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Servqual and service trust as moderation variables in the analysis of user satisfaction in the use of ciputra education digital experience: TAM2 approach

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ABSTRACT

The development of Technology 5.0 and the occurrence of COVID-19 have made the implementation of technology a crucial aspect, especially in education, particularly in the data management of higher education institutions. The Research and Community Service Institute of Ciputra University Surabaya has developed and implemented the Ciputra Education Digital Experience (CEdX) information system, but no evaluation has been conducted before. The theory used in this research is the Technology Acceptance Model 2 (TAM2), with the moderating variables of Service Quality (Servqual) and Service Trust. A quantitative research method is employed, with data collection using a questionnaire, and data processing using SMARTPLS 4. Based on 228 collected data, all variables meet validity criteria, with outer loading > 0.6 and fulfilling construct reliability, with Cronbach's alpha > 0.7. In the overall hypothesis testing, 7 hypotheses are accepted, and 9 hypotheses are rejected. The subjective norm variable in this study indicates no influence, possibly due to the SN context being supervisors. Furthermore, output quality and result of demonstrability also have no effect. Service trust is proven not to have a significant influence. Meanwhile, variables that do have an impact show that the ease of use and usefulness of CEdX affect the intention to use CEdX, as evidenced by the p-value of PEU and PU < 0.05. In addition, the quality of the Research and Community Service Institute's services also reinforces and increases faculty members' intention to use CEdX.

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INTRODUCTION

The current era of digitization introduces Industry 5.0, where the focus is on the full integration of human capabilities and technological intelligence (Mourtzis, Angelopoulos and Panopoulos, 2021). The rapid advancement of technology, especially after the COVID-19 pandemic, demands continuous development in the digitalization process within the education industry, both in terms of learning and managerial aspects (Marinoni *et al.*, 2020). Through the COVID-19 pandemic, educational institutions, especially universities, have made strenuous efforts to create an information system that facilitates the learning and management processes for the academic community, enabling implementation through online means (Zawacki-Richter, 2021) The implementation of information systems is expected not only to enhance the performance of universities but also to provide convenience for faculty members in fulfilling their tri-dharma duties. The digitalization of higher education is also considered a significant change. According to a survey conducted by the University of Oldenburg in Germany, 74% of professors stated that the workload in online teaching is heavier, and 42% of professors prefer hybrid teaching over fully online instruction (Zawacki-Richter, 2021). Through the COVID-19 pandemic, educational institutions, especially universities, have strived to create an information system that not only facilitates the learning process for the academic community but also ensures that the management process can be carried out online (Zawacki-Richter, 2021). This online management process includes access to all data from anywhere to support Work From Home (WFH) processes.

The implementation of information systems is acknowledged to have many benefits for the education industry (Prasetyo, 2017). The development and implementation of an information system often encounter failures (Hassan, Ahmad and Zuhaira, 2018). It is undeniable that the implemented information systems often do not meet expectations or fail to fulfill user needs. According to Davis (1989), the failure of implementing an information system can be caused by external and internal factors. Information system needs can vary between companies, organizations, or even departments based on the job descriptions (Puška *et al.*, 2020). Continuous evaluation of information systems is necessary, both before and after launch, to adapt to rule changes and user needs.The evaluation of information system implementation in the education industry has been extensively studied, but previous research has mainly focused on the learning aspect rather than the management perspective (Marthasari et al., 2020; Ilmi, Rachmadi and Herlambang, 2019; Rughoobur-Seetah and Hosanoo, 2021). The Technology Acceptance Model (TAM), proposed by Davis (1989), is often used to evaluate the acceptance of an information system. TAM is a theory that continues to evolve, giving rise to TAM 2 developed by Venkatesh and Davis (2000). TAM is used to understand users' perceptions in accepting and adopting new technology. TAM 2 is presented simply, adding numerous external factors that can influence the acceptance of new technology. Previous studies examining the acceptance of LPPM information systems have been conducted (Kadek Budi Sandika and Hamid, 2021; Prasetyo, 2017), but these studies focused on specific menus such as the management of community service program (KKN) data and the citation management of universities.

The acceptance of a system by users can also be influenced by the quality of service or service quality and the user's trust in the provided service, known as service trust. Previous research indicates a significant impact of service quality on enhancing the usage of an information system (Hami et al., 2022; Syahidah and Aransyah, 2023). The study conducted by Syahidah & Aransyah (2023) also reveals that individual trust in the information system can increase the interest in using the system. Additionally, other research explains that the service quality provided by the system owner, along with the ability to instill trust in users regarding the used information system, can enhance user satisfaction with the information system (Chen, Zhang and Xu, 2009; Hakam and Hidayati, 2022). Therefore, this research aims to analyze the influence of service quality and service trust in strengthening the impact of intention to use on usage behavior.

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In the BMC (Business Model Canvas) of LPPM UCS, researchers focus on the Key Activities, specifically numbers 1 and 2, where these two key activities support the main key activities of UCS, namely Tridharma. This research also aims to strengthen UCS's value proposition, namely Ciputra Education Digital eXperience or CEdX. Previously, there has been no research conducted to assess the level of technological readiness and user satisfaction with CEdX.

The implementation of CEdX itself started in 2010, known at that time as HCIS (Human Capital Information System). The implementation of CEdX was deemed ineffective and inefficient, leading to some processes still being conducted manually. Based on the results of Focus Group Discussions (FGD) and interviews related to the use of the LPPM information system, it was observed that the LPPM information system at that time was highly repetitive and did not represent the data needs of the university. The importance of digitalization became more evident in 2020 when the COVID-19 pandemic occurred, and employees were required to work from home for several months, necessitating data access from anywhere. Therefore, from 2020 to 2023, the LPPM of Universitas Ciputra Surabaya endeavored to design a system that would facilitate not only faculty members but also LPPM educational staff.

The process of designing this information system was based on input from faculty members as system users and mapping the data needs required by other departments and external entities within the university. The implementation of the designed LPPM information system is periodically developed based on the evolving needs for reporting performance to the government and foundations. However, user acceptance evaluation, particularly from faculty members, has not been conducted before. Therefore, measuring faculty acceptance of the LPPM information system is necessary. Technology acceptance among faculty members is measured using TAM (Technology Acceptance Model). Through this research, managerial implication is to develop the system continuously so it will be relevant to lecturer and university needs.

Technology Acceptance Model atau TAM was designed based on the Theory of Reasoned Action (TRA) proposed by Martin Fishbein and Icek Ajzen in 1967. TAM utilizes TRA as the theoretical foundation for perceived usefulness and perceived ease of use of a technology (Venkatesh and Davis, 2000). TAM is used to explain perceived usefulness and perceived ease of use, aiding researchers and practitioners in identifying potential resistance to a technology and presenting accurate improvement possibilities. TAM is a theory and model introduced by Fred Davis in 1989, later refined with Viswanath Venkatesh in 1996, becoming known as Technology Acceptance Model 1 or TAM 1 (Davis, 1989; Venkatesh and Davis, 1996). TAM 1 comprises four dimensions: Perceived usefulness, perceived ease of use, behavioral intention, and use behavior (Venkatesh and Davis, 1996). The TAM theory was later developed into a more complex model and is an extension of TAM 1, known as Technology Acceptance Model 2 or TAM 2 (Venkatesh and Davis, 2000). In the development of TAM 2, external variables were added.

Second variable that used in this research is service quality or Servqual. Servqual is defined as the difference between users' perceptions and expectations of a service (Grönroos, 2001). Additionally, Parasuraman, Zeithaml and Berry (1985) define service quality as the comparison between what users perceive in relation to what the company should offer with the actual service

performance of the company. According to Parasuraman, Zeithaml and Berry (1988), service quality is a form of attitude, related but not equivalent to satisfaction, arising from the comparison between expectations and perceptions of performance. Seth, Deshmukh and Vrat (2005)) also define service quality as the provider's ability to match the expected service with the perceived service to achieve customer satisfaction. The Servqual model was first introduced by Parasuraman in 1985. In various studies, several dimensions of Servqual are described, consisting of five dimensions: tangibles or berwujud, reliability or reliabilitas, responsiveness or daya tanggap, assurance or jaminan, and empathy or empati (Parasuraman, Zeithaml, and Berry, 1985, 1988, 1994; Parasuraman, Berry, and Zeithaml, 1991).

Third variable used in this research is service trust or servtrust. Servtrust can be simply viewed as an individual's expectation of a company's behavior (Anderson and Narus, 1990). Other researchers also define trust as the belief that the trusted party will act in the customer's best interest (Crosby, Evans and Cowles, 1990). Service trust, in particular, can be defined as the belief that another party will behave responsibly in a socially responsible manner and, as a result, will meet the expectations of the trusting party without exploiting vulnerabilities (Pavlou, 2003). Based on the background and theories used in this study, the research hypotheses are formulated as follows Hypotesis 1, Subjective norm influences image; Hypotesis 2, Subjective norm influences perceived usefulness; Hypotesis 3, Subjective norm influences perceived usefulness through image; Hypotesis 4, Experience moderates the relationship between subjective norm and perceived usefulness; Hypotesis 5, Subjective norm influences intention to use; Hypotesis 6, Experience moderates the relationship between subjective norm and intention to use; Hypotesis 7, Voluntariness moderates the relationship between subjective norm and intention to use; Hypotesis 8, Job relevance influences perceived usefulness; Hypotesis 9, Output quality moderates the relationship between job relevance and perceived usefulness; Hypotesis 10, Result demonstrability influences perceived usefulness; Hypotesis 11, Perceived ease of use influences perceived usefulness; Hypotesis 12, Perceived ease of use influences intention to use through perceived usefulness; Hypotesis 13, Perceived ease of use influences intention to use; Hypotesis 14, Intention to use influences use behavior; Hypotesis 15, Service quality moderates the relationship between intention to use and use behavior; Hypotesis 16, Service trust moderates the relationship between intention to use and use behavior.

RESEARCH METHOD

This study aims to assess the satisfaction and acceptance levels of users of CEDX at LPPM Universitas Ciputra Surabaya using the Technology Acceptance Model (TAM) method. Additionally, the research will review the quality of services provided by LPPM and users' trust in the CEDX system of LPPM. The research technique involves a survey conducted among several respondents, including professors at Universitas Ciputra Surabaya who are users of the CEDX LPPM system.

Population is defined as a description of the amount of data in a study in a large and comprehensive number (Darmawan, 2013). Populasi can also be considered as a collection of all possible individuals, objects, or other measures that are the subjects of study (Suharyadi and Purwanto, 2016). The type of population used in this research is a finite population, where the number of populations to be studied is known and measurable (Salim, 2012). In this study, the population consists of all faculty members of Universitas Ciputra Surabaya, totaling 228 faculty members.

Sampel is defined as a part of the quantity and characteristics possessed by the population (Sugiyono, 2015). This research uses a saturated sample or total sample, where the sample used

includes all members of the population (Sugiyono, 2015). Therefore, it can be concluded that the sample in this study consists of 228 faculty members from Universitas Ciputra Surabaya.

RESULTS AND DISCUSSIONS

The Convergent Validity of the measurement model with reflective indicators can be observed from the correlation between item scores/indicators and their constructs (loading factors), which can be seen from the outer loadings output. In the testing of the first factor, there are two items with values less than 0.6, namely RD4 and ST2. Therefore, these two items are eliminated, and a rerun of the outer loading data is performed, resulting in the values range 0.660 – 0.980. Based on the outer loadings output, it can be observed that the measurement loading results for all indicators for each construct have met convergent validity, as all the loading factor values for each indicator are above 0.60. Discriminant Validity of reflective indicators can be observed in the cross-loading between indicators and their constructs. The output of cross-loading results from the PLS Algorithm range 0.921 – 0.771.Regarding composite reliability and Cronbach's alpha, it is found that the values for each construct are above 0.70. Therefore, the reliability values for each construct in the estimated model are considered good. The R-square (R2) values for each dependent construct from the model estimation can be seen in Table 4.15. Based on the R-square (R2) output in the table above, it can be concluded that the structural model (inner model) in this study is considered "moderate."

Table 1. R-Square

	R-square	Keterangan
Image	0.366	moderate
Intention to Use	0.621	Good
Perceived Usefulness	0.715	Good
Usage Behavior	0.593	moderate

From the table above, it can be noted that SRMR meets the criteria, with the value being below 0.10. Furthermore, the value of d_ULS should be above 2.000, indicating a good fit of the model with the data. For the GFI value, it should be above 0.900, indicating that the size of the model's fit to the descriptive data is acceptable, and the fit can be concluded, allowing the testing of the model's alignment or criteria for the relationships between constructs. NFI is still within the range of marginal fit to meet the criteria.

Table 2. Goodness of Fit

	Saturated model	Kriteria Model Fit
SRMR	0.094	SRMR < 0,10
d_ULS	13.147	d_ULS> 2.000
d_G	6.025	d_G > 0,900
Chi-square	6.265.664	NFI>0,9

Through hypotesis testing, it can be observed that there are 7 accepted hypotheses and 9 rejected hypotheses. The following is a more detailed discussion of each hypothesis.

Subjective Norm effect Image

Based on the data analysis results, it can be seen that the p-value is 0.000, which is ≤ 0.05, and the t-value is 10.582, which is greater than the critical t-value. Therefore, it can be concluded that the null hypothesis (H0) is rejected, indicating that Subjective norm influences image. In the context of this research, Subjective norm refers to the immediate superiors of each lecturer, such as deans and heads of study programs. The influence of subjective norm on the image or self-image of lecturers is presumed to be due to the desire of lecturers to maintain their image within the scope of their study program or faculty. This is in line with research conducted by (Tsai *et al.*, 2017;

Izuagbe *et al.*, 2019), which shows that social factors such as subjective norm can influence the improvement of one's self-image.

Subjective Norm effect Perceived Usefulness

Based on the data analysis results, it can be seen that the p-value is 0.222, which is ≥ 0.05, and the t-value is 1.221, which is smaller than the critical t-value. Therefore, it can be concluded that the null hypothesis (H0) is accepted, indicating that Subjective norm does not influence perceived usefulness. In the context of this research, Subjective norm, representing the immediate superiors of lecturers, does not affect lecturers' perceptions of whether a system is useful. This may occur because the usefulness of CEdX is not influenced by superiors, where superiors, as an essential part of a job, are more concerned with outcomes rather than the processes undertaken by subordinates. Therefore, technical aspects such as the usefulness of the system for lecturers are not within the considerations of superiors. This is not in line with some previous studies that explain that peer influence or influence from one's social environment significantly affects an individual's perception of the system's usefulness (Tsai et al., 2017; Jing et al., 2019). This difference may arise because the assessment of the usefulness of a system is influenced by the social environment, depending on the people chosen as the context of the study. If the chosen social environment in this study is peer colleagues, the results obtained may be different. However, the results of this study are in line with the research of (Venkatesh and Davis, 2000), which explains that the selection of subjective norm in the TAM context significantly influences the research results.

Subjective Norm effect Perceived Usefulness through Image

Based on the data analysis results, it can be seen that the p-value is 0.970, which is ≥ 0.05, and the t-value is 0.038, which is smaller than the critical t-value. Therefore, it can be concluded that the null hypothesis (H0) is accepted, indicating that Subjective norm does not influence perceived usefulness through image. This indicates that subjective norm does not affect perceived usefulness even though it has been mediated by image. This result may mean that in the context of using CEdX LPPM, the role of the social environment does not have an influence on the perception of system usefulness. This result is not in line with the research conducted by (Surowiec and Bansal, 2016). This discrepancy may arise because the influence of superiors does not intervene in the use of CEdX LPPM, as it is related to technical aspects.

Experience moderates the influence of Subjective Norm on Perceived Usefulness

Based on the data analysis results, it can be seen that the p-value is 0.289, which is ≥ 0.05, and the t-value is 1.061, which is smaller than the critical t-value. Therefore, it can be concluded that the null hypothesis (H0) is accepted, indicating that experience does not moderate the influence of subjective norm on perceived usefulness. This suggests that the influence of subjective norm on perceived usefulness cannot be strengthened by the experience variable. This may occur because the function of the moderation variable is to weaken or strengthen an influence, while subjective norm does not affect perceived usefulness.

Subjective Norm effect Intention to Use

Based on the data analysis results, it can be observed that the p-value is 0.458, which is ≥ 0.05, and the t-value is 0.742, which is smaller than the critical t-value. Therefore, it can be concluded that the null hypothesis (H0) is accepted, indicating that Subjective norm does not influence intention to use. This may occur because the usefulness of CEdX is not influenced by superiors, where superiors, as crucial parts of a job, are more concerned with outcomes than the processes carried out by subordinates. Therefore, the intention of lecturers to use CEdX LPPM is not within the consideration of superiors. If we review the item "People who influence my behavior (in this case, my superiors) think I should use CEdX LPPM," it can be inferred that the

superiors may not intervene in the use of CEdX LPPM, for example, by instructing lecturers to use CEdX LPPM. As argued in section 4.5.2.4.2, superiors in the context of this study do not provide interventions regarding the use of CEdX LPPM.

Experience moderates the influences of Subjective Norm on Intention to Use

Based on the data analysis results, it can be observed that the p-value is 0.760, which is ≥ 0.05, and the t-value is 0.306, which is smaller than the critical t-value. Therefore, it can be concluded that the null hypothesis (H0) is accepted, indicating that Experience does not moderate the influence of Subjective norm on intention to use. This result suggests that the experience of lecturers in using CEdX LPPM does not strengthen the influence of subjective norm on intention to use. This finding is not consistent with previous research indicating that experience can enhance the influence of subjective norm on intention to use (Mailizar, Almanthari and Maulina, 2021). This discrepancy may arise because the context of subjective norm in this study pertains to the superiors of the lecturers, who may prioritize outcomes over processes.

Voluntariness moderates the influence of Subjective Norm on Intention to Use

Based on the data analysis results, it can be observed that the p-value is 0.323, which is ≥ 0.05, and the t-value is 0.989, which is smaller than the critical t-value. Therefore, it can be concluded that the null hypothesis (H0) is accepted, indicating that Voluntariness does not moderate the influence of subjective norm on intention to use. This could be because the superiors do not intervene in the use of CEdX LPPM, and the use of the CEdX system is considered an obligation by the university, not a voluntary action. This finding is consistent with previous research conducted by (Chiu and Ku, 2015; Izuagbe et al., 2019), where voluntariness has a direct impact or acts as a moderation on intention to use, depending on the context and the subject of the study.

Job Relevance effect Perceived Usefulness

Based on the data analysis results, it can be observed that the p-value is 0.000, which is ≤ 0.05, and the t-value is 6.040, which is greater than the critical t-value. Therefore, it can be concluded that the null hypothesis (H0) is rejected, indicating that Job Relevance influences perceived usefulness. This suggests that if CEdX LPPM is designed to meet the administrative needs of lecturers, then lecturers will perceive CEdX LPPM as useful. This is consistent with research conducted by (Venkatesh and Davis, 2000) and (Ike Wahyuning *et al.*, 2019), which suggest that a system that helps individuals achieve their goals in their work will be perceived as useful.

Output Quality moderates the influence of Job Relevance on Perceived Usefulness

Based on the data analysis results, it can be observed that the p-value is 0.233, which is ≥ 0.05, and the t-value is 1.193, which is smaller than the critical t-value. Therefore, it can be concluded that the null hypothesis (H0) is accepted, indicating that Output Quality does not moderate the influence of Job Relevance on perceived usefulness. This result suggests that Output Quality does not strengthen the influence of Job Relevance on perceived usefulness, possibly because the performance reporting input results are still considered inadequate by lecturers. Examining the items related to Output Quality, such as "The quality of the results of my input process in CEdX LPPM is very good" and "I have no problems with the quality of the results of my input process in CEdX LPPM," it indicates that the results of the input process in CEdX LPPM may still be considered inadequate, or lecturers may have issues with the input process results, such as mismatched results, requiring manual completion for the academic position application process.

Result of Demostrability effect Perceived Usefulness

Based on the results of the data analysis, it can be observed that the p-value is 0.829, which is ≥ 0.05, and the t-value is 0.217, which is smaller than the critical t-value. Therefore, it can be concluded that the null hypothesis (H0) is accepted, indicating that Result Demonstrability does not influence perceived usefulness. This may occur because the innovation of CEdX LPPM is perceived as still insufficient to meet the needs of lecturers in the performance reporting process.

Perceived Ease of Use effect Perceived Usefulness

Based on the results of the data analysis, it can be observed that the p-value is 0.000, which is ≤ 0.05, and the t-value is 3.676, which is greater than the critical t-value. Therefore, it can be concluded that the null hypothesis (H0) is rejected, indicating that Perceived Ease of Use influences Perceived Usefulness. This is consistent with several previous studies that have shown that Perceived Ease of Use influences Perceived Usefulness (Venkatesh and Davis, 2000; Tahar et al., 2020). This suggests that ease of use in a system can enhance individuals' perceptions of the usefulness of the system.

Perceived Usefulness effect Intention to Use

Based on the data analysis, it can be observed that the p-value is 0.000, which is ≤ 0.05, and the t-value is 5.343, which is greater than the critical t-value. Therefore, it can be concluded that the null hypothesis (H0) is rejected, indicating that Perceived Usefulness influences Intention to Use. This is consistent with previous research (Venkatesh and Davis, 2000; Kamal, Shafiq and Kakria, 2020). These results suggest that the perceived usefulness of a system for individuals can enhance their intention to use the system.

Perceived Ease of Use effect Intention to Use through Perceived Usefulness

Based on the data analysis, it can be observed that the p-value is 0.011, which is ≤ 0.05, and the t-value is 2.545, which is greater than the critical t-value. Therefore, it can be concluded that the null hypothesis (H0) is rejected, indicating that Perceived Usefulness mediates the influence of Perceived Ease of Use on Intention to Use. This is consistent with several previous studies (Venkatesh and Davis, 2000; Kamal, Shafiq, and Kakria, 2020; Tahar et al., 2020). These results suggest that the ease of using the system, either directly or through perceived usefulness, affects the intention to use the system.

Intention to Use effect Usage Behavior

Based on the data analysis, it can be observed that the p-value is 0.000, which is ≤ 0.05, and the t-value is 3.944, which is greater than the critical t-value. Therefore, it can be concluded that the null hypothesis (H0) is rejected, indicating that Intention to Use influences Usage Behavior. This result suggests that the higher the intention to use the system, the more likely the actual behavior or usage of the system will increase. This finding aligns with the results of several previous studies (Venkatesh and Davis, 2000; Tahar et al., 2020).

Service trust moderates the influence of Intention to Use on Usage Behavior

Based on the data analysis, it can be observed that the p-value is 0.175, which is ≥ 0.05, and the t-value is 1.356, which is smaller than the critical t-value. Therefore, it can be concluded that the null hypothesis (H0) is accepted, indicating that Service Trust does not moderate the influence of Intention to Use on Usage Behavior. The results of this study suggest that the trust of lecturers in the system does not strengthen or have an influence on the intention and actions of lecturers in using the system. The trust of lecturers in the information system used does not increase the intention to use the system, possibly because there is an obligation to use the system. Additionally, what is perceived as important for lecturers is the ease of use and the utility of the system in

improving their performance. These findings align with previous research conducted by Zahara et al. (2021), where trust does not have a significant impact if an application or information system provides ease of use and utility for users.

Service Quality moderates the influence of Intention to Use on Usage Behavior

Based on the data analysis, it can be observed that the p-value is 0.003, which is ≤ 0.05, and the t-value is 2.958, which is greater than the critical t-value. Therefore, it can be concluded that the null hypothesis (H0) is rejected, indicating that Service Quality moderates the influence of Intention to Use on Usage Behavior. The results suggest that good service can strengthen and enhance the intention to use the system and increase the behavior of lecturers in using the system. This is consistent with several previous studies where better service quality leads to an increase in individuals' intention and actions (Chen, Zhang and Xu, 2009; Hakam and Hidayati, 2022).

CONCLUSION

The acceptance of the application can be well-measured since the obtained data, consisting of 228 responses, aligns with the predetermined target respondents. The questionnaire results indicate that a majority of lecturers agree with each variable. The research findings highlight the importance for LPPM to maintain and improve services for lecturers, thereby enhancing their willingness to report research and community service activities through CEdX LPPM. The development of the system to be more user-friendly and the improvement of research results, particularly in the form of generated reports, are crucial for increasing the system's usage in reporting. Additionally, continuous development of CEdX LPPM is essential to adapt to evolving regulations and meet lecturers' needs in the administrative reporting process. Regular socialization of CEdX LPPM is also necessary to enhance lecturers' proficiency in using the system, providing a platform for feedback and suggestions for the ongoing development of CEdX LPPM. This research contributes to technology acceptance model 2 implication and prove that service quality can enhance satisfaction. Limitation of this research is that this research only observed one university, it would contribute more by comparing more than one university. Suggestion for further research is to consider involving leadership variable on subjective norm criteria because this research shown that choosing objective for subjective norm is important.

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