Investigating the Influencing Aspects of User Continuance Intention of Google Workspace Ecosystem in Academic Environment based on Extended Expectation Confirmation Model (E-ECM)

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ABSTRACT
The application of cloud software-as-a-service (SaaS) services is widely adopted to help various activities and work, including academic activities. One of the SaaS services is the Google Workspace ecosystem, which significantly transforms academic institutions and students in managing information, collaborating, and maximizing productivity. However, some users still switch back to conventional software, and there is intense market competition from similar companies. In addition, acquiring new users costs five times more than keeping existing users. Thus, this study aims to investigate the reasons or aspects that influence users to continue adopting the Google Workspace ecosystem in the academic environment. To achieve this goal, this study adopts the extended expectation confirmation model (E-ECM). This study uses a quantitative method with a purposive sampling technique to determine the sample respondents, namely active undergraduate students of Universitas Negeri Semarang who use the Google Workspace ecosystem for academic purposes. A total of 390 valid data were obtained from distributing questionnaires online. The analysis identified that satisfaction, trust, and perceived usefulness directly influence user continuance intention. Then, satisfaction is directly influenced by confirmation, institutional support, and service quality. Then, trust is directly influenced by satisfaction, system quality, and service quality. In addition, perceived usefulness is also directly influenced by confirmation. The results of this study

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are expected to be taken into consideration by stakeholders and future researchers.

1. INTRODUCTION

The implementation of information technology runs so fast in contemporary life, especially during the Covid-19 pandemic. One type of digital technology product utilized today is software-as-a-service, a service in cloud computing that allows users to use software through a web browser without needing to install it locally. According to research by Snisarenko (2023), more than 30,000 cloud software-as-a-service companies with the largest market share are occupied by the productivity and collaboration segment. In addition, the massive academic development in Indonesia opens opportunities for students to compete and collaborate with any method, including adopting a technology (Kemendikbud, 2020). One of the technology adoptions in the academic environment is using the Google Workspace ecosystem, an ecosystem of software-as-a-service, cloud-based productivity and collaboration service providers. The Google Workspace ecosystem can help improve the competitiveness and ability of academic institutions to provide quality education (Promevo, 2023).

Although cloud software-as-a-service has many advantages, users still switch back to conventional software (Palos-Sanchez et al., 2017). Also, the significant usage intensity of the Google Workspace ecosystem, with a market share of 50.34%, ignites fierce market competition (Duarte, 2023). In addition, there is the fact that getting new users costs five times more than keeping existing users (Fourie et al., 2023). So, this research aims to find out what reasons or aspects influence users to continue adopting the Google Workspace ecosystem, especially in the academic environment.

One approach to finding these influencing aspects uses user continuance intention analysis with the Expectation Confirmation Model (ECM) theory (Bhattacherjee, 2001). In previous research, the ECM theory was also expanded by adding relevant variables and has been proven to be able to answer problem formulations in various contexts (Al-Maroof & Salloum, 2021; Budner et al., 2017; Ifada & Abidin, 2023). Very few previous studies have looked at the quality of systems and services, which is a crucial aspect (Riatun & Lestari, 2022), as well as user trust (Li & Wang, 2021). Institutional support also has a significant role in the adoption or use of technology in the academic environment (Kok et al., 2022; Zhao et al., 2020), but previous research only explains the influence in the context of satisfaction and initial adoption, not to the interest in continued use. Thus, it is essential to explain user continuance intention with an extended ECM theory to fill the gap, which will ultimately provide new insights into the academic field and achieve the objectives of this study.

2. RESEARCH FRAMEWORK

The Figure 1. presents a conceptual research model that explores the factors influencing user continuance intention in a digital banking application. This model incorporates various constructs, including confirmation, institutional support, system quality, service quality, satisfaction, trust, and perceived usefulness. Each variable is interconnected through hypothesized relationships (H1-H12) to illustrate how they contribute to user satisfaction, trust, and ultimately, their intention to continue using the application.

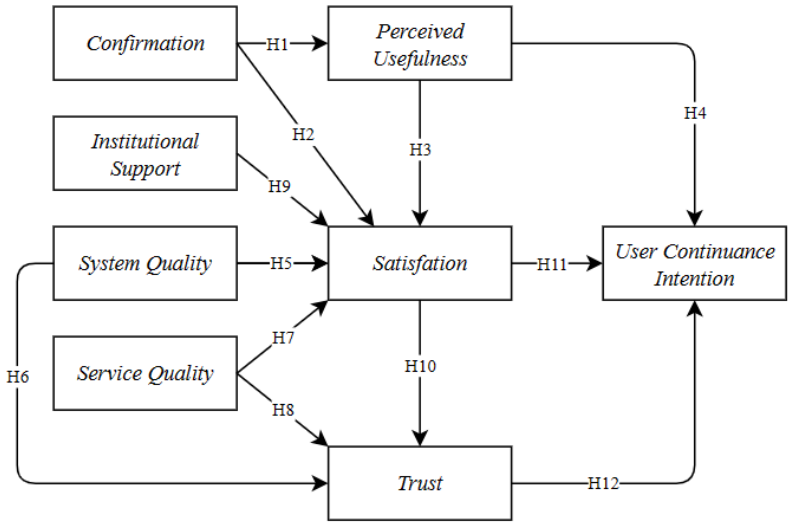


Figure 1. Research Framework

When users' experience of confirmation matches or exceeds their expectations after adopting a system or technology, they tend to feel that the system is sound (perceived usefulness) in meeting their needs (Ambalov, 2018) and will feel more satisfied (Bhattacherjee, 2001). Confirmation significantly and positively influences perceived usefulness and satisfaction (Budner et al., 2017; Cheng, 2020; Qasem et al., 2021).

H1: Confirmation (CON) has a significant positive effect on Perceived Usefulness (PEU)

H2: Confirmation (CON) has a significant positive effect on Satisfaction (SAT)

Perceived usefulness is measured by how users feel that using a particular system or technology will optimize their job performance (Islam et al., 2017). In general, if a user feels that a system or service is functional (perceived usefulness), then they are likely to feel satisfaction with using the system or service (Ambalov, 2018) and tend to have a strong interest in continuing to use it (Mtebe & Gallagher, 2022). Al-Maroof and Salloum (2021) revealed a significant effect of perceived usefulness on user satisfaction and user continuance intention in the context of cloud

software-as-a-service, which was also confirmed by Budner et al. (2017) and Cheng (2020).

H3: Perceived Usefulness (PEU) has a significant positive effect on Satisfaction (SAT)

H4: Perceived Usefulness (PEU) has a significant positive effect on User Continuance Intention (UCI)

System quality is essential for the sustainability of cloud or SaaS services. A high-quality system will make users more satisfied and use the service continuously. Kuo et al. (2023), Al-Maroof and Salloum (2021), and Li and Wang (2021) identified that the role of system quality on user satisfaction on cloud services has a significant positive effect. System quality was also found to affect user trust Li and Wang (2021). Maintaining system quality is crucial in increasing user satisfaction and trust to ensure continued use.

H5: System Quality (SYQ) has a significant positive effect on Satisfaction (SAT)

H6: System Quality (SYQ) has a significant positive effect on Trust (TRS)

Service quality is the user's perception of the suitability of expectations or desires for services facilitated by system or technology developers (Gu et al., 2021). When the services a company or organization provides are perceived as high quality by users, their satisfaction and trust increase. Li and Wang (2021), in their research in the field of cloud software-as-a-service, identified that service quality has a significant positive impact on user satisfaction, which is also confirmed by Al-Maroof and Salloum (2021), and Kuo et al. (2023). In addition, service quality was also found to have a significantly positive role on user trust (Park & Oh, 2019) which will also have implications for the continued use of the system post-adoption (Li & Wang, 2021).

H7: Service Quality (SEQ) has a significant positive effect on Satisfaction (SAT)

H8: Service Quality (SEQ) has a significant positive effect on Trust (TRS)

Institutional support reflects the resources or facilities institutions provide to support their members in adopting a technology or system. In the research of Kok et al. (2022), institutional support was found to increase student satisfaction with system adoption. In addition, institutional support also plays a role in interest in system use in the academic environment (Zhao et al., 2020).

H9: Institutional Support (INS) has a significant positive effect on Satisfaction (SAT)

Satisfaction refers to the level of emotional satisfaction that actors feel when the service achieves their interests and expectations (Bölen & Özen, 2020). In a previous study by Li and Wang (2021), the user trust factor was found to be directly positively and significantly affected by user satisfaction. Similarly, the satisfaction felt after using the information system encourages satisfied users to have a stronger desire to continue using the information system (Bhattacherjee, 2001; Budner et al., 2017; Cheng, 2020; Qasem et al., 2021).

H10: Satisfaction (SAT) has a significant positive effect on Trust (TRS)

H11: Satisfaction (SAT) has a significant positive effect on User Continuance Intention (UCI)

Trust is the nature of users who trust and believe in a system they use for something safely, reliably, and effectively based on specific aspects (Bøe, 2018). In the context of

cloud services, user trust is one of the aspects that significantly and positively underlie continued use (Park & Oh, 2019), which is also confirmed by Bøe (2018), and Li and Wang (2021). If users feel that they can trust the system and service provider, they tend to be more motivated to continue using it (McKnight et al., 2017).

H12: Trust (TRS) has a significant positive effect on User Continuance Intention (UCI)

3. RESEARCH METHODS

3.1 Sample

The study utilized the purposive sampling method, which sets specific criteria or reflects certain characteristics of the population or research subjects to be studied (Rahmadi, 2011). The criteria set as the sample in this research are active undergraduate students of Universitas Negeri Semarang batch 2017 to 2023 aged 18 to 28 years old who use Google Workspace ecosystem for academic purposes and utilize at least two applications/services on Google Workspace ecosystem through a web browser. Data collection was carried out for ten days, and 390 respondents' data had been cleaned and met the criteria. The data obtained still exceeds the minimum sample that has been determined, namely 381 samples based on the Isaac and Michael (1995) formula so it can be continued to the following analysis stage.

3.2 Research Instrument

The instrument in this study consists of two segments. The first segment is a question about the demographic profile of respondents, such as class, faculty, age, gender, and use of applications/services in the Google Workspace ecosystem. The second segment contains 40 reflective statements about confirmation, perceived usefulness, system quality, service quality, institutional support, satisfaction, trust, and user continuance intention on Google Workspace ecosystem services. The instrument is expressed as a questionnaire measured using a Likert scale with seven scoring intervals.

3.3 Data Analysis

Data analysis in this study was carried out to evaluate the model and inspect the hypotheses that have been compiled using the Partial Least Square (PLS) based Structural Equation Model (SEM) technique, which has two stages, namely outer model evaluation and inner model analysis through the SmartPLS version 3 tool. PLS-SEM is a non-parametric statistical method that does not require testing the assumption of normality of data distribution because the algorithm in PLS-SEM can handle non-normalized data and is not a problem in PLS-SEM because the estimated statistical parameters remain robust (Hair et al., 2022).

4. RESULTS AND DISCUSSION

4.1 Demographic Analysis

Based on 390 valid respondents who have filled out the questionnaire, respondents are dominated by female students, namely 285 people or 73%. Respondents are also dominated by students aged 20-22 years, which is 65%. Respondents who are in the class of 2020 are the leaders of the class, with 106 respondents or 27% of the 390 respondents. Meanwhile, respondents who are students from the FMIPA faculty have the highest number of respondents, with 26% of the total respondents. A more complete demographic profile can be seen in Table 1.

Table 1 Demographic Profile of Respondents

Respondent Demographics	Total	Percentage
Gender		
Female	285	73%
Male	105	27%
Age		
18 years	48	12%
19 years	54	14%
20 years	83	21%
21 years	97	25%
22 years	73	19%
23 years	22	6%
24 years	9	2%
25 years	4	1%
Batch		
2017	6	2%
2018	18	5%
2019	54	14%
2020	106	27%
2021	87	22%
2022	51	13%
2023	68	17%
Faculty		
FMIPA	103	26%
FBS	64	16%
FIS	44	11%
FT	43	11%
FEB	41	11%
FIPP	34	9%
FK	28	7%
FH	21	5%
FIK	12	3%

4.2 Outer Model Evaluation

Outer model evaluation assesses how valid and reliable an indicator and variable is. The first evaluation is to measure the outer loading value in the convergent validity evaluation. An indicator is valid if it has an outer loading value above 0.7 (Hair et al., 2022). A total of 35 of the 40 indicators studied have a value above 0.7, so they are valid, as described in Table 2.

Table 2 Convergent Validity: Outer Loading Calculation Result

Indicator	Outer Loading	Decision
CON1	0.725	Valid
CON2	0.792	Valid
CON3	0.725	Valid
CON4	0.767	Valid
CON5	0.739	Valid
PEU1	0.721	Valid
PEU2	0.848	Valid
PEU3	0.836	Valid
PEU5	0.727	Valid
SYQ1	0.757	Valid
SYQ2	0.760	Valid
SYQ3	0.725	Valid
SYQ5	0.770	Valid
SEQ1	0.810	Valid
SEQ2	0.836	Valid
SEQ3	0.810	Valid
SEQ5	0.781	Valid
INS1	0.816	Valid
INS2	0.816	Valid
INS3	0.774	Valid
INS4	0.835	Valid
SAT1	0.856	Valid
SAT2	0.857	Valid
SAT4	0.822	Valid
SAT5	0.790	Valid
TRS1	0.766	Valid
TRS2	0.797	Valid
TRS3	0.793	Valid
TRS4	0.788	Valid
TRS5	0.795	Valid
UCI1	0.722	Valid
UCI2	0.751	Valid
UCI3	0.858	Valid
UCI4	0.867	Valid
UCI5	0.766	Valid

Next is the evaluation of discriminant validity based on the Fornell-Larcker criterion value. A variable can be said to be valid if the AVE root value of the latent variable itself is greater than the AVE root value of other variables (Hair et al., 2022). The calculation results listed in Table 3 show that all variables are valid.

Table 3 Discriminant Validity: Fornell-Larcker Criterion Calculation Result

	CON	PEU	SYQ	SEQ	INS	SAT	TRS	UCI
CON	**0.750**							
PEU	0.588	**0.785**						
SYQ	0.668	0.596	**0.753**					
SEQ	0.680	0.696	0.724	**0.809**				
INS	0.494	0.477	0.535	0.588	**0.811**			
SAT	0.681	0.605	0.659	0.744	0.664	**0.832**		
TRS	0.607	0.578	0.661	0.717	0.608	0.735	**0.788**	
UCI	0.566	0.552	0.582	0.675	0.567	0.721	0.654	**0.795**

Evaluating reliability is also carried out in the outer model evaluation stage. A variable can be called reliable if it has Cronbach's alpha and composite reliability points more than equal to 0.70 (Hair et al., 2022). The calculation results shown in Table 4 identify that all variables studied have Cronbach's alpha and composite reliability values above the threshold, which means the variables are reliable.

Table 4 Realibility Testing Calculation Result

Variable	Cronbach's Alpha	Composite Reability	Decision
Confirmation (CON)	0.805	0.865	Reliable
Perceived Usefulness (PEU)	0.790	0.865	Reliable
System Quality (SYQ)	0.746	0.840	Reliable
Service Quality (SEQ)	0.824	0.884	Reliable
Institutional Support (INS)	0.826	0.885	Reliable
Satisfaction (SAT)	0.852	0.900	Reliable
Trust (TRS)	0.849	0.891	Reliable
User Continuance Intention (UCI)	0.853	0.895	Reliable

4.3 Inner Model Analysis

Structural or inner model analysis aims to explain hypotheses about how the variables measured in the outer model evaluation are interconnected in a conceptual structure. In path coefficient analysis, a correlation can be declared positive if the original sample is more than equal to 0. Then, if a path has P-Values ≤ 0.05 and T-Statistic ≥ 1.96, then the path is said to have a significant correlation (Hair et al., 2022). Based on the path coefficient calculation results listed in Table 5, there are ten hypotheses with a significant direct relationship, namely H1, H2, H4, H6, H7, H8, H9, H10, H11, and H12. The other two, namely H3 and H5, have no significant relationship.

Table 5 Path Coefficient: Direct Effect Calculation Result

Hypothesis	Path	Original Sample	T-Statistic	P-Values	Decision
H1	CON → PEU	0.588	14.287	0.000	Accepted
H2	CON → SAT	0.232	4.366	0.000	Accepted
H3	PEU → SAT	0.064	1.230	0.219	Rejected
H4	PEU → UCI	0.134	2.930	0.004	Accepted
H5	SYQ → SAT	0.089	1.739	0.083	Rejected
H6	SYQ → TRS	0.280	3.502	0.001	Accepted
H7	SEQ → SAT	0.306	4.511	0.000	Accepted
H8	SEQ → TRS	0.280	3.884	0.000	Accepted
H9	INS → SAT	0.292	6.059	0.000	Accepted
H10	SAT → TRS	0.397	6.865	0.000	Accepted
H11	SAT → UCI	0.471	7.751	0.000	Accepted
H12	TRS → UCI	0.230	3.602	0.000	Accepted

On the other hand, the results of the indirect effect path coefficient calculation on user continuance intention (UCI) recorded in Table 6 show that four independent variables, namely confirmation, system quality, service quality, and institutional support, have a positive and significant indirect relationship to user continuance intention (UCI) because the relationship has an Original Sample score ≥ 0, P-Values ≤ 0.05 and T-Statistic ≥ 1.96.

Table 6 Path Coefficient: Indirect Effect Calculation Result

Path	Original Sample	T-Statistic	P-Values	Correlation
CON → PEU → UCI	0.079	2.783	0.006	Significant
CON → SAT → UCI	0.109	3.626	0.000	Significant
SYQ → TRS → UCI	0.045	2.311	0.020	Significant
SEQ → SAT → UCI	0.144	3.920	0.000	Significant
SEQ → TRS → UCI	0.064	2.311	0.006	Significant
INS → SAT → UCI	0.137	4.501	0.000	Significant

The following analysis looks at the effect size value. The effect is small if the F^2 is between 0.02 and 0.14. If the value is between 0.15 and 0.34, it is considered moderate. Then, if the F^2 value presented is greater than 0.35, it has a significant effect (Hair et al., 2022). Based on the results of the effect size calculation embedded

in Table 7, it can be observed that there is one path that has a high effect, three paths that have a moderate effect, and six paths that have a small effect.

Table 7 Effect Size Calculation Result

Hypothesis	Path	F^2	Decision
H1	CON → PEU	0.528	High
H2	CON → SAT	0.075	Small
H4	PEU → UCI	0.024	Small
H6	SYQ → TRS	0.046	Small
H7	SEQ → SAT	0.092	Small
H8	SEQ → TRS	0.073	Small
H9	INS → SAT	0.163	Moderate
H10	SAT → TRS	0.174	Moderate
H11	SAT → UCI	0.210	Moderate
H12	TRS → UCI	0.052	Small

Testing the coefficient of determination is no less important; this test is used to measure how much influence the dependent variable can have on the independent variable (as a whole). The influence is said to be high if the R-Square (R^2) score is more than equal to 0.75. Moderate if the score is between 0.50 to 0.74, and small if the score is between 0.25 to 0.49 (Hair et al., 2022). Table 8 shows that 3 dependent variables are moderately influenced, and one variable is influenced in a small way. First, the perceived usefulness (PEU) variable can be explained by 34.5% by its independent variable, confirmation (CON). Second, the satisfaction variable (SAT) can be explained by 67.6% moderately by its independent variables, namely CON, INS, and SEQ. Third, the trust variable (TRS) can be explained by 62.3% moderately by its independent variables, namely SYQ and SEQ. Fourth, the user continuance intention (UCI) variable can be explained by 56.4% moderately by its independent variables, namely PEU, SAT, and TRS. Meanwhile, the influence portion of the remaining

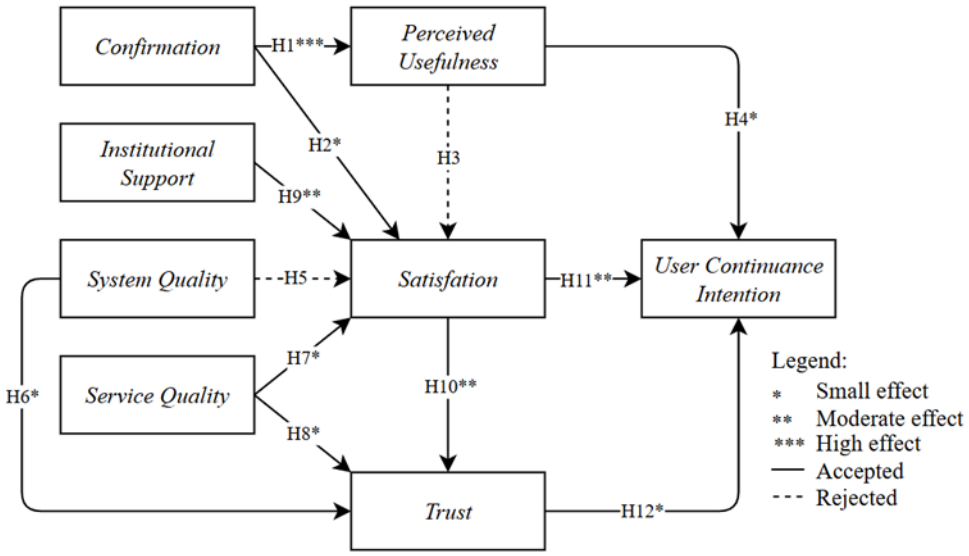
percentage is a factor of unknown variables and has not been embedded in this research model.

Table 8 Coefficient of Determination Calculation Result

Variable	R^2	Decision
Perceived Usefulness (PEU)	0.345	Small
Satisfaction (SAT)	0.676	Moderate
Trust (TRS)	0.623	Moderate
User Continuance Intention (UCI)	0.564	Moderate

5. CONCLUSION

Figure 2 illustrates the proposed research model combining Technology Continuance Theory (TCT), Expectation Confirmation Model (ECM), and external factors to explain user continuance intention in digital banking. Key variables include Confirmation, Perceived Usefulness, Satisfaction, Trust, and Service/System Quality. Solid and dashed lines represent accepted and rejected hypotheses, respectively, with varying effect sizes. The results highlight the strong influence of Confirmation and Satisfaction on continuance intention, while Trust also plays a mediating role. The model emphasizes satisfaction and trust as key drivers of continued use in digital banking services.



Based on the calculation results from the previous analysis process, it is known that confirmation has a direct positive role on perceived usefulness **(H1 accepted)** and satisfaction **(H2 accepted)**, which is also confirmed by Qasem et al. (2021) and Cheng (2020). In addition, confirmation also has a positive and significant indirect relationship with user continuance intention, according to the research of Budner et

al. (2017). The impact is that users will feel that the system is more valuable and satisfying, and users will be more likely to continue using the Google Workspace ecosystem if their expectations have been confirmed/fulfilled.

Perceived usefulness was identified as having no significant relationship with satisfaction **(H3 rejected)** but was found to have a positive and significant direct relationship with user continuance intention **(H4 accepted)**. This is in line with the research results by Qasem et al. (2021) and Al-Maroof and Salloum (2021). Therefore, users tend to be interested in continuing to adopt the Google Workspace ecosystem if the benefits can be felt optimally, even though it does not affect user satisfaction.

Meanwhile, system quality is also identified as not having a significant relationship with satisfaction **(H5 rejected)**, but still has a significant and positive direct relationship with user trust **(H6 accepted)**. This is by research conducted by Li and Wang (2021). In addition, perceived usability also indirectly affects user continuance intention, which is also confirmed by the results of Li and Wang (2021) research. Thus, users will have more confidence in using the Google Workspace ecosystem if it has advantages in system quality, even though this does not affect user satisfaction.

Furthermore, the analysis also found that service quality plays a significant and positive direct role in user satisfaction **(H7 accepted)** and trust **(H8 accepted)**. In addition, service quality has an indirect significant positive relationship with user continuance intention. Similar to the results of research conducted by Kuo et al. (2023) and Li and Wang (2021). These results show that users are more satisfied and trustful when the service they provide is considered good quality. Users will tend to be interested in continuing to use the Google Workspace ecosystem.

The analysis also shows that institutional support has a significant positive direct role in user satisfaction **(H9 accepted)**. Meanwhile, institutional support also indirectly influences interest in continued use. This results from research by Kok et al. (2022) and Zhao et al. (2020). Based on this, users will feel satisfied if they get support from institutions that help their academic activities adopt the Google Workspace ecosystem stems. This will also affect user sustainability interest.

User satisfaction was found to have a positive and significant direct role on user trust **(H10 accepted)**, and user satisfaction was also found to have a direct significant relationship with interest in continued use **(H11 accepted)**. These findings are also in line with the findings in research conducted by Li and Wang (2021) and Al-Maroof and Salloum (2021). The findings mean that if they feel satisfied with the system, users tend to feel trust and interest in continuing to use the Google Workspace ecosystem.

Meanwhile, user trust is identified as having a positive and significant direct influence on interest in continued use **(H12 accepted)**. This identification is in line with

the findings of Li and Wang (2021). Based on this, users who have put their trust in the system will tend to be interested in continuing to utilize or adopt the Google Workspace ecosystem.

The investigation in this study found that 10 out of 12 hypotheses were accepted because they met the test criteria. The accepted hypotheses are H1, H2, H4, H6, H7, H8, H9, H10, H11, and H12. The rest, namely H3 and H5, cannot be accepted. It is identified that users' sustainability interest in adopting the Google Workspace ecosystem in the academic environment is influenced and directly affected by aspects of user satisfaction (SAT), user trust (TRS), and user-perceived benefits (PEU). Not only that, users' sustainability interest in adopting the Google Workspace ecosystem in the academic environment is also influenced and indirectly affected by user confirmation of expectation conformity (CON), system quality (SYQ), service quality (SEQ), and institutional support (INS). Thus, Google Workspace ecosystem stakeholders need to strengthen critical aspects or factors that directly influence interest in continued use in the academic environment. Stakeholders also need to pay attention to aspects that indirectly influence users' sustainability interest in adopting the Google Workspace ecosystem in the academic environment. Although it does not directly impact, aspects of user confirmation of expectation conformity, system quality, service quality, and institutional support also affect user continuance intention.

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