Factors for Predicting Success in e-Learning System Management during the COVID-19 Pandemic: The Case Study of Suranaree University of Technology

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***Abstract*—The COVID-19 pandemic widely affected many sectors including education. Suranaree University of Technology, as the first autonomous university of technology in Thailand, had improved online education and applied the university e-learning systems to cope with the pandemic situation. Thus, this research aimed to 1) study the levels of the related factors and the success of the e-learning systems in disruptive online education, 2) study the correlation between the related factors and the success of the e-learning systems in disruptive online education, and 3) study the factors predicting the success of the e-learning systems in disruptive online education. The samples were 405 students, instructors, and staff. Data were collected by using a questionnaire. The results showed that Organizational Factor, Instructor Factor, User Support Factor, Student Factor, and Teaching and Learning Management Factor were at a high level, whereas the System Performance Factor, and Technology and Infrastructure Factor were at a moderate level. Moreover, all factors were significantly correlated to success at a high level ($r = 0.77$, $p < 0.01$). Finally, in predicting the success of the e-learning system, five factors namely, Instructor Factor, User Support Factor, System Performance Factor, Organizational Factor, and Student Factor were able to predict success for 60%, and the Instructor Factor only was able to predict success for 49%.**

***Index Terms*—E-learning, online education, success factors, COVID-19 pandemic**

I. Introduction

Recently, the Coronavirus (COVID-19) pandemic spread widely throughout the world and affected many sectors, especially the educational sector where many institutions had to be closed during the outbreak. UNESCO recommended educational institutions hold online education and use technology as a tool to keep interactions between instructors and students [1, 2].

In Thailand, the Minister of Education announced that educational institutions under and in control of the Ministry of Education close for the special situation from March 18, 2020, onwards until the changes were announced [3]. Many universities in Thailand, thus, had announced closed and held their online learning following the measures to prevent the spread of COVID-19.

Suranaree University of Technology (SUT) started to change its education to online education when the measure for teaching management in the abnormal situation of the COVID-19 pandemic was announced on March 10, 2020. All classes were changed to online, and normal onsite learning was not allowed from March 16, 2020, to April 19, 2020. After that, as the epidemic situation has not diminished, the second announcement of measures for teaching management in the abnormal situation of the COVID-19 pandemic and the following announcements has been released. As a result, online education continued until the second semester of the academic year 2021 (i.e. until February 2022).

The sudden change in the form of education has caused concerns and problems that both instructors and students were unable to suddenly turn to online platforms [4]. The university had a policy to prepare and use technology to enhance effective online education. Therefore, SUT e-Learning, the Learning Management System, had been launched and had been used as the main tool for online education during the abnormal situation. The system had been improved from the existing system that has been in service since 2003 to be able to support a large number of instructors and students who use the system simultaneously.

Moreover, Suranaree University of Technology tried to reduce the limitations of online education by improving the online educational environment and creating accessible channels. For example, digital media production training and digital media production consultation had been held for instructors together with the training on the use of technology information for teaching and learning. Additionally, software for online education management had been prepared and provided to increase the effectiveness of online education.

However, the sudden change in teaching and learning platforms showed limitations that affect accessibility to technology; for example, the limitations of the technological infrastructure and the lack of supportive systems from the institution, instructors, and students [1, 4]. Thus, the Critical Success Factors (CSFs) for effective online education on the technological network should be critically analyzed in order to enhance the effectiveness of the technological networks and the success of online education. [5]

Cheriyan [6] argued that the research results related to Critical Success Factors vary significantly based on the country in which the research has been conducted. Al-Fraihat *et al.* [7] found that there was much research that tried to evaluate e-learning systems and investigate the factors and issues related to the success of e-learning systems at the

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university level. However, each research focused on different stakeholder groups [6]. Most of the research is concerned with only students [6, 8, 9] or mainly concerned with instructors or staff [10, 11]. Only some are concerned with students and instructors [12]. Ejdys [13] suggested that higher educational institutes should be concerned and investigated factors related to the acceptance and success of e-learning because it is a challenge and opportunity for each institution during the strong competition. There are a small number of studies that investigate success factors from students, instructors, and staff, especially from the university of technology.

Therefore, this research aimed to study the factors predicting the success of the e-learning system management during the COVID-19 pandemic from the perspective of students, instructors, and staff of Suranaree University of Technology. The results of the study will be a guideline for analyzing and planning strategies to promote more effective e-learning system management and respond to the need in using technology for supporting education in all situations.

II. Research Objectives

The objectives of the study were as follows:

1) to study the levels of the relevant factors and the success of the e-learning system management during the COVID-19 Pandemic
2) to study the correlation between the relevant factors and the success of the e-learning system management during the COVID-19 Pandemic
3) to study the predictive factors for the success of the e-learning system management during the COVID-19 Pandemic

III. Literature Review

The related theories, principles, research, and documents concerning e-learning system management and the predicting factors for the success of e-learning system management were reviewed. E-learning systems were initially used in the mid-1990s together with the development of information technology and networking. E-learning is distance learning when the learners and instructors are in different places and at different times [14]. Thus, the learning process can be happened by using technology, namely, the Internet to access learning materials and support communication between students and instructors and among peers from anywhere, at any time [15]. In addition, Ali, Hossain, and Ahmed [8] defined e-learning as an electronic learning process in which learners can use electronic media through electronic media both online and offline. Therefore, the system that can support learning through the network must be a system that has suitable features for the online learning management system, named LMS.

DeLone and McLean [16] developed a model of the success of information systems. The results of the study revealed the influential factors which consisted of data quality, system quality, and service quality that affected the Intention to continue using, user satisfaction, and the benefits to both individuals and organizations. Sun *et al*. [9] revealed that the factors affecting learner satisfaction consisted of the anxiety of the computer user, instructors' attitudes toward e-learning, the flexibility of the curriculum, the quality of the course, the benefit awareness, the ease of use, and the diversity in assessment. Similarly *et al*. [17] and Siqueira *et al*. [18] identified the learning management through the network to consist of three main aspects namely Content, teaching and learning, and technology. Gautam and Tiwari [19] identified a learner-based aspect of e-learning to consist of learners, curriculum, page design, content engagement, and the usability of the system. Cheriyan [6] identified the factors affecting the success of the e-learning system management to consist of technological support, e-learning resources, e-learning support and training, and characteristics of learners and instructors. Naveed *et al*. [5] identified the factors that influenced the success of e-learning systems in five dimensions consisting of the learner dimension, the instructor dimension, the design and content dimension, the management of the organization dimension, and the system and technology dimension. Additionally, the success of the e-learning system management was based on the user's decision that came from their consideration of the usability, observability, testability, familiarity with the technology, the system complication, and the user's satisfaction with the systems [12].

Therefore, factors predicting the success of e-learning system management refer to the factors affecting the success of e-learning system management that can be measured by satisfaction, benefits, and the intention to continue using the system.

Al-Fraihat *et al*. [7] studied the evaluation of the success of e-learning systems: an empirical study. An empirical model was developed from the literature review and analyzed. The results were used for improving the e-learning system. The data were collected from 563 UK universities. The results showed that the factors affecting satisfaction with e-learning system management were the quality of the technical system, the quality of information, the quality of service, the quality of the support system, learner quality, and instructor quality. These factors were able to describe satisfaction by 71.40% of the variance in perceived satisfaction. Additionally, these factors were able to describe the perception of the benefits by 54.20% of the variance of the perceived benefits. Moreover, it was found that the structure that determined the use of e-learning consisted of the quality of the education system, the quality of the support system, learner quality, and the perception of benefits that can be described by 34.10%, and the perception of benefits, satisfaction, and the usability can be described by 64.7% of the variance in e-learning benefits.

Alqahtani and Rajkhan [20] studied e-Learning critical success factors during the COVID-19 pandemic: a comprehensive analysis of e-learning managerial perspectives. The objective of the study was to identify the success factors for e-learning during COVID-19 by using the multi-criteria Analytic Hierarchy Process (AHP) and Technique for Order Preference by Similarity to Ideal Solution (TOPSIS) techniques. The data were collected from 69 e-learning system managers from educational institutions by using interviews. The results showed that learners and instructors needed information technology management, support from the management team, and the raising of

learners' awareness of the use of e-learning at a high level, and the Organizational Factor was considered the most influential one during the COVID-19 pandemic.

Ebner *et al*. [21] studied the COVID-19 epidemic as an e-Learning boost: chronological development and effects at an Austrian University against the background of the concept of "e-Learning Readiness." The study described the situation of Graz University of Technology (TU Graz) regarding e-learning in reference to Alshaher [22]. It proposed a model for assessing e-learning readiness namely the MCKINSEY 7S model that consisted of 1) Strategy consisting of vision and mission, goals/objectives, and strategic plan, 2) Structure consisting of centralization, size, and CIO position, 3) System consisting of technology, content, support platform, and documents, 4) Style/Culture consisting of organizational culture, leadership, the support from the senior management team, and communication, 5) Staff consisting of sufficient manpower, planning group, training, and education, 6) Skills consisting of management skills, IT staff skills, and learner's skills, and 7) Shared value.

Watanakanjana *et al*. [23] studied the effectiveness of online learning of lecturer's competence and assessment: a case study of the Faculty of Management Science, Nakhon Pathom Rajabhat University. The data were collected online from 1,368 students from all 10 majors of the Faculty of Management Science by using an online questionnaire. The results showed that online learning efficiency was significantly influenced by the combined influence of the lecturer's competence and assessment with a predictive power of 71.90%.

IV. Conceptual Framework

According to the related studies presented in Table I, the e-learning success factors that were repeatedly mentioned by more than 50% were selected to use as variables in this research. The conceptual framework was presented in Fig. 1.

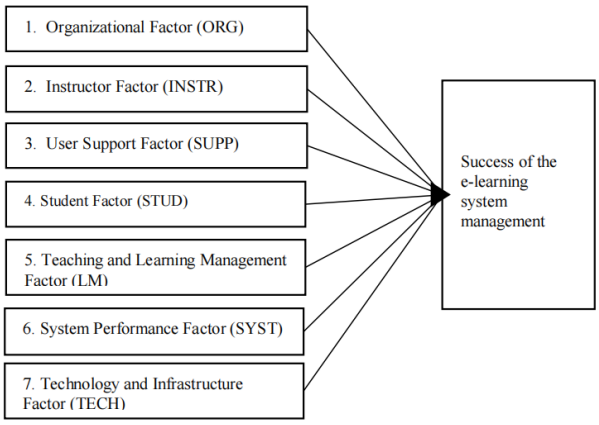

Fig. 1. Research framework.

TABLE I: The Synthesis of Factors That Predict Success in e-Learning System Management

Channels	[5]	[6]	[9]	[12]	[16]	[20]	[21]
1. Organizational	✓			✓		✓	✓
2. Instructor	✓	✓	✓	✓	✓	✓	✓
3. User support	✓	✓	✓	✓	✓	✓	✓
4. Student	✓	✓	✓	✓	✓	✓	✓
5. Teaching and learning management	✓	✓	✓	✓	✓	✓	✓
6. System performance		✓	✓	✓	✓		✓
7. Technology and infrastructure	✓	✓	✓	✓		✓	✓
8. Common beliefs							✓
9. Knowledge Management						✓	

V. Research Methodology

A. Population, Sample and Data Collection Method

The population of the study was 17,924 students, instructors, and staff of Suranaree University of Technology (data retrieved on February 28, 2021). The number of samples was calculated by using the sample size formula with confidence at 95% and error at ±5% [24]. Hence, the suitable sample number for this study was more than 391 students, instructors, and staff of Suranaree University of Technology. The samples of the study were selected by using accident sampling selection. The data were collected by using an online questionnaire, and there were 405 respondents.

B. Research Tools

The research instrument was a questionnaire consisting of four parts. Part 1 was the general information of the respondents (11 items). Part 2 was the opinions on the e-learning system management of the University of Technology Suranaree (29 items). This part was presented in a 5-point Likert scale divided into seven groups of items as follows: Organizational Factor (4 items), Instructor Factor (5 items), User Support Factor (4 items), Student Factor (5 items), Teaching and Learning Management Factor (4 items), System Performance Factor (4 items), and Technology and Infrastructure Factor (3 items). Part 3 was opinions on the SUT e-learning system's success was presented on a 5-point Likert scale (3 items). Part four was open-ended questions and other suggestions.

Content validity and Index of Item-Objective Congruence (IOC) [25] were analyzed by three experts in information technology (i.e. two experts had a doctoral degree and 5-year experience, and one expert had a master's degree and 10-year experience). The IOC indexes of each question were 0.67–1.00. The Cronbach's coefficient alpha reliability of the whole questionnaire was at 0.98.

C. Data Analysis

All 405 responses were checked and used for statistical analysis. The statistical analyses were as follows: 1) General information was analyzed by using descriptive statistics consisting of frequency, percentage, mean, and standard deviation. The criteria for determining the mean were as follows:

Mean 4.51–5.00 Highest relevant factors
Mean 3.51–4.50 High relevant factors
Mean 2.51–3.50 Moderate relevant factors
Mean 1.51–2.50 Low relevant factors
Mean 1.00–1.50 Lowest relevant factors.

The correlation between e-learning factors and success was analyzed by using Pearson's correlation coefficient statistics (Pearson's Product Moment Correlation) (i.e. where r = 0.50 to 1.00 is considered high correlation, r = 0.30 to 0.49 is considered moderate correlation, and r = 0.10 to 0.29 is

considered low correlation).

The prediction of the influential power of e-learning factors on the success of e-learning system management was analyzed by using Stepwise Multiple Regression Analysis.

VI. Results

There were 405 respondents. Most were female (n = 283, 69.88%), being students (n = 345, 85.19%), majoring in Engineering (n = 198, 48.89%), having experience using the SUT e-Learning system for one year and over (n = 313, 77.28%), using a personal computer or notebook (n = 383, 94.57%).

The order of results was presented in three parts according to the objectives of this study.

A. Levels of the Relevant Factors and the Success of the e-Learning System Management

The results showed that the factors that were at the high levels were 1) Organizational Factor, 2) Instructor Factor 3) User Support Factor, 4) Student Factor, and 5) Teaching and Learning Management Factor. The factors that were at the moderate level were 6) System Performance Factor and 7) Technology and Infrastructure Factor. The success of the e-learning system management during the COVID-19 Pandemic was at a high level, as shown in Table II.

TABLE II: Average, Standard Deviation of the Degree of Factors Involved and Success of the e-Learning System Management during the COVID-19 Pandemic

Factors	x̄	*S.D.*	Description
1. Organizational Factor (ORG)	3.93	0.67	High
2. Instructor Factor (INSTR)	3.66	0.73	High
3. User support Factor (SUPP)	3.64	0.76	High
4. Student Factor (STUD)	3.63	0.71	High
5. Teaching and Learning Management Factor (LM)	3.57	0.78	High
6. System Performance Factor (SYST)	3.43	0.78	Moderate
7. Technology and Infrastructure Factor (TECH)	3.37	0.81	Moderate
The success of the e-learning system management	3.80	0.63	High

B. Correlation between the Relevant Factors and the Success of the e-Learning System Management during the COVID-19 Pandemic

The results of the correlation between the relevant factors and the success of the e-learning system management showed that Organizational Factor, Technology and Infrastructure Factor, System Performance Factor, Teaching and Learning Management Factor, Instructor Factor, Student Factor, and User Support Factor showed the coefficient alpha at a high level ($r = 0.77$, $p < 0.01$)

The coefficient alpha of the correlation between each factor with the success of the e-learning system management was between 0.53 to 0.85. The factors with the highest effect size were the Instructor Factor and Student Factor ($r = 0.85$, $p < 0.01$). Moreover, these two factors were the most highly significantly correlated with the success of the e-learning system management ($r = 0.70$, $p < 0.01$), as shown in Table III.

TABLE III: Pearson's Correlation Coefficient of Factors Related to Success in e-Learning Management during the COVID-19 Pandemic

Factors Variable	SUCCESS	ORG	INSTR	SUPP
SUCCESS	1.00	-	-	-
ORG	0.58**	1.00	-	-
INSTR	0.70**	0.63**	1.00	-
SUPP	0.68**	0.53**	0.73**	1.00
STUD	0.70**	0.62**	0.85**	0.73**
LM	0.67**	0.62**	0.76**	0.72**
SYST	0.65**	0.55**	0.69**	0.63**
TECH	0.61**	0.56**	0.69**	0.62**
Factors Variable	**STUD**	**LM**	**SYST**	**TECH**
SUCCESS	-	-	-	-
ORG	-	-	-	-
INSTR	-	-	-	-
SUPP	-	-	-	-
STUD	1.00	-	-	-
LM	0.75**	1.00	-	-
SYST	0.67**	0.71**	1.00	-
TECH	0.64**	0.66**	0.74**	1.00

** $p < 0.01$, ORG = Organizational Factor, INSTR = Instructor Factor, SUPP = User Support Factor, STUD = Student Factor, LM = Teaching and Learning Management Factor, SYST = System Performance Factor, TECH = Technology and Infrastructure Factor

C. Predictive Factors for the Success of the e-Learning System Management during the COVID-19 Pandemic

The results of the factors predicting the success of the e-learning system management during the COVID-19 Pandemic at Suranaree University of Technology showed that five factors can predict the success for 60% (Adjust $R^2 = 0.60$) consisting of Instructor Factor, User Support Factor, System Performance Factor, Organization Factor, and Student Factor (B = 0.12, 0.21, 0.17, 0.13, and 0.16 and β = 0.14, 0.25, 0.20, 0.14, and 0.18, respectively). The multiple correlations of the criteria and predictors were 0.78 and the error was 0.40., as shown in Table IV.

TABLE IV: Factors with the Highest Predictive Power of the Success of the e-Learning System Management during the COVID-19 Pandemic

Variable	B	SE	β	Sig
Instructor Factor (INSTR)	0.12	0.06	0.14	0.03
User support Factor (SUPP)	0.21	0.04	0.25	0.00
System performance Factor (SYST)	0.17	0.04	0.20	0.00
Organizational Factor (ORG)	0.13	0.04	0.14	0.00
Student Factor (STUD)	0.16	0.06	0.18	0.01

The results of the Stepwise Multiple Regression Analysis with the five highest effect size factors showed five predictive equations as follows:

Eq. (1): Instructor Factor influenced the success of the

e-learning system management for 49% as

$$(\beta)\ y\ SUCCESS\ =\ 1.58\ +0.70\ INSTR \quad (1)$$

Eq. (2): Instructor Factor and User Support Factor influenced the success of the e-learning system management for 55% as

$$(\beta)\ y\ SUCCESS\ =\ 1.33\ +0.43\ INSTR\ +0.36\ SUPP \quad (2)$$

Eq. (3): Instructor Factor, User Support Factor, and System Performance Factor influenced the success of the e-learning system management for 58% as

$$(\beta) y\ SUCCESS\ =\ 1.23\ +0.31\ INSTR\ +0.30\ SUPP\ +\ 0.25 SYST \quad (3)$$

Eq. (4): Instructor Factor, User Support Factor, System Performance Factor, and Organizational Factor influenced the success of the e-learning system management for 59% as

$$(\beta)\ y\ SUCCESS\ =\ 0.99\ +0.24\ INSTR\ +0.28\ SUPP\ +0.22\ SYST\ +0.16\ ORG \quad (4)$$

Eq. (5): Instructor Factor, User Support Factor, System Performance Factor, Organization Factor, and Student Factor influenced the success of the e-learning system management for 60% as

$$(\beta)\ y\ SUCCESS\ =\ 0.96\ +\ 0.14\ INSTR\ +\ 0.25\ SUPP\ +\ 0.20\ SYST\ +\ 0.14\ ORG\ +\ 0.18\ STUD \quad (5)$$

VII. Discussion

The study of factors for predicting success in e-Learning system management during the COVID-19 pandemic: the case study of Suranaree University of Technology can be discussed as follows:

A. Levels of the Relevant Factors and the Success of the e-Learning System Management

The results revealed that the Organizational Factor had the highest mean score and was at a high level. That was because the university's policy can determine the direction of education management. Suranaree University of Technology changed teaching and learning methods not to be in the normal onsite classroom starting on March 16, 2020, and followed the third announcement of the Measures and Surveillance of the COVID-19 Outbreak of the Ministry of Higher Education, Science, Research and Innovation that all higher education institutions must stop teaching and learning and hold online education instead starting from April 1, 2020 [26]. After Suranaree University of Technology announced a policy to change education management, an online education support center was established, and the training on online tools and online education management including teaching material production and software for online education usage was held on March 11–12, 2020. Initially, 200 instructors and staff attended the training.

The following three most influential factors were Instructor Factor, User Support Factor, and Student Factor had the close mean score, and all were at a high level.

The instructor Factor is highly crucial as the university instructor plays an important role to drive and implement university policy. When the administrators set a clear policy to support online education, the instructors can get benefits in developing their potential in using online tools. As the strength of Suranaree University of Technology is that the university takes instructor development as important, the university by the innovation center continuously holds SUT e-Learning training and develops online educational materials including e-Courseware. And since the outbreak of COVID-19, the innovation center has held training for e-learning system management including teaching and testing management for 17 sessions. The attendants of the training sessions were up to 520 instructors and 610 teacher assistants which can be accounted for 85.25%.

Considering the User Support Factor, the university provided more budget for supporting SUT e-Learning server computers to increase the system's capacity to support a large number of simultaneous accesses. Other software such as Zoom cloud meetings had been purchased to support online education, and the manual for Zoom had been provided for instructors and learners. Thus, SUT e-Learning had been more accessed and used to support their online education. According to the report for the fiscal year 2019-2021 of the Innovation Center, there were 673 courses on the SUT e-Learning system in the academic year 2018 before the spread of COVID-19 that can be accounted for 32.54% of all undergraduate courses in SUT. However, after the spread of COVID-19 in the academic year 2019, the number of e-Learning courses increased to 882 courses which can be accounted for 40.38%, and later the number of e-Learning courses increased to 1,147 courses which can be accounted for 49.42% of the semester 1 of the academic year 2021.

For Student Factor, the current undergraduate students were born between 2000–2004 and were considered a group of children of Generation (Gen) Z (i.e. born between 1995–2009). Gen Z children are those who grew up with familiarity with using various technologies, thus they are fast learners who live with digital media [27]. Hence, students were able to adapt themselves to online education and use the SUT e-Learning system easily. When they face any difficulty, they preferred to study from the video clip or contact the e-learning system administrator via Line official or Facebook immediately. As the users of the system knew its benefits and had the potential in using the computer and network systems, the SUT e-Learning is widely accepted and resulting in e-learning management success during COVID-19 Pandemic [13].

System Performance Factor and Technology and Infrastructure Factor were at the moderate level. This may be due to the increasing need to use computers and the use of network signals during the COVID-19 pandemic. Although the university supports SIM cards for staff and students, the speed of the network signal is still not good enough. In the rainy season, the weather was inclement and caused electricity out that further affecting the instability of the internet and the errors of the SUT e-Learning server. Another problem concerning System Performance Factor and Technology and Infrastructure Factor was that the SUT e-Learning system had not been optimized at the early stages of the COVID-19 pandemic, therefore, it caused trouble in

using the system. As a result, the System Performance Factor and Technology and Infrastructure Factor were rated less than other factors. The results were consistent with the findings of Kaewchan and Rattanapongpinyo [28] who reported that Prince of Songkla University, Phuket Campus, had prepared online teaching and learning management system through the network and improved technology and infrastructure but still not enough to meet the need for access of the users when the teaching and learning methods had changed to online education due to the COVID-19 pandemic.

The success of using the e-Learning system was at a high level. The intention to use the system had the highest mean score. The reason was that the pandemic made both instructors and students accept the changing conditions from classroom to online education. Thus, they accepted and intentionally used the system for their education management to avoid education disruption. This can be noticed from the higher mean score than other factors. The respondents considered that the success of the e-learning system management was that the SUT e-learning helped them review lessons anywhere at any time. It also supported students to get effective learning, especially in the abnormal situation during the COVID-19 pandemic. Students can learn and review lessons anywhere at any time and can be done repeatedly until they understand the lessons. E-learning management can support interaction between instructors and students and between students and their peers keeping them closer and making them keep in touch.

The results of the study were consistent with the study of e-Learning critical success factors during the COVID-19 pandemic by Alqahtani and Rajkhan [20] who reported that the learner's and instructor's needs of information technology management, support from the management team, and the raising of learner's awareness of the use of e-learning affected the success of e-learning management. Additionally, they claimed that the readiness of the e-learning system played a significant role during the COVID-19 pandemic. These findings supported the results of the study of Almaiah *et al*. [12] who reported that the factors affecting e-learning management consisted of the technology factor, the quality of the e-learning system factor, culture factor, self-awareness factor, and reliability factor.

In conclusion, the organizational factors concerning policy making and direction decisions are very important to drive educational institutions to develop the potential of instructors and students in using and applying technology to help online education. The COVID-19 pandemic can be considered as an opportunity to improve online education.

B. Correlation between the Relevant Factors and the Success of the e-Learning System Management

Instructor Factor and Student Factor were highly correlated, and both factors were significantly correlated to the success of e-learning management. Thus, the results of the study indicated that instructors play an important role as they are responsible for developing the learning process, determining learning outcomes, and selecting activities to support and assess students' learning outcomes.

The results of the study are consistent with Wongsumeth [29] who reported that instructors are the indicators of success or failure in e-learning management because they were the ones who designed activities in their classes when students had to participate in online education following the instructor's requirements [29, 30]. The competency in using information technology of instructors and students was considered another factor that made the instructor factor and the student factor correlate with the success of e-learning management during the disruption. It is possible that the experience of using the SUT e-learning system of both instructors and students can represent the readiness and acceptance of online learning as they all perceived the benefits of the teaching process, and the fast and convenient access to the system helping users decide to use it.

C. Factors Predicting the Success of the e-Learning System Management during the COVID-19 Pandemic

The results showed that the Instructor Factor can predict success for 49%. The Instructor Factor together with the User Support Factor can predict success up to 55%. Additionally, the two factors with the other three factors namely System Performance Factor, Organization Factor, and Student Factor were able to predict success up to 60%. The findings revealed that only the Instructor Factor can lead to the success of e-learning management. Similarly, the study of Watanakanjana *et al.* [23] claimed that the effectiveness of online education can be significantly influenced by Instructor's performance and evaluation.

VIII. Conclusion

For Suranaree University of Technology, the obtained results confirmed that Instructor Factor, User Support Factor, System Performance Factor, Organization Factor, and Student Factor influenced the success of the e-learning system management for 60%. However, only the Instructor Factor was able to predict the success for 49%. While the Instructor Factor together with the User Support Factor can predict the success for 55%.

Therefore, the success of online education at the Suranaree University of Technology mainly depends on the instructor's technology literacy, material design, and ability of the instruction to design lessons to be consistent with the assessment. At the same time, if the university supports the instructors in these factors, the results will be beneficial to the success of e-learning management. Moreover, active training together with the development of e-learning efficiency to support more users and increase the ease of use can be essential for supporting instructors and further influence the success of e-learning management.

The limitations of the current research are the fact that the data was collected during the COVID-19 pandemic from students, instructors, and staff of Suranaree University of Technology, Thailand. It would be interesting for a future study to conduct the same research methodology in a post COVID-19 situation. Comparing the research findings between during and post COVID-19 pandemic could provide some interesting results. Moreover, the samples are limited to only a university of technology. Further research could consider other types of universities.

CONFLICT OF INTEREST

The authors declare no conflict of interest.

AUTHOR CONTRIBUTIONS

Sutthinee Srisawat, Sorachai Kamollimsakul, and Thawatphong Phithak designed the research, analyzed data, and wrote the manuscript. Amornthep Thepvichit, Akkhadesh Sosongchan, and Apisara Aorsuwan collected data. Saranya Chularee and Jintana Tapin analyzed data and provided some discussion. All authors had approved the final version.

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