

What Motivate Students to Continue Using Online Collaborative Tools: Post-Acceptance of Information System Approach

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Abstract—This paper aims to understand what motivates students at universities in Indonesia to continue using Online Collaborative Tools (OCTs) for their collaboration work. Utilising OCTs is crucial as the COVID-19 pandemic hit us in 2019 and forced all of us, particularly those who studied at university, to work online as precautionary measures. This research employs the Post-Acceptance Model of Information Systems (IS) approach to understand this issue. For an OCT to continue use, performance: effectivity, efficiency, and certainty is the key determinant, and perceived usability: perceived usefulness, perceived ease of use, and perceived enjoyment mediates confirmation and satisfaction and the intention to continue use. A total of 354 participants are involved in the data analysis employing Structural Equation Modelling (SEM). Our results revealed that while the relationship between confirmation and satisfaction is partially mediated by perceived ease of use and enjoyment, the relationship between confirmation and intention to continue use is also partially mediated by perceived usefulness and enjoyment, and satisfaction. We found that the intention to continue using the OCT can be determined by 67.9% (substantial) of the variance of the model. Our research contributes theoretically to the IS research in this context and practically to the OCT discourse. Limitations and future research directions are discussed.

Keywords—Online Collaborative Tools, performance, perceived usability, Post-Acceptance Model, intention to continue use

1 Introduction

When it comes to learning, using methods that encourage students to work together to solve problems and learn has long been considered a best practise in education [1]. Students often collaborate on creating a final assessment artefact (such as a report or presentation) in a group setting [2]. Online Collaborative Tools (OCTs) are one approach to facilitating this change in how courses are delivered and completed. One of the most popular and widely used OCTs is Google Docs (GD) [3]. It has been recommended as an OCT because of its small footprint, ability to handle several editors at once, and ease of use [4].

When several students have access to the internet at the same time, GD enables rapid feedback and collaboration on student-generated material [5]. The instantaneous saving and safety of GD free students from worrying about losing their written assignments stored on external storage. The added benefit is that students may easily and quickly share their work with their instructors and peers so that they can all see and make changes to the same document simultaneously. [6] agrees with Ragupathi [7]’s assessment of GD and argues that it fosters collaboration between students for many reasons, such as controlling edit settings, allowing simultaneous work, saving changes, and recovering previous versions, among others. If many students are working on the same document at the same time, they may all view each other’s edits in real-time.

In a survey [8] of 350 students across 40 universities in the US, 78% of them preferred GD as a tool for collaborative work. Additionally, using the GD, the document will be automatically saved and updated to reflect other users’ contributions with different colours. Not only may students and lecturers work together on papers, but they can also speak with one another as they make changes. Notwithstanding these, as most students have massively accepted the OCT for their collaborative works, our concern lies in whether or not the students will continue to use this application.

While early adopters are crucial to an information system’s long-term performance, repeat users are more critical to an IS’s continuous sustainability and ultimate success. In this regard, Oliver [9] has postulated his Expectation-Conformation Theory (ECT). He posited that the user would first see the perceived performance and expectation towards the intention to continue use after the initial adoption. Once users are confirmed to both factors, they affect the intention to continue use mediated by satisfaction. In other words, Oliver [9] sees that confirmation of the users’ initial use of a particular IS is the only determinant of the satisfaction.

However, in this study, our view is similar to the one of Bhattacharjee [10] in his Post-Acceptance Model of Continuance Use, explaining that confirmation of the initial use is not the only determinant affecting satisfaction that leads to continued use. Other factors, such as performance of the technology perceived by the user, perceived enjoyment, perceived ease of use, and perceived usefulness, have also been studied in separate studies [11–13] by which they are the key factors to satisfaction.

Following is the article’s outline: Section 2 provides theoretical backgrounds of this study. The Research Model and Hypothesis Development are sketched out in Section 3. Section 4 covers the research approach, while Section 5 details the data analysis. The Discussion and Implications are discussed in Section 6 and finally the limitations and future research direction are described in Section 7.

2 Theoretical background

2.1 Online collaborative tools

To many, Google Docs (GD) represents the epitome of what it means to work collaboratively online [14]. GD’s online collaborative editing features make it possible to generate new information cheaply [15, 16]. Because of the ease with which content can be created and edited by users, GD has been used as an online collaborative tool to performance. In recent years, GD popularity has skyrocketed, making it one of the world’s most visited websites [17].

Earlier studies have mostly concentrated on four main topics: the benefits of utilising GD, collaborative learning and writing, knowledge development and management, and information sharing and organisation [14, 18]. GD, according to the published literature, is an effective tool for group projects in a variety of academic contexts and disciplines [19, 20]. GD has been shown in several studies to improve access and facilitate cooperation amongst college and university students.

2.2 Performance

There are various definitions of performance. In the context of this research, we follow the definition by Venkatesh et al. [21], that is “the degree to which an individual believes that using the system will help him or her to attain gains in job performance” [21]. It records users’ mental projections of the system’s actual behaviour (performance). Although the original Expectation-Confirmation Theory (ECT) was developed to explain how a product’s performance-specific expectations and the subsequent expectancy disconfirmation influenced customer satisfaction (Oliver, 1980), individuals’ expectations about a product or system are not necessarily limited to the performance aspect.

In this research, students build an initial anticipation of what they will get. After using it for a while, individuals acquire opinions on how well it works. They then compare how well it really performed to their initial anticipation and evaluate how well their prediction was borne out (confirmation). Next, they develop a feeling of contentment (or an effective response) depending on their degree of confidence and the basis for that confidence, their expectations. In the end, happy students make up their minds to use it again (continue use), whereas unhappy ones decide to stop using the GD as OCT altogether.

2.3 Perceived usability

Perceived usability refers to “the extent to which a product can be used by specified users to achieve specified goals with effectiveness, efficiency, and satisfaction in a specified context of use” [22]. Perceived usability, quality, value, and usability disconfirmation are all co-determinants of satisfaction, which in turn determines consumers’ desire to continue using a product or service [23]. This extension of Expectation-Confirmation Theory (ECT) was supported by empirical evidence.

The three main components of usability in this research are perceived usefulness, perceived ease of use and perceived enjoyment. Roca et al. [24] employs Technology Acceptance Model (TAM) from Davis [11] to determine the continuance intention to use e-learning system. They see that perceived usefulness and perceived ease from TAM is the key references influencing the satisfaction that leads to the intention to continue use the e-learning system. Venkatesh [25] envisaged that perceived enjoyment determines the intention to the e-learning although it is mediated by perceived ease of use. While Nguyen [13], on the other hand, has demonstrated that perceived enjoyment significantly affected that continuance intention to use information system. Thus, in this research, we formulated that perceived ease of use, perceived usefulness and perceived enjoyment are the determinants to the intention to use GD as an Online Collaborative Tool.

2.4 Post-Acceptance of IS continuance

The decision to keep using an IS is analogous to the repurchase decision made by consumers in that both (1) occur after an initial acceptance or purchase decision, (2) are influenced by the initial use (of IS or product) experience, and (3) can potentially lead to ex post reversal of the initial decision. Rationally minded users probably undergo a non-trivial decision process analogous to ECT before making an educated, well-considered call.

To use ECT in a new setting (IS continuation), however, a number of theoretical modifications are necessary. Such elaborations provide one-of-a-kind possibilities for theory improvement. They may provide a more complete rationale for IS continuation choices than electroconvulsive therapy alone. TAM-based research has conceptualised and proven affect (as attitude) as a significant predictor of intent for IS usage (e.g., Davis et al. [11]). The satisfaction-continuation intention relationship that ECT establishes is given indirect support by this research. Our proposed research model is drawn in Figure 1.

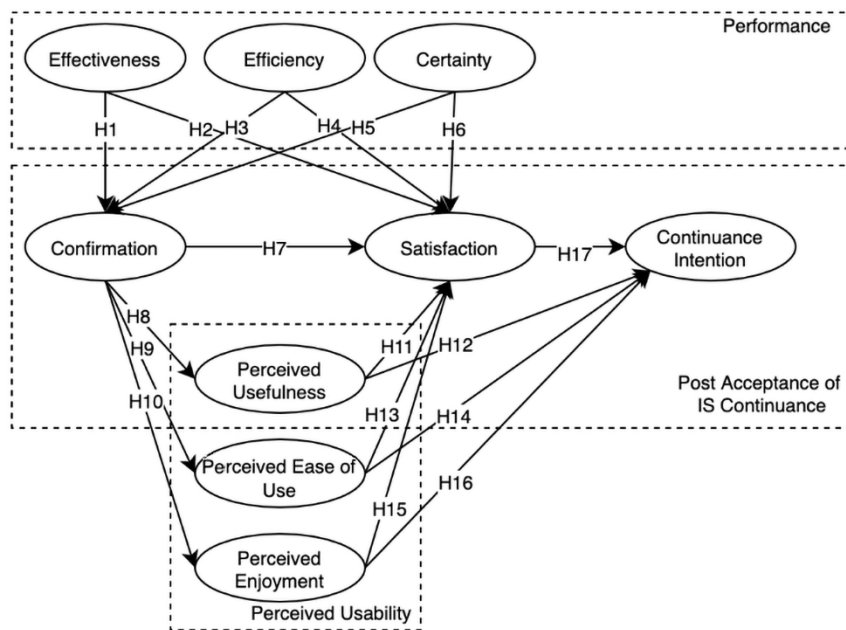


Fig. 1. Proposed research model

3 Research model and hypothesis development

3.1 Effectiveness

In the context of information system use, effectiveness is defined as making use of a system in a manner that contributes to the accomplishment of the objectives set for utilising the system [26]. In their study, Wiid et al. [27] examined students' belief towards the effectivity of the OCT in learning processes. They found that the effectiveness of

the OCT requires a high awareness by all group members and to be able to achieve such thing, they both need to confirm that. In this study, effectiveness refers to how high OCT to be used by students in their collaborative assignments. The higher the effectiveness of it, it will affect to the conformation and the satisfaction level in using it in their collaborative work. Accordingly, we hypothesise that

- H1.** Effectiveness significantly affects confirmation
- H2.** Effectiveness significantly affects satisfaction

3.2 Efficiency

Efficiency is described as how instant the satisfaction can be confirmed by users once they use an IS directly [28]. Higher education has been impacted by the use of ICTs or the right allocation of ICT resources in order to improve student learning outcomes, as stated by Kenny [29]. As a result, it is anticipated that efficiency would rise as a result of the use of ICT, leading to greater results achieved with less labour. This might point to a higher level of interest among stakeholders in using ICT to improve efficiency in educational institutions [29]. The following conjecture may be drawn from this reasoning. Thus, we hypothesise that:

- H3.** Efficiency significantly affects confirmation
- H4.** Efficiency significantly affects satisfaction

3.3 Certainty

Certainty is about one's confidence level towards an attitude. It is described as a mechanism by users to evaluate their confidence level to a product or service [30]. By this instrument, certainty can be described as a way to measure the consumer satisfaction [28]. This implies that there is a process of confirmation between the performance and the prior expectation. In this regard, we hypothesise that:

- H5.** Certainty significantly affects confirmation
- H6.** Certainty significantly affects satisfaction

3.4 Confirmation

In the initial use of a particular use of information system, the end users will determine their satisfaction to it during a period of time [11]. However, to do so, they first will confirm that the IS is useful for them and therefore they are satisfied with it [10]. As described earlier, in our context, confirmation determines the perceived usability under which it also affects perceived ease of use and enjoyment. Therefore, we hypothesise that:

- H7.** Confirmation significantly affects satisfaction
- H8.** Confirmation significantly affects perceived usefulness
- H9.** Confirmation significantly affects perceived ease of use
- H10.** Confirmation significantly affects perceived enjoyment

3.5 Perceived usefulness

Perceived usefulness is one of the key determinants to the IS acceptance. It is defined as “the degree to which a person believes that using a particular system would enhance his or her job performance” [11]. In turn, a user who has faith in a favourable use-performance connection would rate a system highly in perceived usefulness. We, thus, hypothesise that:

- H11.** Perceived usefulness significantly affects satisfaction
- H12.** Perceived usefulness significantly affects continuance intention

3.6 Perceived ease of use

Another key determinant to the IS adoption is perceived ease of use [11]. It is described as “the degree to which a person believes that using a particular system would be free of effort”. Users are more inclined to adopt an application that they believe is simpler to use than another:

- H13.** Perceived ease of use significantly affects satisfaction
- H14.** Perceived ease of use significantly affects continuance intention

3.7 Perceived enjoyment

As in Venkatesh [25] in his seminal work that the perception of ease of use of an information system stated that for the users to adopt an information system, they have to enjoy during their initial usage. This essentially echoes the one of Davis [11] that once the end users are pleased to use the information system, they are very likely to continue adopt it. In this context, we assume that:

- H15.** Perceived enjoyment of use significantly affects satisfaction
- H16.** Perceived enjoyment significantly affects continuance intention

3.8 Satisfaction

In the ECT of Oliver [9] and others e.g. Bhattacharjee & Lin [31] that studies the continuance use of an information system confirm that satisfaction is the only key determinant for the user to keep continue using it. However, our view is similar to the one of Bhattacharjee [10] that satisfaction is also influenced by other factors such as perceived usability. However, all the theories agree that satisfaction is the key factor and first factors that heavily impact the continued use of an information system. Thus, we formulate that:

- H17.** Satisfaction significantly affects continuance intention

4 Research methodology

4.1 Sample

Table 1 informs the socio-demographic characteristics of participants. A total of the participants is 354 users involving in this study. However, as the targeted respondents are those who have experienced using GD application in a collaboration task/assignment, there are 68 respondents were excluded from further analysis as they did not meet the requirement and only 286 of them can be further analysed.

Table 1. Socio-demography characteristic of respondents

Profile	Category	Freq.	%
Domicile	Jabodetabek	203	70.98
	Java island (non-Jabodetabek)	37	12.94
	Sumatera	34	11.89
	Kalimantan	6	2.10
	Others	6	2.10
Frequency of using GD in a collaboration task in the last month?	1–3 times	112	39.16
	4–6 times	89	31.12
	7–9 times	27	9.44
	>9 times	58	20.28
Age	18 – 22 years	281	98.25
	23 – 27 years	4	1.40
	28 – 32 years	1	0.35
Gender	Male	128	44.76
	Female	158	55.24
How long have you used GD for collaboration tasks?	< 1 year	51	17.83
	1–2 years	101	35.31
	3–4 years	88	30.77
	> 4 years	46	16.08

4.2 Research instrument

As this is quantitative research, a questionnaire is used to collect the sample for this study, focusing on GD users in Indonesia. We created the questionnaire in Google Forms to swiftly submit it to the target respondents online. The respondents' replies are assessed using 5-point Likert scales, with 1 (one) representing strongly disagree and 5 (five) representing strongly agree, respectively.

Prior to delivering the questionnaire to the respondents, it is piloted by all authors, four bachelor students, a professor, and two senior lecturers of the Information System department to increase its readability and improve its ambiguities. Once the questionnaire was completed, we distributed it through social media platforms such as, Instagram, Twitter and WhatsApp and Facebook. We addressed data collection using

a purposive sampling strategy [32]. SmartPLS 4.0’s Partial Least Squares-Structural Equation Modelling (PLS-SEM) is used as an analytical technique in this study. All the measurement items used in this study are adopted and altered from previous publications. All the research variables in this study: Effective (EFE), Efficient (EFI), Certainty (CER), Confirmation (CO), Perceived Usefulness, (USE), Perceived Ease of Use (PEOU), Perceived Enjoyment (ENJ), Satisfaction (SA), Continuance Intention (CI) are described in Table 2. The references to all the measurement indicators are also shown.

5 Data analysis and result

5.1 Measurement model evaluation

The assessment of measurement models is the first of two steps in data analysis. The examination begins with a look at Factor Loading (FL). FL values are generally accepted if the value is more than 0.7 [33]. As in Table 2, indicators CER1 and USE4 are excluded from further analysis as they did not meet the threshold. The internal consistency reliability is assessed employing both Cronbach’s alpha (CA) and composite reliability (CR) values. All CA and CR scores are acceptable once the values are no less than 0.7 [33]. Convergent validity is the next one to evaluate using the Average Variance Extracted (AVE). It is accepted once the level is 0.5 or greater [34]. The next to evaluate is discriminant validity. This is based on the Fornell-Larcker criterion [33]. Our evaluation shows that discriminant validity is well established. In conclusion, the measurement model evaluation shows our instruments are valid and reliable.

Table 2. Confirmatory factor analysis of the variables

Variable	Indicators		FL	References
EFE CA, CR, AVE = 0.704, 0.835, 0.629	EFE1	I feel that using GD can help me in group assignment collaboration more accurate	0.820	[35]
	EFE2	I feel that using GD can help me in group assignment collaboration with more quality	0.810	
	EFE3	I feel that using GD can help me to complete group assignment better	0.747	
EFI CA, CR, AVE = 0.724, 0.845, 0.645	EFI1	I feel that using GD can help me in group assignment collaboration more efficient	0.783	[35]
	EFI2	I feel that collaborating in group assignment using GD is more saving time	0.846	
	EFI3	I feel that using GD can help me to complete more group assignments	0.778	
CER CA, CR, AVE = 0.635, 0.804, 0.578	CER2	I feel that I can rely on GD in group assignment collaborations	0.769	[36]
	CER3	I feel that I can trust GD security to manage user access in group document collaboration	0.724	
	CER4	I feel GD is competent enough in enabling group member to see the completed tasks	0.786	

(Continued)

Table 2. Confirmatory factor analysis of the variables (Continued)

Variable	Indicators		FL	References
CO CA, CR, AVE = 0.774, 0.869, 0.689	CO1	I feel my experience in using GD to group assignment collaboration is beyond my expectation	0.828	[10]
	CO2	I feel the services offered by GD in supporting group collaboration is better than my expectation	0.859	
	CO3	Overall, my expectation in group assignment collaboration is met	0.802	
USE CA, CR, AVE = 0.755, 0.859, 0.670	USE1	I feel GD is useful in group assignment collaboration	0.829	[11]
	USE2	I feel that GD fits my requirements related to group assignment collaboration	0.833	
	USE3	I feel using GD improves my performance in group assignment collaboration	0.793	
PEOU CA, CR, AVE = 0.809, 0.875, 0.636	PEOU1	I feel GD is easy to use in group assignment collaboration	0.799	[11]
	PEOU2	I feel GD is an application that easy to learn to be used in group assignment collaboration	0.799	
	PEOU3	I feel it is easy to master GD in group assignment collaboration	0.831	
	PEOU4	I feel easy to do what I need to in group assignment collaboration using GD	0.759	
ENJ CA, CR, AVE = 0.841, 0.894, 0.678	ENJ1	I feel happy collaborating with my peers using GD in group assignment collaboration	0.820	[12, 13]
	ENJ2	I enjoy doing group assignment using GD	0.846	
	ENJ3	I like using GD to do group assignment	0.854	
	ENJ4	I feel GD help group assignment collaboration more practice	0.770	
SA CA, CR, AVE = 0.830, 0.887, 0.662	SA1	I am satisfied in group assignment collaboration using GD	0.831	[10, 37]
	SA2	I am comfortable in group assignment collaboration using GD	0.818	
	SA3	I feel doing group assignment using GD is enjoyable	0.805	
	SA4	I feel my decision to use GD in group assignment collaboration is correct	0.802	
CI CA, CR, AVE = 0.866, 0.909, 0.714	INT1	I intend to keep continue using GD for group assignment collaboration in the future	0.876	[21]
	INT2	I feel that I will keep continue using GD for group assignment collaboration in the future	0.852	
	INT3	I plan to keep using GD for group assignment collaboration in the future	0.832	
	INT4	I will recommend others to use GD for group assignment collaboration	0.819	

5.2 Structural model evaluation

Once the reliability and validity of the research instrument are evaluated in the measurement model evaluation, the structural model evaluation is examined. It is shown in Figure 2. As in the figure, out of seventeen hypotheses, twelve are accepted. However, five of them are rejected; they are H2, H4 and H6, H11 and H14, as their p values are not statistically significant ($p < 0.05$). The measurement used two-tail evaluation as the developed hypotheses do not demand the direction (positive affect), with 5000 subsamples of bootstrapping procedure and a 0.05 significance level.

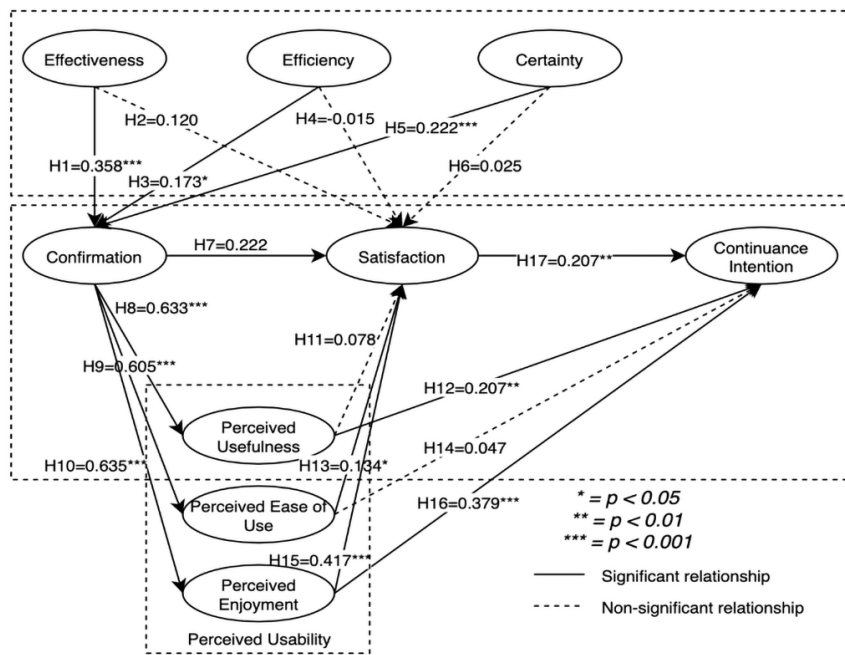


Fig. 2. Proposed research model evaluated

As for the coefficient of determination (R^2), their values in a row are 0.426, 0.716, 0.399, 0.364, 0.402 and 0.679 for CO, SA, PU, PEOU, ENJ and INT. The results of structural model evaluation are shown in Table 3.

Table 3. Results of structural model evaluation

	Hypothesise	T Statistics	P Value	Remarks
H1	EFE → CO	4.917	0.000	Accepted***
H2	EFE → SA	1.875	0.061	Rejected
H3	EFI → CO	1.966	0.049	Accepted*
H4	EFI → SA	0.333	0.739	Rejected
H5	CER → CO	3.690	0.000	Accepted***
H6	CER → SA	0.442	0.658	Rejected
H7	CO → SA	4.013	0.000	Accepted***
H8	CO → USE	17.458	0.000	Accepted***
H9	CO → PEOU	12.788	0.000	Accepted***
H10	CO → ENJ	15.409	0.000	Accepted***
H11	USE → SA	1.300	0.193	Rejected
H12	USE → INT	2.936	0.003	Accepted**
H13	PEOU → SA	2.225	0.026	Accepted*
H14	PEOU → INT	0.682	0.495	Rejected
H15	ENJ → SA	5.231	0.000	Accepted***
H16	ENJ → INT	4.950	0.000	Accepted***
H17	SA → INT	2.936	0.003	Accepted**

Notes: * p value < 0.05; ** p value < 0.01; *** p value < 0.001.

This coefficient represents the variance of the dependent variable that can be predicted by the independent variables or how well the statistical model predicts the outcome. In other words, how effectively the model reproduces observed outcomes is quantified by the fraction of result variance that is explained by the model.

6 Discussion and implications

This study investigates the continuance intention to use GD as an online collaborative tool for students in Indonesia. In this study, instead of using Expectation-Confirmation Theory (ECT) [9] as theoretical lens, we employ Post-Acceptance Model of IS Continuance [10]. This is because our view is similar to that of Bhattacharjee [10] that continuance intention to use an IS is not primarily determined by satisfaction only based on the initial use. Instead, it is also influenced by perceived usefulness and confirmation as concerted determinants of acceptance. However, in our view, we envisaged that (1) not only is continuance intention determined by satisfaction only, but (2) it is also influenced by perceived usability, which in our model it comprises three factors: perceived ease of use (PEOU), perceived usefulness (PU) and perceived enjoyment (ENJ).

As confirmed on the structural model evaluation, out of seventeen hypotheses, twelve are accepted. There are five hypotheses rejected; they are H2, H4 and H6, H11 and H14. In particular, from the rejected hypotheses, they showed that in the context of the research, the performance that are represented by effectiveness (H2), efficiency (H4) and certainty (H6) have no direct effect on satisfaction. However, it is fully mediated by confirmation. In other words, the results demonstrated that performance has a significant influence statistically on the confirmation (H1, H3 and H5 are statistically significant values).

In this research, our evaluation based on the research model demonstrated that the relationship between confirmation and satisfaction (H7) is partially mediated by perceived ease of use (PEOU) and perceived enjoyment (ENJ). In addition, the results also revealed that the relationship between confirmation to the continuance intention is also partially mediated by satisfaction and perceived usefulness (USE) and perceived enjoyment (ENJ). These results are essentially our key contributions to the discourse of post-acceptance of IS continuance. From these results, it can be seen that perceived enjoyment in perceived usability constitutes a solid determinant for mediating the confirmation of satisfaction and continuance intention. This is because perceived ease of use and perceived usefulness are not as consistent as mediation factors to both satisfaction and continuance intention, as described above.

This result essentially confirms both ECT [9] and post-acceptance of IS continuance [10] that confirmation significantly influences the satisfaction to the IS acceptance towards the continuance intention. In other words, for an information system to be continued, the end users need to confirm its performance first before having an intention to continue using it. However, the accepted hypotheses H12 (perceived usefulness → continuance intention) and H16 (perceived enjoyment → continuance intention) reveal that satisfaction is not the only factor determining the continuance intention to use GD as a collaborative tool. Both H12 and H16 inform that these two factors also significantly affect the continuance intention. This result essentially confirms the concern of Bhattacharjee [10] that distinguish his work in the context of IS continuance and that of Oliver [9]. That satisfaction is not the only factor determining the intention to continue use an information system. This result essentially confirms our key contribution in this research.

Simply put, our research fundamentally shed more light on the literature on the post-acceptance of IS continuance that to facilitate the sustainable use of a particular IS, in this context, the use of GD is a collaborative tool for the student at the university, other variables should coexist with satisfaction as antecedents to it. Our investigation showed unequivocal results based on the substantial coefficient of determination ($R^2 = 0.679$) [38, 39] towards the continuance intention. This implies that 67.9% of continuance intention (dependent variable) can be explained by its independent variables (satisfaction, perceived usefulness, and perceived enjoyment). While perceived ease of use (H14) has no significant effect statistically on the continuance intention. Although GD is perceived as an ease-of-use collaborative tool for university students, however, for them to retain their use, this factor is not the concern but perceived usefulness (USE) and perceived enjoyment (ENJ) in the context of the research. These findings have significant implications for the understanding of how perceived usability significantly mediates the relationship between the confirmation, satisfaction to the continuance intention.

7 Limitations and future research directions

The generalisability of these results is subject to certain limitations. First, in this study, the respondents are university students, particularly those at the bachelor level (98.25%). Although this cohort comprises the biggest portion of students at the university (compared to the postgraduate cohort), however, this condition prevents us from generalising the conclusion to all university students in Indonesia. Second, although most students are on Java Island, they are also distributed almost evenly on the island. However, in this study, most of the respondents are only from Jabodetabek (Jakarta, Bogor, Depok, Tangerang and Bekasi), consisting of almost 84%. Further studies need to be carried out to validate these findings with a more significant sample representing Indonesia as a whole.

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