business, this had a high level of influence.

3.5 A study on the confidence in data protection within digital systems

The influence level of the confidence in data protection within digital systems on the readiness of Thai universities to organize learning activities in the metaverse era is shown in Table 7.

**Table 7.** Influence level of the confidence in data protection within digital systems (N=384)
 Image: N=384

Specifications	Mean	S.D.	Influence Level
Sufficiently strong prevention of access to data	4.56	.4973	Very high
Issues of personal data loss	4.53	.4995	Very high
Issues of fake identity creation in digital systems	4.63	.4840	Very high
Issues of cyber-bullying and online stalking	4.55	.4981	Very high
Overall issues of data protection within digital systems	4.57	.3873	Very high

According to Table 7, the overall confidence in data protection within digital systems was found to have a very high level of influence on the readiness of Thai universities to organize learning activities in the metaverse era. That is, with low confidence, when considering each individual aspect, it was found that all aspects had a very high level of influence: issues of fake identity creation in digital systems, sufficiently strong prevention of access to data, issues of cyber-bullying and online stalking, and issues of personal data loss, respectively.

3.6 Factors affecting the readiness of Thai universities to organize learning activities in the metaverse era

The study of factors affecting readiness of Thai universities to organize learning activities in the metaverse era was constructed using multiple regression analysis, as shown in Table 8.

**Table 8.** Multiple regression analysis results of factors affecting the readiness of Thai universities to organize learning activities in the metaverse era

Independent variable (predictor)	b	Beta	t	р		
B: Human development to support digital	.292	.340	6.213	.000		
competitiveness						
D: Internet availability to support the metaverse	.147	.180	3.131	.002		
E: Development of transaction availability on the	.159	.162	3.028	.003		
metaverse						
C: Opportunities to access metaverse technologies	.104	.127	2.238	.026		
Constant	1.347		7.879	.000		
$R = 0.704$ $R^2 = 0.496$ $F = 93.130$ p value < 0.000						

As observed on Table 8, the multiple regression analysis results of factors affecting the readiness of Thai universities to organize learning activities in the metaverse era revealed that factors positively influencing the readiness of Thai universities, with statistical significance at the .01 level, consisted of 3 factors: Human development to support digital competitiveness ( $\beta = 0.340$ ), the internet availability to support the metaverse ( $\beta = 0.180$ ), and the development of transaction availability on the metaverse ( $\beta = 0.162$ ). The factors positively influencing the readiness of Thai universities, with the statistical significance level of .05, consisted of one factor, namely opportunities to access metaverse technologies ( $\beta = 0.127$ ). The confidence in data protection within digital systems did not influence the readiness of Thai universities in the metaverse era.

The results revealed the value of  $R^2 = 0.496$ , indicating the predictive efficiency coefficient for factors affecting the readiness of Thai universities to organize learning activities in the metaverse era. The 4 factors are human development to support digital competitiveness, internet availability to support the metaverse, the development of transaction availability on the metaverse, and opportunities to access metaverse technologies. The predictive efficiency contributes to 49.6 percent, and the remaining 51.4 percent are the result of other variables, which were not considered in this study. Survey of precision medicine strategy using cognitive computing international journal of machine learning and computing and a dataset for automatic

contrast enhancement of microscopic malaria infected blood RGB images, data in brief and image segmentation technique using SVM classifier for detection of medical disorders also included in digital literacy era to understand the digital literacy in health aspects in metaverse world (Ramu et al, 2018, somasekar et al, 2019, Janardhan et al, 2019).

From the statistical analysis of the coefficients for all 4 independent variables, it can be written in the form of a linear equation, obtained through the multiple regression analysis, to predict the readiness of Thai universities to organize learning activities in the metaverse era as follows: Readiness of Thai universities = 1.347 + .292(Human development) + .147(Internet) + .159(Transaction availability) + .104(Access opportunities)

The equation can also be written in the standard score form as follows:

Z Readiness of Thai universities = 0.340 Z Human development + 0.180 Z Internet + 0.162 Z Transaction availability + 0.127 Z Access opportunities

#### Conclusion

The results of the study can be summarized as follows.

**1.** Measures used to assess the readiness of Thai universities to organize learning activities in the metaverse era - from the studies conducted on metaverse specialists, university administrators and program administrators offering courses in Communication, Information & Technology, it was found that the measures used to assess the readiness for learning management in the metaverse consisted of 6 measures, 2 of which were technology measures and 4 were related to knowledge and learning management processes.

2. The readiness levels of Thai universities in organizing learning activities in the metaverse era – it was discovered that the overall readiness of Thai universities to organize learning activities in the metaverse era was at a very high level. When considering each individual aspect, it was found that Thai universities had a very high level of readiness for the use of Metaverse Platforms within the university, the use of Metaverse Studio within the university, and the use of Augmented Reality Technology. Regarding the readiness for building fundamental knowledge on metaverse, the use of Virtual Reality Technology, and program development supporting the metaverse, there is a high level of readiness.

**3.** The comparison of the readiness of Thai universities to organize learning activities in the metaverse era, classified by the type of universities – revealed that public universities had a higher overall level of readiness for learning activities in the metaverse era compared to private universities. When comparing each individual aspect, it was found that public universities had a higher level of readiness to organize learning activities in the metaverse era than that of private universities in 5 aspects: building the fundamental knowledge on metaverse, program development supporting the metaverse, the use of Metaverse Studio within the university, the use of Metaverse Platforms within the university, and the use of Virtual Reality Technology. For the use of Augmented Reality Technology, it was found that both public and private universities were equally equipped.

**4.** Factors affecting the readiness of Thai universities to organize learning activities in the metaverse era. The results of the study found that:

4.1 Overall human development to support digital competitiveness was shown to influence the readiness of Thai universities at a high level. When considering each aspect, it was found that human development to increase the ability to manage education regarding Software & Application developers and the ability to train personnel on Information Technology had a very high influence. As for the human development in other areas, there was a high level of influence.

**4.2** The overall opportunities to access metaverse technologies was shown to influence the readiness of Thai universities to organize learning activities in the metaverse era at a very high level. When considering each aspect, it was found that lecturers' access to VR

and AR devices, students' access to VR and AR devices, enterprises' access to VR and AR devices, the trend of developing lower-cost VR and AR devices, and the entrepreneurial technology capabilities, all aspects had a very high level of influence.

**4.3** The overall internet availability supporting the metaverse was found to have a very high level of influence on the readiness of Thai universities to organize learning activities in the metaverse era. When considering each aspect, it was shown that the internet speed supporting real-time 3D images, applications in 5G internet systems, application usage in 5G internet systems, and 5G internet systems had a very high level of influence.

**4.4** The overall development of transaction availability on the metaverse was shown to have a very high level of influence on the readiness of Thai universities to organize learning activities in the metaverse era. When considering each aspect, it was observed that the virtual playground, virtual office, virtual bank, and virtual space had a very high influence level.

**4.5** The overall confidence in data protection within digital systems was found to have a very high influence level on the readiness of Thai universities to organize learning activities in the metaverse era. When considering each aspect, it can be seen that the issue of fake identity creation on digital systems, the issue of sufficiently strong prevention of access to data, the issues of cyber-bullying and online stalking, and the issue of personal data loss had a very high level of influence.

**4.6** Factors affecting the readiness of Thai universities to organize learning activities in the metaverse era – it was observed that factors positively influencing the readiness of Thai universities consisted of 4 factors, which are human development to support digital competitiveness ( $\beta = 0.340$ ), internet availability to support the metaverse ( $\beta = 0.180$ ), development of transaction availability on the metaverse ( $\beta = 0.162$ ), and opportunities to access metaverse technologies ( $\beta = 0.127$ ). The confidence in data protection within digital systems did not influence the readiness of Thai universities to organize learning activities in the metaverse era. The predictive efficiency coefficient is 49.6 percent ( $\mathbb{R}^2 = 0.496$ ), which can be written in the form of a linear equation as follows:

Readiness of Thai universities = 1.347 +.292(Human development) +.147(Internet) +.159(Transaction availability) +.104(Access opportunities)

The equation can also be written in the standard score form as:

### **Discussion of Results**

The study has shown that the confidence in data protection within the digital system does not affect the readiness of Thai universities to organize learning activities in the metaverse era. Whereas, the other 4 factors, including human development to support digital competitiveness, internet availability supporting the metaverse, the development of transaction availability on the metaverse, and opportunities to access metaverse technologies, all influenced the readiness of Thai universities to organize learning activities. This indicates that the issues related to digital impersonation, sufficiently strong data protection, cyber-bullying and online stalking, and the loss of personal data, all of which occurs in digital systems, are not considered an obstacle in Thailand's metaverse accessibility. Therefore, university administrators and program administrators for courses related to Communication, Information & Technology in universities with currently no implementations to support metaverse learning management, should urgently emphasize on the upcoming changes such as the development of programs supporting the metaverse and building fundamental knowledge on metaverse in higher education institutions, henceforward.

#### **Recommendations**

#### **Recommendations for applying the research results:**

Through the study, it was found that the readiness of Thai universities in organizing learning activities in the metaverse era is at a very high level. This is especially true for the readiness on the use of Metaverse Platforms within the university, the use of Metaverse Studio within universities, and the use of Augmented Reality Technology. However, Thai universities still have to improve their readiness on building fundamental knowledge on the metaverse, the use of Virtual Reality Technology, and especially program development supporting the metaverse. The study also revealed that the readiness to organize learning activities in the metaverse era of public universities and private universities regarding the use of Augmented Reality Technology, had no difference. This was true for only one aspect, which indicates that private universities in Thailand need to accelerate the development of their readiness in terms of building fundamental knowledge of the metaverse, program development supporting the metaverse, the use of Metaverse Studio within the university, the use of Metaverse Platforms within the university, and the use of Virtual Reality Technology, to increase urgently.

The study showed that the factors affecting the readiness of Thai universities to organize learning activities in the metaverse era consists of 4 factors: human development to support digital competitiveness, internet availability supporting the metaverse, development of transaction availability on the metaverse, and opportunities to access metaverse technologies. With the exception of the confidence in data protection within the digital system. This shows how Thailand's development approach for the metaverse has been successful to an extent. That is, government agencies, the entrepreneurial sector, and higher education institutions must cooperate to improve the metaverse development strategy in order to enhance the success and continue to organize learning activities in the metaverse era of Thailand.

Recommendations for further research:

According to the study on factors affecting the readiness of Thai universities to organize learning activities in the metaverse era, which discovered that the predictive efficiency coefficient constitutes 49.6 percent, while the remaining 50.4 percent was a result of other variables, which were not included in this study. Therefore, the other factors affecting the readiness of Thai universities to organize learning activities in the metaverse era should be studied in order to increase the predictive efficiency further.

### References

Cirulisa, A., and Brigmanis K.B., (2013). 3D Outdoor Augmented Reality for Architecture and Urban Planning. Procedia Computer Science, 25: 71-79.

Collins, C. (2008). Looking to the future: Higher education in the Metaverse. Educause **Review**. 43(5): 51-63.

Danthamrongkul, W. (2021). Preparation for the Metaverse Era. Bangkokbiz news. Retrieved September 29, 2021. From

https://www.bangkokbiznews.com/blogs/columnist/962657

Efinancethai. (2021). The Metaverse is a virtual world that is bigger than you think. Retrieved August 13, 2021. From https://www.efinancethai.com/Fintech/FintechMain.aspx?release=y&name=ft\_20210813141 9

Etzkowitz, H. (2008). Triple Helix Innovation: University-Industry-Government Innovation in Action. New York: Routledge.

Webology (ISSN: 1735-188X) Volume 19, Number 2, 2022

Flood, A. (2021). **NFT beats cheugy to be Collins Dictionary's word of the year**. Retrieved December 4, 2021 from https://www.theguardian.com/books/2021/nov/24/nft-is-collins-dictionary -word-of-the-year

Graduate School of Management and Innovation, King Mongkut's University of Technology Thonburi. (2020). **Smart Community-Based Tourism Program with AR.** Retrieved November 7, 2021. from <u>http://gmi.kmutt.ac.th/academic/academic\_detail/16</u>

Office of the National Economics and Social Development Council. (2021). Social Situation and Outlook. Bangkok: Office of the Prime Minister.

Prachachat. (2021). **Metaverse "Virtual Worlds" Learning Opportunities-Challenges**. Retrieved December 4, 2021. from <u>https://www.prachachat.net/education/news-814816</u>

Razak, A. A. (2015). The Triple Helix model for innovation: a holistic exploration of barriers and enablers. **International Journal of Business Performance and Supply Chain Modelling**, 7(3), 278-291.

Thairath online. (2021). **Unicorn of Thai startups and the path to the digital economy**. Retrieved December 4, 2021. from <u>https://www.thairath.co.th/business/feature/2235578</u>

Thaipost. (2021). **Pointing out that Thailand is preparing for the Metaverse, expanding the Digital Economy**. Retrieved November 7, 2021. from <u>https://www.thaipost.net/news-update/20462/</u>

Tubtiang, A. (2021). The Study of Factors Influencing Thai Defense Industry towards Metaverse Era. **National Defense Studies Institute Journal**. 12(3): 29-43.

Yen, J., Tsai C., and Wu, M. (2013). Augmented Reality in the Higher Education: Students' Science Concept Learning and Academic Achievement in Astronomy. In 13<sup>th</sup> International Educational Technology Conference, 165-173.

G. Ramu, P. Dileep Kumar Reddy, Appawala Jayanthi .(2018). "A Survey of Precision Medicine Strategy Using Cognitive Computing" International Journal of Machine Learning and Computing, Vol. 8, No. 6, December 2018 DOI: 10.18178/IJMLC2018.8.6.741 530 to 535.

J. Somasekar a, , G. Ramesh , Gandikota Ramu, P. Dileep Kumar Reddy, B. Eswara Reddy, Ching-Hao Lai, (2019) "A dataset for automatic contrast enhancement of microscopic malaria infected blood RGB images", Data in brief, Elsevier. https://doi.org/10.1016/j.dib.2019.104643, 2352-3409

Ummadi Janardhan Reddy, Pandluri Dhanalakshmi, Pallela Dileep Kumar Reddy. (2019). **Image Segmentation Technique Using SVM Classifier for Detection of Medical Disorders** Ingénierie des Systèmes d' Information, 24 (2): 73-176. <u>https://doi.org/10.18280/isi.240207</u>