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AN INDISPENSABLE EVOLUTION FOR SUSTAINABLE CORPORATES**

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EXAMINE USAGE OF LEARNING MANAGEMENT SYSTEMS (LMSS) BY FACULTY STAFF AT UNIVERSITY OF ECONOMICS (UEF) AND FINANCE WITH EXPANDED TECHNOLOGY ACCEPTANCE MODEL (TAM)

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Abstract:

Learning Management system (LMS) is an indispensable tool for universities, lecturers, and students everywhere. Many universities have invested heavily to purchase or make their own LMS, yet their effort may or may not have been fully realized. Evidence suggests that faculty staff are underutilizing LMS capability, and some have attempted to investigate the issues. One of the notable papers on these particular issues is Fathema et al. They modified a well-known model within the psychology field, the Technology Acceptance Model, to fit the higher education context. The result proves that their modification is justified in explaining LMSs using behavior. However, their study is limited to two universities within the United States, and they are unsure if the same results would still hold for a different context. This is the gap that this paper hopes to fill. The result shows considerable deviation from Fathema et al. study in the US. To be precise, Attitude toward Using is found numb to most other elements, while Facility Condition and System Quality exert a much stronger effect than previous studies. At this point, there are some theories on why such drastic differences occurred. However, there is no concrete ground to conclude without further studies covering other Vietnamese universities to cover a more extensive database.

Keywords: Education, TAM, Vietnam

1. Introduction

Learning Management Systems (LMSs) are employed by most, if not all, educational institutions as powerful tools to assist the teacher and improve learning outcomes. UEF is no exception. Like most universities, UEF also invests heavily in LMS, yet there are reasons to believe that faculty staff are underutilizing them. Such belief is based on similar research findings that seldom lecturer has direct contact with LMS participants (Hustad & Arntzen, 2013). In the survey, a measly 20% of faculty use LMS to record their lecture. Similar conclusions are reached close to the previous result that only a minority of faculty take full advantage of LMS (Dahlstrom et al., 2014). This particular topic has been covered extensively by a paper in 2015 in two United States universities. The study expanded the original Technology Acceptance Model and successfully justified the added elements (Fathema et al., 2015). However, the original study did note that its results were based on two LMS, not only that the two-university sampled from was both in the United States, so it is restricted to a particular setting.

The research question is to evaluate if the impact of the proposed expanded variables still holds in a vastly different context. Even though the scope of the research currently is confined within the legal boundaries of UEF, this paper would (hopefully) fill the gap and be the stepping stone for future studies that wish to gain insight into the LMS-using behaviors in Vietnam.

2. Literature review

2.1 Origins of TAM and its modified version.

Technology Acceptance Model (TAM) is not a new concept. The theory dates back to the late 90s; as technology increased usage, so did the need to understand its users. The theory that preceded TAM was the Theory of reasoned action and Theory of perceived behavior. Initially developed by Ajzen and Fishbein, the two ideas seek to understand what determines a person's rejection/acceptance of new technology. At first, theories were confined to the field of psychology. However, when they began to grasp the attention of other social sciences, it was clear that the model was insufficient, which is expected since it is the first of its kind. Thus, Fred Davis adapted them and proposed TAM. Since then, many attempts have been made to modify and expand the model to fit a more niche purpose throughout the decades (Marangunić & Granić, 2015). One notable modification out of many was Fathema, Shannon, and Ross's TAM expansion. This expansion is one of the few versions of the TAM adapted to the higher education context and has gained significant popularity. Thus, it is chosen for this paper.

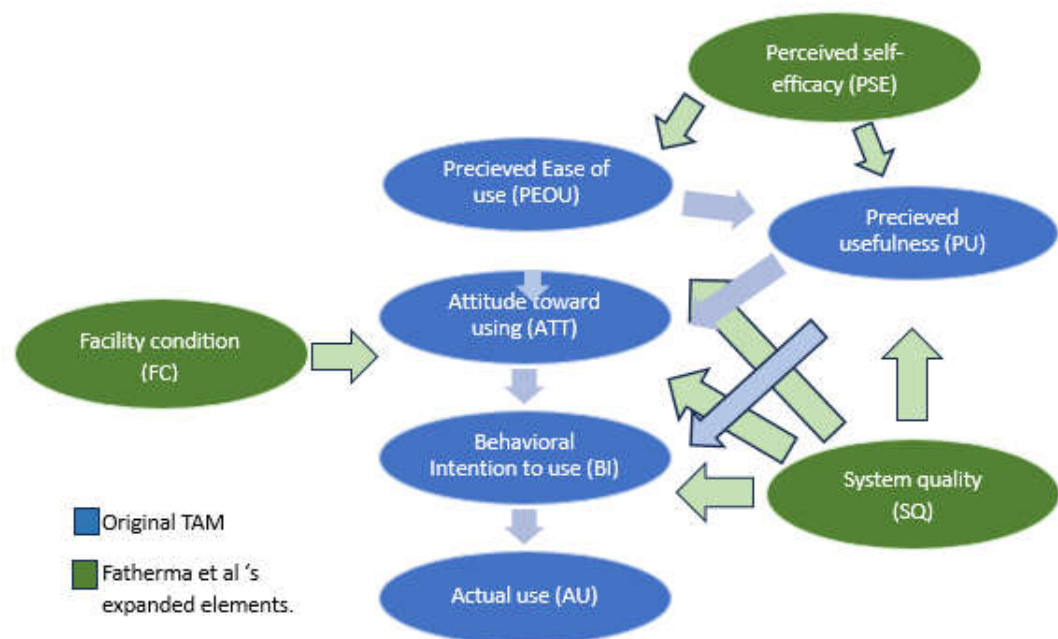


Figure 1 Theoretical framework

2.2 Fathema et al.'s expanded TAM.

Father et al. propose three additional factors to the original TAM (figure 1).

System Quality (SQ) in "the Internet environment measures the desired characteristics (usability, availability, reliability, adaptability, and response time) of an e-commerce system" (i.e., LMS) (William H. Delone & Ephraim R. McLean, 2003). The research shows that system quality has a significant impact on Behavioral intention to use (BI), Perceived ease of Use (PEU), and Perceived usefulness (PU).

Facility Condition (FC) can be defined as "perceived enablers or barriers in the environment that influence a person's perception of ease or difficulty of performing a task" (Teo, 2010). Fatherma et al.'s survey proved that this factor has a considerable effect on Attitudes toward using (ATT) only.

Perceived self-efficacy (PSE) is not as straightforward. It was defined in the text as "an individual's judgment of their capability to organize and execute the courses of action required to attain designated types of performances. It is not concerned with the skills one has but with the judgments of what one can do with whatever skills one possesses." (Bandura, 1986). In layman's terms, PSE is a person's confidence in using LMS. The statistic in the text supported that PSE has noticeable sway over both PU and PEOU.

2.3 TAM in Vietnam Context

Research regarding TAM is not that popular in Vietnam, surprisingly. Given the rapid growth and modernization this emerging market is going through, a need to understand technology users would expect to be much more widespread. This may be explained by the underdeveloped psychology field in Vietnam or an under-appreciation of the benefit of studying technology acceptance. While changing the TAM for educational context is relatively not plentiful, application in Vietnam education is even farther between. Recall that TAM originated from the field of psychology in a developed country. It is reasonable to believe that the results might not hold when applied to a drastically different context, like Vietnam. For example, a survey in 2020 found that perceived safety and privacy did not significantly affect the intention to use cloud-based accounting software (Le & Cao, 2020). Similarly, only seven out of eleven hypotheses proposed by the Unified theory of acceptance and Use of technology (an approach similar to TAM) were accepted in Vietnam. (Nguyen et al., 2014). Therefore, this paper aims to fill the gap between lacking TAM research in Vietnam and TAM research in higher education.

Methodology

Following Fatherma et al. work, the survey was modified to fit the local context. The Faculty of Economics at Ho Chi Minh University of Economics and Finance conducted the study. The Dean of Faculty approved the research, and the LMS system employed by the university is Moodle.

Data was collected from all lecturers across different faculty confined within the boundary of the university's faculty staff. Visiting lecturer included. Some LMS functions are compulsory to use, like grade books and assignments. However, some, like discussion boards and questions, are entirely optional.

Data collection

The survey was conducted through Qualtrics online with 42 anonymous responses (10% response rate). The original study randomized the question to avoid the order effect. But this survey was not due to time constraints, which slightly affected the data's accuracy. The respondent was asked to rate their agreement with a statement on a 5-point Likert scale adopted from the original questionnaire. Internal consistency reliabilities for 8 items, calculated based on Cronbach alphas, range from 0.845 to 0.927 (except Actual Use)*, considered reliable.

Scale	Total Items	Reliability
System Quality (SQ)	4	0.880
Perceived Self Efficacy (PSE)	3	0.910
Facilitating Condition (FC)	4	0.907
Perceived Ease of Use (PEOU)	3	0.845
Perceived Usefulness (PU)	3	0.910
Attitude toward Using (ATT)	4	0.927
Behavioral Intention (BI)	3	0.850
Actual Use (AU)	3	0.423

Table 1 Reliability of measurement scale

**All other scales have 5 options from "strongly disagree" to "strongly agree." Actual Use has 2 items that were measured with 3 options about how much time faculty staff spent on LMS per semester. The final item of the scale has 7 options listing all available functions of LMS, a respondent that ticked less than 3 options was categorized as "minimal user," 3 to 4 was "average users," and 4-7 was "extensive users." Because of this, Cronbach's Alpha of the scale was smaller than usual.*

Of 42 respondents, only 26 are valid responses (no empty field). Of the respondents, 58% are males, 39% are female, and 3% are specified as others.

In the original paper, the measurement model was developed by Confirmation Factor Analysis (CFA). Structural Equation Modeling (SEM) was then used to test all causal relationships among all constructs of the proposed model. This paper will replicate every step to try whether the same results would hold in different cultures. Survey participants mostly have master's degrees at 61%, while 30% earned the rank of Doctorate, and only 9% have a higher rank. Therefore, the majority demographic of the study is young mature adults in their early 30s. It is also noteworthy that 36% of respondents are mainly lecturers from Faculty of Economics, Faculty of Law, and Visiting lectures, have the same proportion at 15%. Therefore, some bias in sampling may have occurred.

Variables	Total	%
Gender		
Male	19	58%
Female	13	39%
Others	1	3%
Age range		
<30	6	17%
30-39	17	48%
40-50	9	26%
>50	3	9%
Academic Rank		
Master	20	61%
Doctorate	10	30%
Associate Professor	2	6%
Professor	1	3%

Table 2 Demographic

Data analysis

Following FATHERMA et al.'s study, the first step is Confirm Factor Analysis (CFA) to determine the measurement model. Then, Structural Equation Model (SEM) was used to test the causal relationship between all constructs. Stata was the software of choice to conduct both analyses.

Normality test

Like the original study, the data collected did not meet normality assumptions. Unlike the original study, however, the data was less skewed to the right (strongly agree) but instead centered around the neutral option with a slight right. Nonetheless, the Bollen-Stine bootstrap method interfered with the exact measurement and structural model.

Construct and Items	Mean	SD	Construct and Items
System Quality (SQ)	3.554	0.832	System Quality (SQ)
Perceived Self Efficacy (PSE)	3.528	0.784	Perceived Self Efficacy (PSE)
Facilitating Conditions (FC)	3.544	0.832	Facilitating Conditions (FC)
Perceived Ease of Use (PEOU)	3.337	0.807	Perceived Ease of Use (PEOU)
Perceived Usefulness (PU)	3.406	0.791	Perceived Usefulness (PU)
Behavioral Intention (BI)	3.522	0.642	Behavioral Intention (BI)
Attitude toward Using (ATT)	3.446	0.866	Attitude toward Using (ATT)

Table 3 Means and Standard Deviations of Constructs and Items

Results

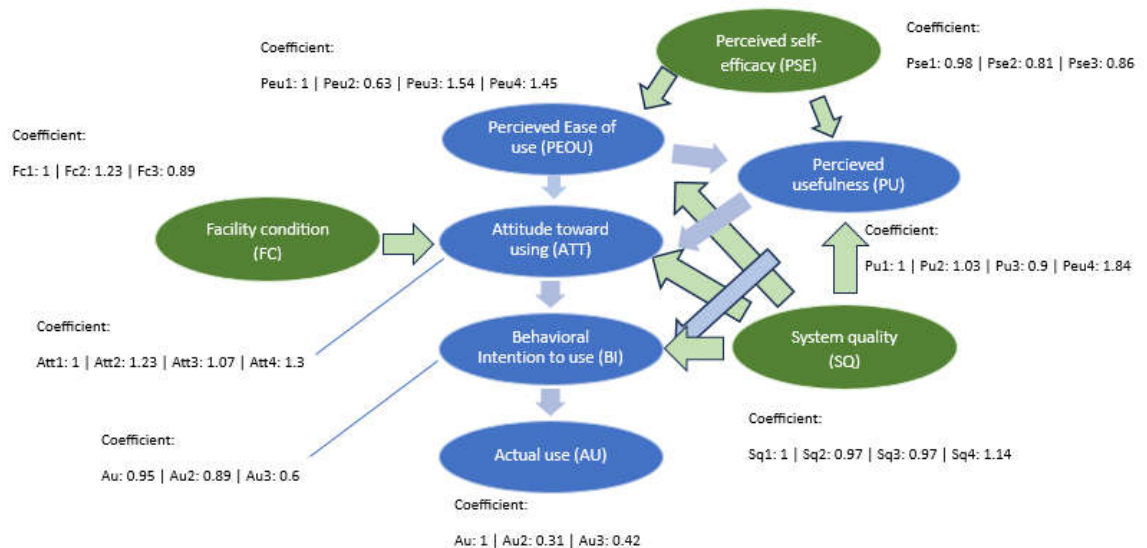


Figure 2 Confirmatory Factor Analysis

Due to the nature of the data, bivariate Person coefficients were calculated to examine linearity between latent variables (indicated as oval shapes) and observed variables (displayed as small capital words such as pse1, pse2). Regrettably, since the valid observation is well below 30, the model fit was near perfect.

LR test of model vs. saturated: $\chi^2(0) = 0.00$, Prob > $\chi^2 = 0$.

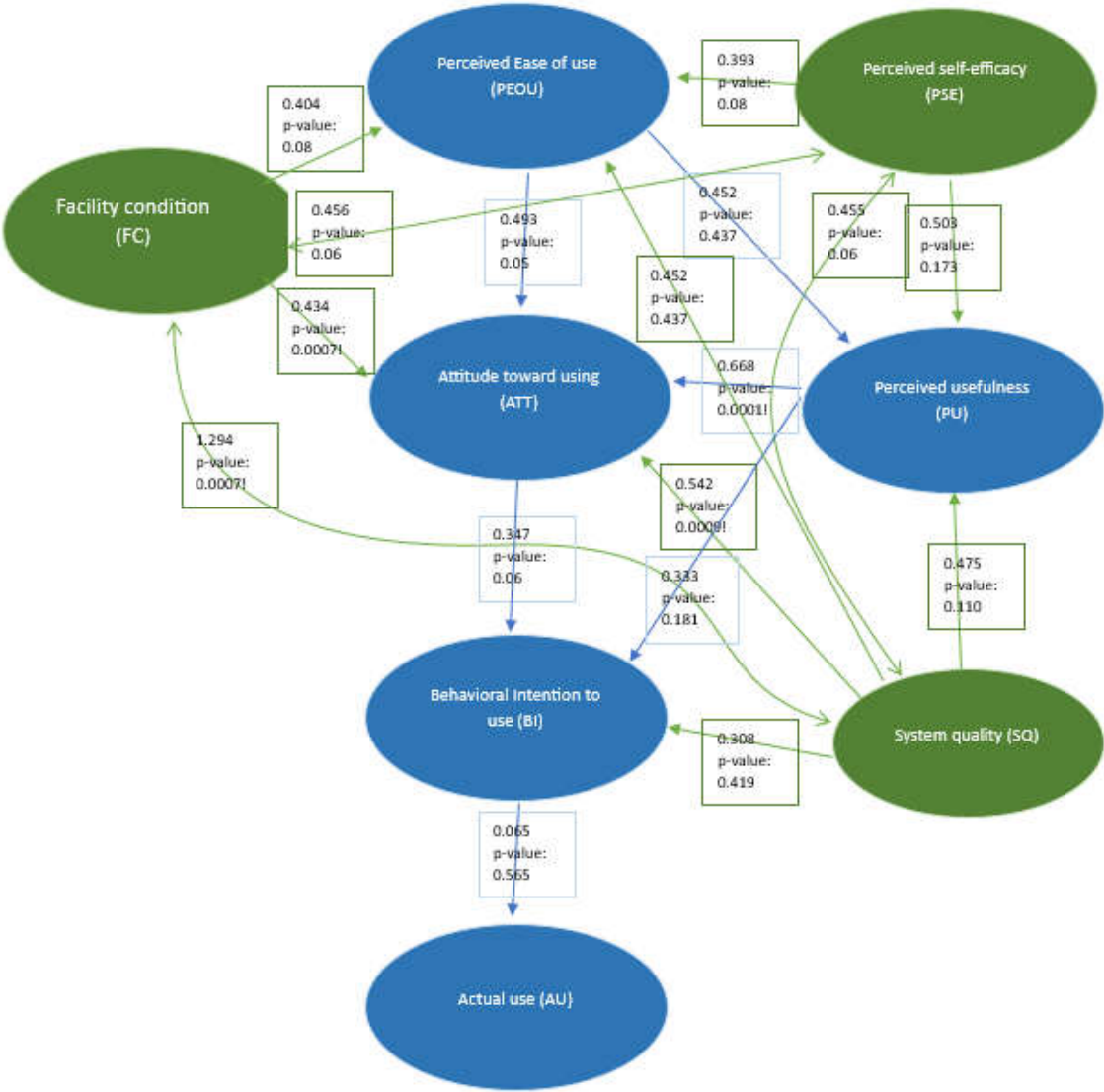


Figure 3 Structural Equation Model

	PSE	AU	FC	PEOU	PU	ATT	BI	SQ
PSE	1.00							
AU	0.175	1.00						
FC	0.744	0.003	1.00					
PEOU	0.787	0.132	0.830	1.00				
PU	0.816	0.030	0.758	0.826	1.00			
ATT	0.669	-0.020	0.678	0.841	0.890	1.00		
BI	0.659	0.077	0.511	0.669	0.608	0.680	1.00	
SQ	0.733	0.004	0.831	0.830	0.759	0.678	0.511	1.00

Table 4 Correlation among 8 latent constructs

No multicollinearity was found among the latent variables.

Discussion and conclusion

Path	Support	Fatherma et al.'s
SQ->PU	Yes	Yes
SQ->ATT	No	Yes
SQ->BI	Yes	No
SQ->PEOU	Yes	Yes
PSE->PEOU	Yes	Yes
PSE->PU	Yes	Yes
FC->PEOU	Yes	No
FC->ATT	No	Yes
PEOU-> PU	Yes	Yes
PEOU->ATT	Yes	Yes
PU->ATT	No	Yes
PU->BI	Yes	Yes
ATT->BI	Yes	Yes
BI->AU	Yes	Yes

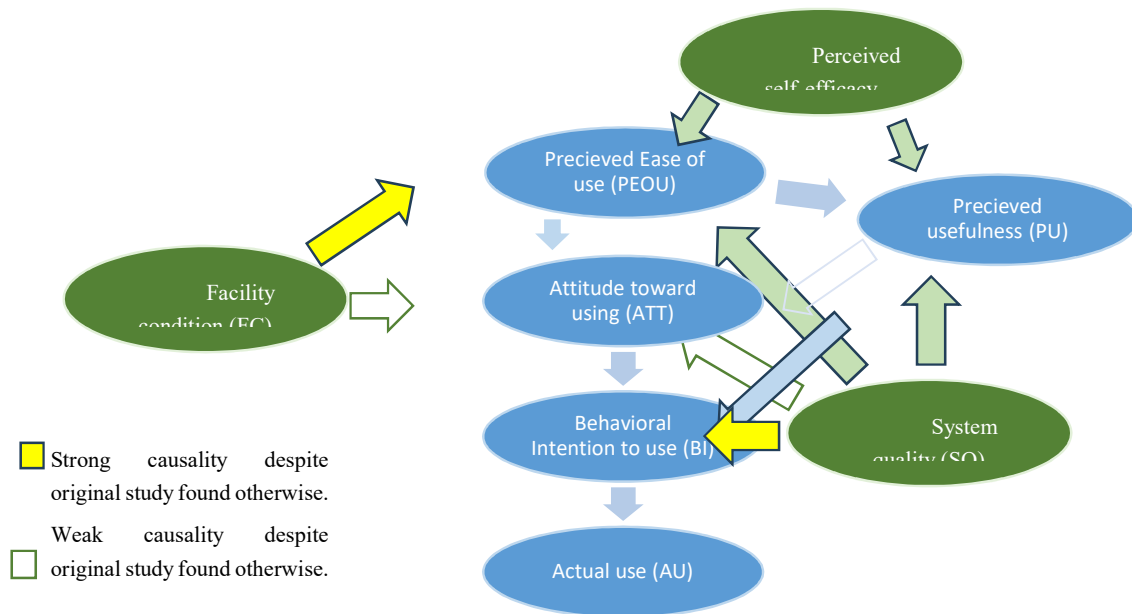


Figure 4 Result framework

The result has 5 paths that conflicted with the previous study. Unlike expectations, SQ was much more important to BI; likewise, FC significantly affects PEOU. Surprisingly the PU causal effect on ATT was weak despite being part of the original TAM model. The most egregious of all is that ATT seems unaffected by most but PEOU. However, the focus of this study is to test whether the modified model would hold in a different context, not explain the difference. However, there are a few possible reasons for such conflicting findings.

The first feasible reason is the pragmatic nature of Vietnamese culture. One of the differences between how LMSs were used in America vs. Vietnam is that usage was much more liberal in America. Faculty staff had more freedom in engaging with LMS, while there was much more compulsory function that lecturers had to use in Vietnam, namely assignment and uploading documents. Therefore, ATT was strictly dictated by PEOU. For example, in the survey result, the more effort-demanding function of LMS, such as recording lectures, saw little Use despite being perceived as a beneficial function (PU).

A second possibility that the difference in technology literacy. While the study participant's age range is somewhat similar to Fatherma et al.'s study, primarily millennials Gen Y, the level of familiarity with the technology between the two samples may differ. The historical context is that the Vietnam trade embargo was only lifted in 1994. As a result, computer popularity was only a thing in Vietnam for less than 30 years compared to America, which saw the first release of Windows in 1985. FC represents how helpful the organization is to its faculty to its employees. Given the theory that there is a discrepancy in technology familiarity, it could explain why FC has a much more substantial impact on PEOU.

A third attainable consideration is the amount of funding. Blackboard Learning LMS has no free version, and their pricing is \$9500 /year. While freely available for individual teachers, Canvas is not as accessible for the organization. Their hosting service could cost up to a hefty \$7000/year for a university as moderately big as UEF. Hence, Moodle open-sourced is a reasonable choice, but the quality of LMS depends heavily on the IT department that modified it. This might be reflected through such a robust relationship between SQ and BI, as underdeveloped functions of LMS will surely discourage usage.

Finally, the quality of data leaves a lot to be desired. The abysmal response rate (less than 10% of 500 current staff) could be attributed to the lack of rewards and distribution channels. Due to bureaucratic

difficulty, the survey link could not reach every staff member within the school. Thus, the lack of participants from other faculty and the staff that was called was not incentivized to complete the survey.

In conclusion, the study aims to test Fathema et al.'s extended model in the UEF context. The result finds 5 conflicting paths, but due to many limitations, it is not safe to conclude that the model does not hold. Revisiting the study with a bigger sample size and possibly including other Vietnamese universities will be essential to draw concrete conclusions about model viability in Vietnam.

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Abstract

System Quality 1	I feel confident using LMS
System Quality 2	I am satisfied with the Internet Speed
System Quality 3	I am satisfied with the LMS content
System Quality 4	I am satisfied with CANVAS interaction
Perceived Self-Efficacy 1	I feel confident using LMS features
Perceived Self-Efficacy 2	I feel confident operating CANVAS functions
Perceived Self-Efficacy 3	I feel confident that I can find information on LMS
Facilitating conditions 1	UEF has provided adequate training for me to use LMS
Facilitating conditions 2	Technical support is available for assistance with any difficulties related with LMS
Facilitating conditions 3	Equipment (e.g. Internet, computers, printer, etc.) are satisfactory for my needs
Facilitating conditions 4	Online instruction with LMS is available and easy to follow
Perceived Ease of Use 1	My interaction with LMS is clear and understandable
Perceived Ease of Use 2	Interacting with LMS does not require a lot of my mental effort
Perceived Ease of Use 3	I find LMS to be easy to use
Perceived Ease of Use 4	I find it easy to get LMS to do what I want it to do
Perceived Usefulness 1	Using LMS improve my performance as a faculty member
Perceived Usefulness 2	Using LMS in my job increases my productivity
Perceived Usefulness 3	Using LMS enhances my effectiveness in my job
Perceived Usefulness 4	I find LMS to be useful in my job
Attitude toward Using 1	I think it is worthwhile to use LMS
Attitude toward Using 2	I like using LMS
Attitude toward Using 3	In my opinion, it is very desirable to use LMS for academic and related purposes
Attitude toward Using 4	I have a generally favorable attitude toward using LMS
Behavioral Intention to Use 1	I intend to use the non-compulsory functions and content of LMS to assist my academic activities
Behavioral Intention to Use 2	I intend to use the non-compulsory functions and content of LMS as often as possible
Behavioral Intention to Use 3	I intend to use the functions and content of LMS in the future
Actual use 1	Less than 2h/week
Actual use 2	2h/week to 6h/week
Actual use 3	More than 6h/week

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