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Re-examining post-acceptance model of information systems continuance: A revised theoretical model using MASEM approach

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Re-Examining Post-Acceptance Model of Information Systems Continuance: A Revised Theoretical Model using MASEM Approach

Highlights

- This paper extends the post-acceptance model of information systems continuance.
- Perceived ease of use, attitude, trust, and enjoyment are new addition to the original model.
- Relationships are tested using meta-analytic structural equation modeling.
- Perceived ease of use positively influences perceived usefulness, attitude, and satisfaction.
- Trust and enjoyment positively influence users' satisfaction and continuance intentions.

Abstract

This study extends the post-acceptance model of information systems (IS) continuance, which is widely used to explain users' satisfaction and IS continuance intentions. The extended model includes additional variables such as perceived ease of use (PEOU), attitude, trust, and enjoyment. The proposed model was tested using meta-analytic structural equation modeling (MASEM). The analysis included 1,056 observations on fifteen relationships from 214 independent studies with a combined sample of 84,343. The results confirm the significance of all the relationships proposed in the original model. Furthermore, the findings indicate that PEOU directly influences perceived usefulness, satisfaction, and attitude. Trust and enjoyment both have a positive impact on users' satisfaction and IS continuance, wherein the effect of enjoyment was higher than trust. post-consumption satisfaction resulted in a favorable attitude toward technology, which further affected IS continuance. From a theoretical perspective, the current study acknowledges the shift in users' attitude toward technology and emphasizes the hedonic value of IS usage as users report a higher degree of satisfaction toward responsive, easy to use, and enjoyable technologies. Marketers should focus on the enjoyment and gratifications derived from technology to increase potential IS usage.

Keywords: Post-acceptance model of IS continuance, expectation confirmation model, expectation confirmation theory, meta-analytic structural equation modeling, attitude, trust, enjoyment, satisfaction

1. Introduction

The world has experienced dramatic changes in the technological landscape due to the rapid advances in information systems (IS), social media, and exponential growth in smart technologies like smartwatches, smartphones, and smart wearables (Dwivedi et al., 2021; Jeyaraj & Zadeh, 2020). Researchers in IS domain have tracked the ever-changing technology and investigated a multitude of causes that impact the adoption and diffusion of various technologies (Bhattacherjee, 2001a; Davis, 1989; Liao et al., 2009; Venkatesh et al., 2003). However, in many cases, the initial

success of technology failed to result in a grand commercial success or long-term persistent usage. For example, Google+, a social networking site by tech giant Google, attracted 10 million users within 2 weeks after its launch in 2011 (Goldman, 2011). Despite the overwhelming initial success (90 million users in the first year), Google+ lost traction and finally closed its business in 2019. The trends of an exponential rise, followed by a steep fall, are common for technologies irrespective of whether individuals use technology for hedonic gratifications (e.g., Farmville and Pokemon Go) or many users use technology for work-related productivity (e.g., Blackberry and Lotus 1-2-3 notes, Yan et al., 2021). Hence, the identification of factors and characteristics that influence IS continuance among users is a fertile IS research topic (Ambalov, 2021; Bhattacherjee, 2001a; Liao et al., 2009; Mishra & Shukla, 2020; Nguyen et al., 2021).

Many prominent theories such as expectation-confirmation theory (ECT, Oliver, 1980), post-acceptance model of IS continuance (Bhattacherjee, 2001a), and technology continuance theory (TCT, Liao et al., 2009) have explored users' post-adoption behaviors and outcomes such as satisfaction and continuous usage of IS. Post-acceptance model of IS continuance is one of the first models to suggest that cognitive beliefs (e.g., perceived usefulness (PU) and confirmation) and affect (satisfaction) influence IS continuance (Bhattacherjee, 2001a). Extant research has extensively used the IS continuance model (about 8,600 citations in Google Scholar) but with mixed results. For example, users' satisfaction with hedonic technologies such as mobile gaming apps and instant messaging apps lead to higher IS continuance (Gong et al., 2020; Wu et al., 2018; Zheng, 2020). However, the relationship becomes non-significant in the context of online learning management systems (LMS, Zareravasan & Ashrafi, 2019). Similarly, the effect of PU on users' satisfaction diminishes for IS offering similar features and benefits (e.g., MOOCs, Alraimi et al., 2015; Chauhan et al., 2021). Thus, the strength of various relationships proposed in the model depends on the specific IS context. Hence, there is a need to integrate the prior research findings across multiple IS contexts to verify the original model of IS continuance.

Recent IS research has applied meta-analysis to integrate findings from popular pre-adoption theories like the technology acceptance model (TAM, Davis, 1989; Wu et al., 2011), the theory of planned behavior (TPB, Ajzen, 1991; Ashaduzzaman, 2022), unified theory of acceptance and use of technology (UTAUT, Dwivedi et al., 2019, 2021; Hooda et al., 2022; Jadil et al., 2021), and extended UTAUT (UTAUT2) (Tamilmani et al., 2019, 2021). Despite the extensive use of the post-acceptance model to explain IS continuance, only a handful of systematic

review and meta-analysis based papers exist that have synthesized and integrated the findings. For example, Hossain and Quaddus (2012) did a systematic literature review of 43 papers, whereas Yan et al. (2021) reviewed 147 studies on the continuance intentions of online technologies. Ambalov (2018) did the basic meta-analysis on 51 studies, whereas Lai et al. (2016) used meta-analytic structural equation modeling (MASEM) on 65 studies to extend the original model with an additional variable 'habit'. Meta-analysis studies that include fewer studies fail to account for mixed results and may provide inconclusive results (Hunter & Schmidt, 2015). In contrast, this paper includes a much larger sample size of 214 studies and performs recommended steps such as influential diagnostics and sensitive analysis to identify outliers (Jeyaraj & Dwivedi, 2020; Viechtbauer & Cheung, 2010).

Researchers have explored new variables (e.g., PEOU, risks, quality, social norms, trust, and enjoyment) with the post-acceptance model to offer new insights into the varying usage behavior and expectations from emerging technologies such as social media (Ambalov, 2021; Yoon & Rolland, 2015), mobile banking apps (Poromatikul et al., 2019), online learning systems (Dağhan & Akkoyunlu, 2016), and chatbots (Nguyen et al., 2021). This study includes four key variables (PEOU, trust, enjoyment, and attitude) that are extensively used with the post-acceptance model and closely related to individual usage of IS (e.g., Chong, 2013). Moreover, this research addresses the research call from Martins et al. (2014) to shed light on the role of trust in technology adoption. Thus, our study contributes to the existing knowledge on this theory in the following ways: Firstly, this study integrates the findings from a much larger sample of 214 published articles having 1,056 observations with a combined sample size of 84,343. The final list included 194 articles from journals, 18 conference proceedings, and two dissertations. Secondly, the research follows the recommended rigorous method of MASEM to validate an extended model (Jeyaraj & Dwivedi, 2020). Finally, to ensure robustness and rigor of meta-analytic calculations, this paper computed influential diagnostics (e.g., studentized residual, Cook's distance, and hat values) to identify outliers, publication bias, and other related measures (Viechtbauer & Cheung, 2010).

The rest of the paper is organized as follows: Section 2 discusses the theoretical background. Section 3 discusses the proposed model for IS continuance. Further, Section 4 provides details on the research methodology followed by the results and discussion in Section 5 and Section 6 respectively. Finally, Section 7 ends with the conclusions of this paper.

2. Theoretical background

IS adoption research can be categorized into two broad streams. The first stream deals with the pre-adoption behavior and intentions (e.g., TAM, TPB, IS success model, and UTAUT). Conversely, the second stream examines post-adoption behaviors, for example, expectation-confirmation theory (ECT, Oliver 1980), post-acceptance model of IS continuance (Bhattacherjee, 2001a), and technology continuance theory (TCT, Liao et al., 2009) have been employed to explore users' post-adoption behaviors and outcomes such as satisfaction and continuous usage of IS.

2.1 Technology adoption theories

Grounded in the TRA (Fishbein & Ajzen, 1975), TAM (Davis, 1989) proposed PU and PEOU as antecedents to attitude. Attitude toward technology develops an intention to use the technology leading to actual behavior. Further, UTAUT model suggested that effort expectancy, facilitating conditions, performance expectancy, and social influence determine behavioral intentions (Venkatesh et al., 2003). Later, UTAUT model was extended with additional variables of habit, price value, and hedonic motivations (UTAUT2, Venkatesh et al., 2012), which explained a higher variance in behavioral intention than the original UTAUT model (an increase from 56% to 74%). Researchers continue to make conscious efforts to develop, validate, and extend the existing theories and frameworks to meet the challenges of the ever-changing technology landscape (e.g., Bhattacherjee & Lin, 2015; Mishra et al., 2020). Further, most of the current research highlights the critical role of individual factors on IS adoption and continued usage.

2.2 Theories on IS continuance

Systematic advances and innovations in technology have ensured that the long-term success of IS hinges on its persistent usage rather than one-time use (Bhattacherjee, 2001a, 2001b). Hence, post-adoption theories and frameworks are equally important as the pre-adoption theories. Expectation confirmation theory (ECT) suggests that users' post-adoption satisfaction and usage depend on their perceived performance and meeting prior expectations (Oliver, 1980). ECT is widely adapted by researchers for evaluating user satisfaction and post-purchase intention for products, services, and technology (Hossain & Quaddus, 2012). Post-acceptance model by Bhattacherjee (2001a) is an extension of the ECT. Bhattacherjee (2001a) argued that the success of companies operating in the IT/IS domain depends more on continued usage instead of early adoption followed by rejection.

ECT and post-acceptance models have some similarities as well as differences in their approaches. First, ECT measures both pre- and post-adoption variables, whereas post-acceptance model accentuates only post-acceptance parameters. Second, ECT measures the pre-acceptance expectations, but post-acceptance model measures post-acceptance expectations. Third, ECT is considered most suitable for marketing research (Hossain & Quaddus, 2012), and post-acceptance model extends ECT to IS domain (Bhattacherjee, 2001a). Furthermore, post-acceptance model has been considered more powerful than the pre-adoption model due to the following reasons: a) evaluation of post-adoption satisfaction is more important because pre-adoption measurements are perceptions, whereas post-usage behavior reflects actual feelings of consumers; b) higher revenues can be generated through an increase in persistent usage by satisfied users; and c) satisfied users can influence potential future users with their positive feedback and recommendations. The post-acceptance model is referred in the academic literature by other names such as expectation-confirmation model (Ayanso et al., 2015; Bhattacherjee, 2001a; Chen, 2018), information systems continuance theory (ISCT, Bøe et al., 2015) and information systems expectation-confirmation (Dağhan & Akkoyunlu, 2016).

Technology continuance theory (TCT) is another post-adoption theory (Liao et al., 2009), which is a combination of TAM (Davis, 1989), post-acceptance model (Bhattacherjee, 2001a), and cognitive model theory (Oliver, 1980). A comparative analysis of these theories suggested that post-acceptance model performed better than TAM in terms of explanatory power (Liao et al., 2009). Thus, this study evaluates the application of post-acceptance model and explores the various antecedents used in the past literature.

3. Proposed model of IS continuance

Post-acceptance model of IS continuance is based on the concept of expectation-disconfirmation, which emphasizes the post-adoption experience. The model suggests that users' satisfaction and PU determine their continuance intentions of IS use. Users' satisfaction depends on the confirmation of expectations from prior IS use and perceived usefulness. Finally, users' confirmation levels influence post-acceptance perceived usefulness (Bhattacherjee, 2001a). The original model has been extended in subsequent research with additional variables such as ease of use and attitude to widen the scope of the model (Bhattacherjee & Premkumar, 2004). Furthermore, the proliferation of online technologies and social media has stressed the importance of users' trust and enjoyment of IS usage. Thus, we extend the original model by adding four new

constructs: PEOU, trust, enjoyment, and attitude to address these research gaps (see Table 1 for definition). We selected the four variables due to following reasons: a) These are among the most widely used variables with post-acceptance model, b) Extant research confirms these variables as significant predictors of IS continuance in varying contexts (Ambalov, 2021; Dwivedi et al., 2020; Venkatesh et al., 2011), and c) these variables reflect individual choices and preferences toward technology that are used in private settings or for hedonic gratifications. Specifically, we examine how PEOU affects usefulness, users' satisfaction and attitude toward IS. We propose that trust in technology and enjoyment derived from IS usage will significantly impact users' satisfaction and IS continuance. Lastly, a favorable attitude toward IS should encourage higher IS continuance. The conceptual model is illustrated in Fig. 1.

3.1 Satisfaction

Satisfaction is defined as a function of expectations of IS and confirmation of those expectations (Bhattacherjee & Lin, 2015). Users are satisfied with IS that meet or exceed their expectations in terms of functions, performance, and benefits. Based on the cognitive-affective-conative model of attitude and behavior, Cai et al. (2021) argue that satisfaction is a positive emotion (affective), which positively influences users' continued usage of mobile social network sites. Prior research in IS continuance confirms a positive relationship between satisfaction and continuance intention in multiple contexts such as social networking services/systems (Ambalov, 2018), mobile gaming apps (Zheng, 2020), mobile instant messaging (Gong et al., 2020; Wu et al., 2018), and e-finance platform (Zhou et al., 2018). However, an exception to these findings was reported in a study by Zareravasan and Ashrafi (2019), where satisfaction had a non-significant impact on users' continuance intention of LMS. The authors offered an explanation that users might be satisfied with the LMS, but the inadequate quality of infrastructure such as availability, accessibility, and speed of the Internet in remote locations could be a barrier to users' continuance intentions toward LMS. Nonetheless, positive experiences and satisfaction from IS use encourage users to use technology more, whereas negative experiences may lead to termination or avoidance of technology usage (Chen, 2018). Hence, based on the majority of results in prior research on IS continuance, we propose:

H1: Users' satisfaction with IS use is positively related to their IS continuance intention.

Fig. 1. Proposed theoretical model (Source: adapted from Bhattacherjee, 2001a)

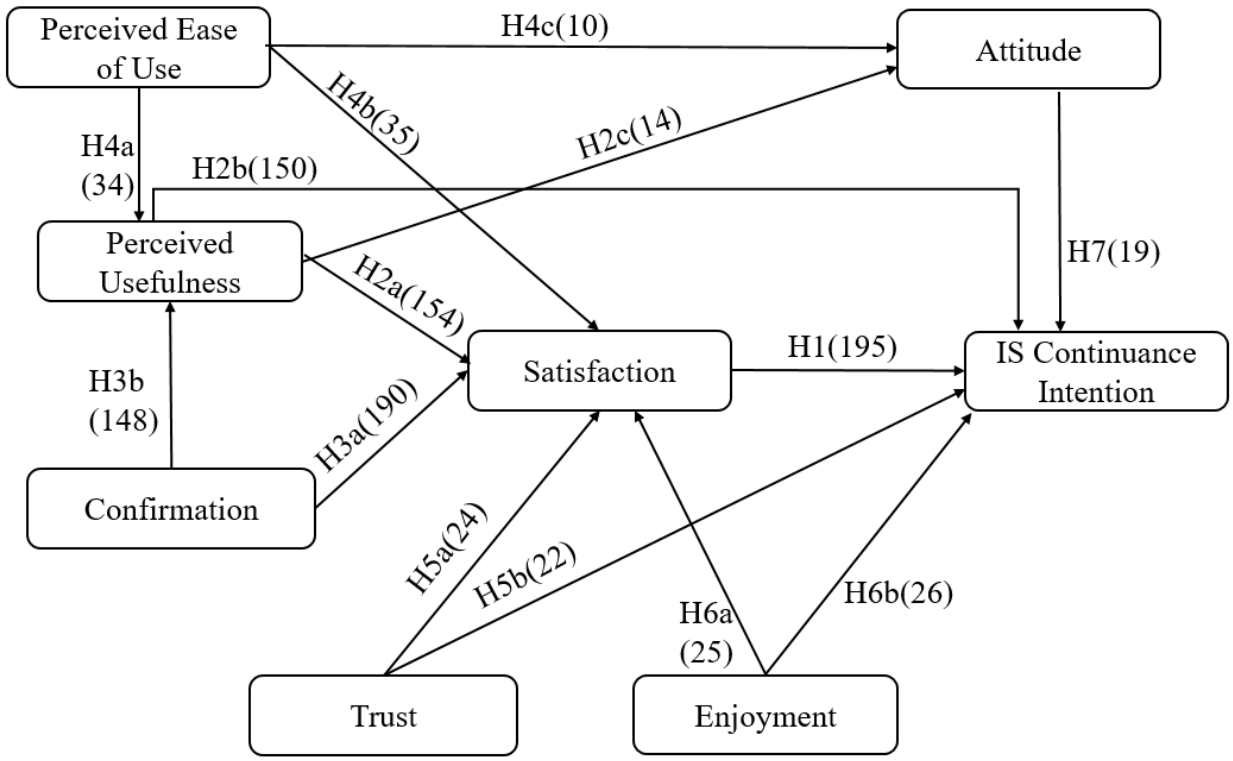


Fig. 1. Proposed theoretical model (Source: adapted from Bhattacherjee, 2001a)

Note: The number in brackets shows the count of studies that have explored the relationships.

Table 1: Main constructs in the model

Construct	Definition	Source
Perceived Usefulness	Users' expectation of perceived benefits from using any IS or technology-based product or services.	Davis (1989)
Confirmation	Matching of user's expectation with the performance of IS or technology.	Bhattacherjee (2001a)
Satisfaction	Users feeling after confirmation of expectation from IS or technology usage.	Bhattacherjee (2001a)
Continuance intention	User's intention to continue using IS or technology.	Bhattacherjee (2001a)
Perceived ease of use	Individual belief of how much effort is required to use a particular system or technology.	Davis (1989)
Trust	Users' concerns about privacy and security of personal and sensitive information while using IS or technology.	McKnight et al. (2002), Venkatesh (2011)

Enjoyment	Degree of enjoyment while using IS or technology.	Venkatesh (2000)
Attitude	An individual's favorable or unfavorable evaluation of an object leading to a consistent behavior toward that object.	Davis (1989), Fishbein and Ajzen (1975)

3.2 Perceived usefulness

Perceived usefulness is defined as "the prospective user's subjective probability that using a specific application system will increase job performance" (Davis, 1989, p.985). Users develop satisfaction from IT/IS usage if they perceive it to be useful. In this study, we conceptualize PU as users' perceptions of expected benefits of using an IS or technology-based product or service. The effect of PU on satisfaction diminishes for long-time users as users have already developed a fair amount of knowledge about the systems (Liao et al., 2009). Likewise, users may fail to differentiate between websites (e.g., MOOCs) that offer similar features and user interfaces (Alraimi et al., 2015). Similar results were reported for online classes in business schools during COVID-19, where perceived usefulness of digital classrooms failed to influence faculty members' satisfaction (Chauhan et al., 2021). Hence, prolonged use of IS can diminish perceived usefulness as users become experts in using systems.

However, PU positively affects the satisfaction levels of initial adopters and short-term users (Liao et al., 2009). Extant research confirms the significant role of PU on users' satisfaction with e-learning technology (Bøe et al., 2020), online-to-offline business websites (Che et al., 2021), mobile apps (Chen, 2018), and social networking websites (Kang et al., 2009). We believe that the expected usefulness and benefits of information systems should be able to satisfy users by meeting their expectations. Hence, we hypothesize:

H2a: Users' perceived usefulness is positively related to their satisfaction with IS use.

A few studies observe that perceived usefulness may not lead to continued IS use. For example, users may find smartwatches useful but don't use them frequently as they don't find much productive value in a smartwatch (as compared to a smartphone) in terms of features and ability to run many apps at the same time (Bolen, 2020). Similarly, users' continuance with mobile banking apps does not depend on the perceived usefulness of the app because users use mobile banking mostly to avoid a visit to a physical branch (Kumar et al., 2018). So, even if the app is complex, it still offers a higher degree of convenience to users in comparison to physical banking.

A majority of prior studies suggest that PU motivates users to continue their IS usage (e.g., Dai et al., 2020). For example, if users believe that using social networking websites is useful, they continue to use these websites and apps (Kang et al., 2009). Similarly, productivity-enhancing systems such as ERP and application software (e.g., spreadsheets and cloud-based computing software) are perceived as highly useful resulting in significant adoption and extensive usage by the workforce (Liang et al., 2007). In the original model, Bhattacherjee (2001a) argued that PU was a significant predictor of IS adoption intention, which resulted in actual behavioral usage (continuance). Hence, we propose:

H2b: Users' perceived usefulness is positively related to their IS continuance intention.

Users' beliefs and perceptions about technology evolve over a period of time and continue to change as users become more familiar with the technology. According to TRA (Fishbein & Ajzen, 1975), the behavior beliefs of users determine their attitude toward the behavior. Perceived usefulness is considered a behavioral belief that positively affects user's attitude toward e-learning systems (Lee, 2010). In fact, TCT also confirms that PU is the most important antecedent to attitude toward IS (Liao et al., 2009). In the post-acceptance scenario, positive experiences and beliefs result in a favorable attitude toward technology (Bhattacherjee & Premkumar, 2004). Past studies reflect a positive effect of PEOU on attitude in multiple IS contexts such as e-wallets (Puspitasari et al., 2021), computer-based training systems (Bhattacherjee & Premkumar, 2004), and bike sharing services (Cheng et al., 2019). Hence, we propose:

H2c: Users' perceived usefulness is positively related to their attitude toward IS use.

3.3 Confirmation

Confirmation reflects users' belief (based on prior IT usage) that their expectations would be fulfilled (Bhattacherjee, 2001a). Users have specific baseline expectations from technology. Confirmation is assessed against users' initial expectations. When users realize expected benefits from IS use, a positive confirmation takes place leading to higher levels of satisfaction. However, if the IS performance fails to meet the expectation, it leads to disconfirmation resulting in dissatisfied users (Ambalov, 2021). We noticed a study in the context of user satisfaction with chatbots, where confirmation doesn't lead to satisfaction (Eren, 2021). The argument for this contradictory finding was that chatbots were in the introduction phase of product life cycle, and hence, users didn't have any experience with the technology. Moreover, users' prior experience with similar technology like mobile banking and Internet baking could have affected the results.

However, most of the past research builds on the argument that meeting expectations of users should lead to higher levels of satisfaction with IS such as e-portfolios (Hsieh et al., 2015), e-wallets (Puspitasari et al., 2021), and taxi-booking apps (Weng et al., 2017). Hence, we propose the following hypothesis:

H3a: Users' confirmation of expectation of IS use is positively related to their satisfaction with IS use.

Confirmation is a cognitive belief and similar to the IS-acceptance context, the two cognitive beliefs i.e., confirmation and perceived usefulness may relate to each other (Bhattacherjee, 2001a). In specific contexts like e-learning, confirmation may not significantly affect the perceived usefulness (Suzianti & Paramadini, 2021). A plausible explanation could be that the e-learning systems may enable effective delivery of classroom sessions, but they fail to improve the quality and productivity of teachers.

During the initial stage of IS adoption, users may have a low level of PU due to unfamiliarity with IS. However, post-acceptance, when users use IS, they can re-evaluate and adjust their earlier perceptions of usefulness of IS. A positive confirmation increases users' perceived usefulness, whereas a dis-confirmation reduces it (Bhattacherjee, 2001a). Confirmation experience can magnify the perceived usefulness of IS, especially when users are not sure about what to initially expect from IS. For example, users were not sure about the usefulness of mobile banking during the initial periods, because they thought that they could complete their tasks by visiting the physical branch. However, as users gained experience, their perceptions of usefulness of banking apps increased significantly (Foroughi et al., 2019). Similarly, confirmation of expectations of new technologies like taxi-booking apps (Weng et al., 2017) and m-commerce (Chong, 2013) elevated users' perceived usefulness of these technologies. Hence, we hypothesize:

H3b: Users' confirmation of expectation of IS use is positively related to their perceived usefulness of IS use.

3.4 Perceived ease of use

Perceived ease of use reflects the need for cognitive efforts required to use a particular system (Davis, 1989). TAM suggests that two critical parameters determine why people accept or reject technology. First, people think about how technology is going to help them accomplish their tasks (perceived usefulness). Second, people evaluate the complexity of the technology (perceived ease of use). Sometimes, the efforts required to learn and use technology may offset its benefits. Hence,

technologies that are easier to use are considered more useful (Cai et al., 2021; Davis, 1989). For example, when users believe that a cloud-based ERP system is easy to use and requires the least amount of time and effort, their perceptions of usefulness are significantly increased (Cheng, 2018).

Past research on website adoption and usage highlights the importance of a simple and intuitive user interface that requires minimal effort from users (Flavian et al., 2006). Similarly, users consider ride-hailing mobile apps having an easy user interface more useful (Malik & Rao, 2019). Similar findings are reported in the context of e-learning systems (Liao et al., 2009), e-wallets (Puspitasari et al., 2021), and mHealth technologies (Jaana & Pare, 2020). Hence, we formulate the following hypothesis:

H4a: Users' perceived ease of use is positively related to their perceived usefulness of IS use.

IS researchers have integrated ECM and TAM to explore the positive influence of PEOU on satisfaction with IS use (Cai et al., 2020; Malik & Rao, 2019). Ease of use is a cognitive construct that influences the affective construct of satisfaction. Drawing from the cognitive learning theory, users prefer to reduce cognitive load while making a decision. For example, users are more satisfied with gaming apps that are easy to play so that they can focus on gameplay instead of interface (Huang et al., 2019). Similarly, users report higher levels of satisfaction with smart wearables that are easy to use and can automatically track health parameters (Park, 2020).

Users tend to be doubtful about new technology due to the natural human behavior of resistance to any change (Joshi, 1991). Users evaluate the changes enforced by the introduction and implementation of IS on their productivity and efficiency. A complex technology requires users to invest time and effort to learn. Whereas a technology that is easy to use (e.g., smartphones) and requires minimal effort from users leads to satisfied users (Mishra et al., 2020). Hence, we hypothesize:

H4b: Users' perceived ease of use is positively related to their satisfaction with IS use.

TAM is probably one of the most influential theories used in IS research to gain insights into the predictors of human behavior toward potential acceptance or rejection of any technology (Davis, 1989; Dwivedi et al., 2019). The model suggests that PU and PEOU are the two main antecedents that determine individuals' intentions to use new technology. Technologies that are perceived as sophisticated, perplexing, and complicated create a sense of risk in user's mind (Slade et al., 2015). Whereas technologies such as mobile payment apps that work seamlessly and require minimal

work from users have successfully attenuated the risks associated with app usage (Talwar et al., 2020). Hence, easy-to-use IS leads to a positive attitude toward technology.

From a behavioral perspective, individuals tend to have positive evaluations and favorable attitudes toward objects that they can easily understand. The human brain is accustomed to breaking down complex tasks into smaller pieces that are manageable and easily comprehensible. The same mechanism holds true for the evaluation of any technology, where the cognitive load required to use technology has a negative impact on individual's attitude toward the technology (Parasuraman, 2011). Many studies confirm the positive association of ease of use with users' attitudes in distinct contexts like mobile banking (Poromatikul et al., 2019), e-learning systems (Lee, 2010), and social networking websites (Ambalov, 2018). Therefore, we propose:

H4c: Users' perceived ease of use is positively related to their attitude toward IS use.

3.5 Trust

Trust plays a critical role in technology adoption and continued use (McKnight et al., 2002, 2011; Nguyen, 2021; Venkatesh et al., 2011). Trust is a multifaceted psychological construct comprising honesty, integrity, benevolence, and competence (Flavian et al., 2006; McAllister, 1995). It is conceptualized as the degree of confidence in a product (Nguyen et al., 2021), while in an IS context, trust represents users' belief in the system and expectations that the system will work for their well-being (Ambalov, 2021; Lankton et al., 2015). It also reflects the ability of a system to take care of users' perceptions of data privacy, security concerns, and transactional completeness (Chong, 2013). Based on the prior research, we conceptualize trust as users' concerns about privacy and security while using technologies that require the online transmission of sensitive information (McKnight et al., 2002; Venkatesh et al., 2011).

Prior studies have examined the impact of trust in IS on users' satisfaction (Akter et al., 2013; Poromatikul et al., 2019). In a study on mobile commerce continuance, Chong (2013) added trust in the original ECM and found that trust had a relatively higher impact on users' satisfaction as compared to other constructs used in the original post-acceptance model. Post-adoption beliefs elevate users' trust in IS. When the system/technology successfully meets the multi-dimensions of trust, it leads to satisfied users (Venkatesh et al., 2011). Thus, we hypothesize:

H5a: Users' trust is positively related to their satisfaction with IS use.

Trust is a critical factor for technologies like e-wallets and mobile banking, where users' personal and sensitive information is of utmost importance. Users have shown significant resistance to these

technologies in the early adoption phase due to their risk perceptions (Talwar et al., 2020). Even, nowadays, many users abandon social media due to privacy concerns. Trust is developed when the mutual expectations of the two parties involved are fulfilled (McAllister, 1995). Hence, users' confirmation of expectations with technology or IS gradually develops their trust in the technology.

Trust is conceptualized to suit IS context such as belief in information technology (McKnight, 2005) or uncertainty in mobile payments (Talwar et al., 2020). Trust is very critical in IS usage due to the element of risk involved in terms of privacy and security. In e-commerce transactions, users provide sensitive information to complete transactions. Users' trust in e-commerce services is a reinforcement of users' prior beliefs, which leads to the continuance of e-commerce services (Bhattacherjee, 2001b). In the context of mHealth services, patients are more likely to use these services after fulfillment of their trusting beliefs (Flavian et al. 2006). Trust significantly predicts behavioral intention in social commerce adoption (Dwivedi et al., 2021). Thus, we propose the following hypothesis:

H5b: Users' trust is positively related to their IS continuance intention.

3.6 Enjoyment

Enjoyment, similar to trust, is also a multifaceted construct. The IS literature defines enjoyment as the "extent to which the activity of using a specific system is perceived to be enjoyable in its own right, aside from any performance consequences resulting from system use" (Venkatesh, 2000, p. 351). Enjoyment and playfulness lead to higher chances of IS acceptance and success (Mishra et al., 2021). Enjoyment is a post-adoption belief (Kang et al., 2010) that increases users' satisfaction and continuance intentions (Steelman & Soror, 2017; Yoon & Rollanad, 2015). According to the causal theory of enjoyment (Davis, 1982), user derives enjoyment if they receive pleasure after using a product that satisfies their desires.

Technology consumption and usage happen for hedonic and utilitarian gratifications (Mishra et al., 2021; Venkatesh et al., 2012). Enjoyment and playfulness are two important predictors of users' online service usage (Kang & Lee, 2010; Venkatesh et al., 2011). Enjoyment positively influences users' satisfaction and continuance intentions of m-commerce (Chong, 2013). Users derive pleasure from using social media leading to a higher degree of satisfaction (Yoon & Rolland, 2015). Lin et al. (2005) suggested that while using web portals, a higher degree

of playfulness leads to instant individual experiences like positive disposition and satisfaction. Hence, we hypothesize:

H6a: Users' enjoyment is positively related to their satisfaction with IS use.

Enjoyment is used as an antecedent to IS continuance in many IS contexts. For example, perceived enjoyment positively impacts users' continuance of social networking websites (Ambalov, 2021), online services (Kang et al., 2009; Kang & Lee, 2010), and intentions to use computers in the workplace (Davis et al., 1992). Since continuance intentions are influenced by the expectation of usefulness (Bhattacherjee, 2001a) and perceived enjoyment is a hedonic utility derived from IS usage, enjoyment emerges as a direct predictor of continuance intention (Ambalov, 2021).

Recent research highlights the importance of enjoyment as users are mostly using technologies for personal gratification. Individuals spend more time with technology that offers playfulness and enjoyment such as smart voice assistants (Mishra et al., 2021) and smart wearables (Park, 2020). Research on emergent technologies (augmented reality and virtual reality) cements the importance of enjoyment in the acceptance and proliferation of these technologies (Mishra et al., 2020). Similarly, users are more willing to continue using chatbots, if they perceive that chatbots are easy to use and enjoyable (Eren, 2021). Hence, we hypothesize:

H6b: Users' enjoyment is positively associated with their IS continuance intention.

3.7 Attitude

Attitude reflects users' favorable or unfavorable predispositions toward an object leading to a consistent behavior toward that object (Davis, 1989; Fishbein & Ajzen, 1975). A vast amount of research has used TAM, TPB, and TRA as theoretical foundations to investigate the impact of user's attitude on IS adoption and continuance intentions (Ajzen, 1991; Davis, 1989; Fishbein & Ajzen, 1975; Venkatesh, 2000). TAM postulates that everything being equal, individuals have higher chances to engage in behaviors toward which they have favorable attitudes. TRA also offers similar arguments, where attitudes are key drivers of behavioral intention. In an extension of the original post-acceptance model, Bhattacherjee and Premkumar (2004) suggested that user beliefs and attitudes were the key drivers of information technology usage. Dwivedi et al. (2019) offered a revised model of UTAUT by integrating attitude in their meta-analysis of UTAUT and confirmed the positive impact of attitude on behavioral intentions.

Many studies have replaced behavioral intention with IS continuance to study the post-adoption usage of IS (Liao et al., 2009). Extant research offers empirical evidence on the positive

influence of attitude on behavioral intentions and continuance in contexts like bike sharing services (Cheng et al., 2019) and the use of e-wallets (Puspitasari et al., 2021). Similarly, users' attitudes positively impact their continual intention to use Fintech services (Nguyen et al., 2021). Hence, we propose the hypothesis as follows:

H7: Users' attitude toward IS use is positively related to their IS continuance intention.

4. Research Methods

4.1 Meta-analysis

Meta-analysis enables the integration and synthesis of results (significant and non-significant) from prior literature to estimate the true effect sizes of relationships (Hunter & Schmidt, 2015; Mishra & Maity, 2021; Rana et al. 2015; Wu et al., 2018). It includes the application of statistical techniques to correct inherent errors in studies (Hunter & Schmidt, 2015). Meta-analysis is considered a robust and rigorous alternative to traditional literature reviews (Hwang, 1996, 2000; Roberts et al., 2017). IS research has witnessed a significant increase in meta-analysis studies in past few years (Jeyaraj & Dwivedi, 2020; Sarkar et al., 2020). Meta-analysis measures the unknown effect size between two constructs. Whereas, MASEM is an advanced method to test the relationships among multiple variables similar to testing research models (Jeyaraj & Dwivedi, 2020). Researchers have applied MASEM to accumulate, test, and propose extensions to the well-established IS theories of technology adoption and continued usage (Dwivedi et al., 2019; King & He, 2006; Tamilmani et al., 2019). This study uses applies both methods: (a) meta-analysis to compute the correlation effect size for each relationship as proposed in the model, and (b) MASEM to test the inter-relationships between multiple variables in the extended research model.

and

4.1.1 Data collection

We did a literature search using two methods to identify the studies to be included in the meta-analysis. First, we used the most popular bibliographic databases 'Scopus' and 'Web of Science (WoS)' to identify the papers. The starting year for the search was 2001 after the publication of the paper of Bhattacherjee (2001a). The cited reference search resulted in 2,641 papers in WoS and 3,636 papers in Scopus. Then, we searched the following search query in the article title, abstract, and keyword sections (Jadil et al., 2021): "expectation-confirmation" OR "expectation confirmation" OR "expectation disconfirmat*" OR "expectation-disconfirmat*" OR

"disconfirmation of expectations" OR "post acceptance" OR "positive disconfirmation" OR "IS continuance". We also considered sources other than academic journals such as books, book chapters, dissertations, and conference proceedings to address the bias of 'publishing only significant results' (Rosenthal & Rosnow, 2008). In addition, we did the keyword search in other databases such as 'EBSCOHOST', 'JSTOR', and 'Google Scholar' to ensure maximum coverage. The specific keyword-based search resulted in 950 papers. We combined all three search results and deleted the duplicates leading to 3,740 papers. We removed journals on irrelevant topics like food, drugs, and medicine to reach 2,613 papers. We also removed literature reviews, conceptual papers, and qualitative studies due to the lack of quantitative data. We included articles that tested at least one relationship from the original model of Bhattacherjee (2001a) and provided Pearson correlation, regression coefficients, or any other statistics that can be used in meta-analytic computations. We identified a total of 214 articles using the search and inclusion criteria. The final list included 194 articles from journals, 18 conference proceedings, and 2 dissertations (see Appendix A for details). The variety of articles from different sources minimizes the publication bias and improves the rigor and quality of the meta-analysis (Jeyaraj & Dwivedi, 2020; Lipsey & Wilson, 2001).

4.1.2 C*oding*

We coded each study for 15 relationships used in our research model. The coding was done for two parts: research descriptive statistics and effect sizes (Yu et al., 2020). For research statistics, we coded for research design (survey or experiment), year of publication, type of sample (student or general population), country of sample collected, average age, and gender distribution of the sample. For effect sizes, we noted the following data for each relationship: sample size, effect size (correlation, beta coefficients, *t* value), means, reliabilities, and standard deviations.

4.1.3 Effect size calculations

We used the correlation coefficient to represent the effect size in our meta-analysis (Rosario et al., 2016; Lipsey & Wilson, 2001). Correlation coefficient is widely used in IS meta-analysis research to represent effect size (e.g., Dwivedi et al., 2019). A majority of the studies included in our meta-analysis reported correlation coefficients as well as beta-coefficients for various relationships. Only two studies did not include correlation data and only standardized regression coefficients were reported. In such cases, we used the formula to convert beta coefficients to r ($r = 0.98\beta + 0.05\lambda$, when $\beta \geq 0$, λ=1, else λ=0; Peterson & Brown, 2005; Yu et al., 2020). The use of regression

coefficients is debated in extant research. However, Peterson and Brown (2005) recommend that a meta-analysis should include the maximum number of effect sizes to make the results more generalizable. Moreover, recent research has included studies with regression coefficients (e.g., Yu et al., 2020). Hence, we also incorporated those studies that provided only the standardized regression (beta) coefficients to make our results more generalizable.

The measurement error may lower the correlation between variables (Hunter & Schmidt, 2015). We used the formula suggested by Hunter and Schmidt (2015) to correct the measurement error: $r_m = r_0/\sqrt{r_{xx}r_{yy}}$, where r_0 is the original effect size, r_{xx} and r_{yy} are the reliabilities, and r_m is the corrected effect size. Finally, Fisher's z to r transformation was used to arrive at the final average effect size r.

4.1.3 Effect size integration

We used the metafor package in R for meta-analytic calculations (Viechtbauer, 2010) such as calculating 95% confidence intervals (CI) to test the significance of correlation coefficients between two variables (absence of zero in CI). We did the influential diagnostics to identify any outliers and computed various diagnostic measures (Viechtbauer & Cheung, 2010, refer to Appendix B for details). We noticed that the article by Wang et al. (2022) could be considered an outlier due to the extremely large sample size of 306,139. This study was removed from further calculations. Furthermore, meta-analysis models can be either a fixed-effects or a random-effects model. A fixed-effects model presumes only one true effect size as all the studies are based on the same population and observed effects differ due to sampling error. In contrast, a random effects model suggests that the sample differs across multiple studies and hence the effect sizes differ due to sampling error as well as variance between studies. We used the random-effects model in our research due to the diverse sample to calculate the correlation coefficient as effect size (Borenstein et al., 2010). Furthermore, potential publication bias may occur, where studies with non-significant results are less likely to be published and included in a meta-analysis (Viechtbauer, 2010). We used Failsafe N (Orwin, 1983) and Egger's regression test (Egger et al., 1997) to diagnose any publication bias.

4.2. Meta-analytic structural equation modeling (MASEM)

4.2.1 Preparation

Meta-analytic correlation analysis offers insights into the relationship between two constructs without considering the effect of other constructs. In this study, we wanted to test the predictive relationships among multiple variables taken together. Hence, we conducted MASEM to analyze the strength and significance of relationships proposed in the research model. MASEM offers flexibility to researchers to perform a theory-driven quantitative analysis of various variables of interest (Viswesvaran & Ones, 1995). In a meta-analysis, correlation is calculated with different sample sizes, but MASEM requires one combined correlation matrix and one single sample size (Jak & Cheung, 2020). Based on the past literature and recommendations, we calculated the harmonic mean of sample sizes of each relationship to be used as the final sample size for MASEM (Dwivedi et al., 2019; Jak & Cheung, 2020). In the next step, since most of the studies did not report standard deviations, we used the pooled correlation matrices obtained in the meta-analysis as a covariance matrix. This approach is valid and used in prior research to overcome the issues related to the lack of required data on standard deviations (Jak & Cheung, 2020; Yu et al., 2020).

4.2.2 Analysis

We performed path analyses on pooled correlations matrix obtained through the meta-analysis using AMOS 21 software with maximum likelihood estimation. AMOS is a covariance-based SEM method that uses covariance matrices to evaluate measurement model and structural model on multiple parameters. To test the research model, we first analyzed the original theoretical model, followed by an extended model and an emergent model. We evaluated the model fit based on recommended values for the following parameters (Bentler, 1990; Hu & Bentler, 1999): comparative fit index (CFI) ≥ 0.95, normed fit index (NFI) ≥ 0.95, root mean square error of approximation (RMSEA) ≤ 0.08, and standardized root mean square residual (SRMR) ≤ 0.08. The modification index values were considered to identify the presence of significant relationships that were not hypothesized in the research model (Sabherwal et al., 2006). We included new paths based on MI values and theoretical considerations. We tested the research model using harmonic mean as the sample size. Since SEM results are sensitive to a larger sample size, we also used average sample size to validate the results of SEM against the harmonic mean. Further, we did an additional analysis with a random sample of about 40 studies having a relatively low sample size

and the findings were similar. The results obtained from all three approaches were consistent and similar.

5. Results

We can see a growing trend in the number of studies that have used the post-acceptance model of IS continuance as their theoretical foundation (see Fig. 2). There is a substantial increase in studies in the last three-year period (2019-2021). In terms of journals, the highest number of studies are published in the Behaviour & Information Technology (N=14), followed by Computers in Human Behavior (N=10), and Journal of Computer Information Systems (N=8, Table 2). Moreover, the articles are published in highly reputed and well-known journals such as MIS Quarterly, Information & Management, International Journal of Information Management, Journal of Management Information Systems, and Information Systems Research. Hence, this meta-analytic study on the post-acceptance model of IS continuance is timely, relevant, and justified.

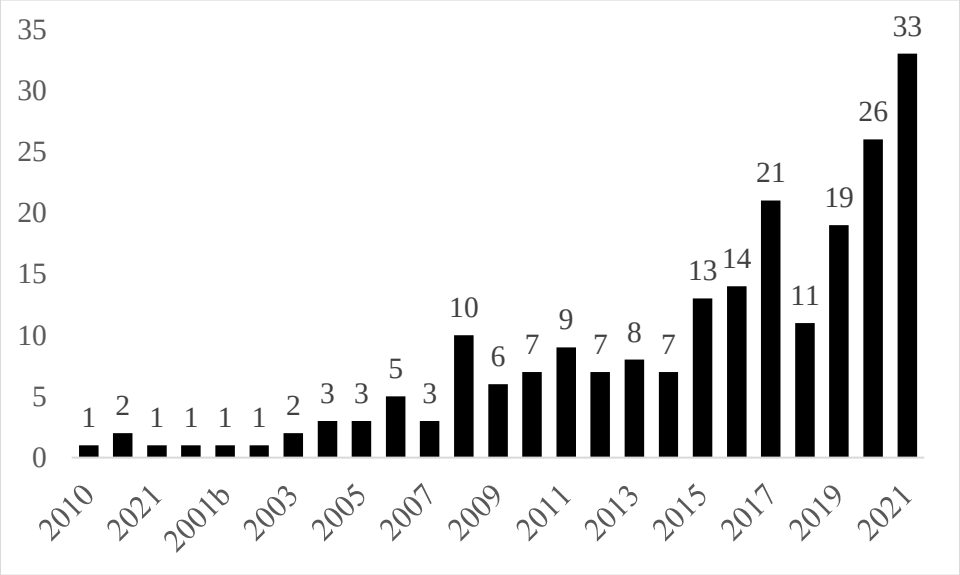


Fig. 2. Published studies year-wise

Table 2: List of journals with most published studies

Journal Name	No. of Studies
Behaviour & Information Technology	14

Computers in Human Behavior	10
Journal of Computer Information Systems	8
Industrial Management & Data Systems	7
Information & Management	7
Sustainability	7
International Journal of Human–Computer Interaction	6
Computers & Education	4
International Journal of Bank Marketing	4
Journal of Enterprise Information Management	4
Journal of the Association for Information Systems	4
MIS Quarterly	4
Telematics and Informatics	4
Decision Support Systems	3
Electronic Markets	3
Information Development	3
Information Systems Frontiers	3
Information Technology & People	3
International Journal of Human-Computer Studies	3
Computers in Human Behaviour	3

5.1 Meta-analytic findings

The results for the calculated correlation values for various relationships are presented in Table 3. We calculated z-values and the 95% confidence interval for each relationship, which excluded zero. The absence of zero suggests that the effect size (correlation) is significant and generalizable. Cohen (1992) suggested the values for effect sizes as follows: low (r = 0.1), medium (r = 0.3), and high (r = 0.5). The results reveal that all the correlation coefficients are positive and the effect size is high.

Table 3: Meta-analysis results (random-effects model)

Relationship	k	N	Main effect size estimates					Heterogeneity tests			Failsafe N
			r	95% CI		z	p	Q	τ^2	I^2	
				LL	UL						
SAT-CI	198	82510	0.546	0.518	0.574	38.18	<0.001	3206.643***	0.037	96.48	3787
PU-SAT	154	65142	0.506	0.471	0.542	27.99	<0.001	3804.43***	0.047	97.30	13946
PU-CI	150	64089	0.514	0.481	0.548	30.12	<0.001	2685.24***	0.040	96.90	8964
PU-ATTI	14	6358	0.540	0.413	0.667	8.35	<0.001	222.963***	0.055	95.98	9438
CNF-PU	148	61035	0.489	0.455	0.523	28.54	<0.001	3161.08***	0.040	94.18	6974
CNF-SAT	190	78185	0.531	0.498	0.565	31.38	<0.001	4067.737***	0.051	95.37	9001
CNF-CI	152	66031	0.487	0.456	0.519	30.07	<0.001	2907.762***	0.036	93.96	8238
PEOU-PU	34	16839	0.438	0.365	0.511	11.79	<0.001	647.25***	0.044	95.5	3817
PEOU-SAT	35	17063	0.453	0.385	0.521	12.99	<0.001	695.62***	0.040	94.96	8875
PEOU-ATTI	10	3463	0.393	0.289	0.498	7.38	<0.001	90.48***	0.025	0.157	1816
TR-SAT	24	11739	0.508	0.431	0.586	12.89	<0.001	448.411***	0.034	94.31	2870
TR-CI	22	11804	0.471	0.387	0.554	11.01	<0.001	422.735***	0.038	95.14	8555
TR-ENJ	3	1291	0.558	0.352	0.765	5.29	<0.001	27.875***	0.031	92.97	437
ENJ-SAT	25	10355	0.538	0.459	0.618	13.24	<0.001	472.624***	0.038	93.84	2640
ENJ-CI	26	10756	0.538	0.459	0.618	13.24	<0.001	472.624***	0.038	93.84	1078

ATTI-SAT	19	7879	0.592	0.525	0.66	17.16	<0.001	144.81***	0.019	88.53	7534

[Note: k - number of occurrences; N - total sample size; r - estimated correlation; LL - lower limit; UL -upper limit; Q - Cochran's Q test for homogeneity; PU – perceived usefulness; CNF – confirmation; SAT – satisfaction; CI – IS continuance intention; PEOU – perceived ease of use; TR – trust; ENJ – enjoyment, ATTI - attitude. ***p < 0.001; **p < 0.01; *p < 0.0

The heterogeneity tests for each relationship suggest significant heterogeneity. Cochrane's Q values are high for each relationship (Table 3) and higher I^2 values further suggest the presence of heterogeneity (Borenstein et al., 2010). The heterogeneity analysis confirms the suitability of the random-effects model in our meta-analysis.

5.2 Publication bias

Publication bias or availability bias refers to the practice of selecting published studies and rejecting studies with non-significant results (Hunter & Schmidt, 2015). The Failsafe N (Orwin, 1983) values are relatively high (Table 3), which suggests that publication bias is not present in the current study. In addition, the results of Egger's tests are non-significant for each relationship (see Appendix C) meaning a lack of publication bias in our analysis (Egger et al., 1997).

5.3 MASEM for the original model

We first tested the original model of Bhattacherjee (2001a). The results for this model are presented in Table 4 (under the 'original model' column). All the relationships and path coefficients were significant. The χ^2 to the degree of freedom ratio was much higher than the recommended value of '3' (Sabherwal et al., 2006). We noticed a similar higher ratio in prior MASEM studies as well (e.g., Dwivedi et al., 2021). However, the parameters for model fit were within acceptable limits (GFI = 0.981, CFI = 0.967, NFI = 0.967, SRMR = 0.04, RMSEA = 0.045). The model explained 24% of variance in PU, 36% of variance in satisfaction, and 37% of variance in continuance intention.

Table 4: MASEM results

Relationship	Original model	Proposed model
SAT → CI	0.384	0.165
PU → SAT	0.324	0.121
PU → CI	0.320	0.218
PU → ATTI		0.453
CNF → PU	0.489	0.379
CNF → SAT	0.373	0.224
PEOU → PU		0.207
PEOU → SAT		0.174
PEOU → ATTI		0.117
TR → SAT		0.101
TR → CI		0.940
TR → ENJ		0.446
ENJ → SAT		0.151

ENJ → CI		0.167
ATTI → CI		0.438
Harmonic N	68656	3098
Model $\chi 2$	371.59 (1)	1352.93 (7)
GFI	0.981	0.955
CFI	0.967	0.961
NFI	0.967	0.96
TLI	0.940	0.96
SRMR	0.040	0.053
RMSEA	0.045	0.054
R^2 PU	0.240	0.290
R^2 ATTI	--	0.280
R^2 SAT	0.360	0.440
R^2 CI	0.370	0.490

[Note: PU – perceived usefulness; CNF – confirmation; SAT – satisfaction; CI – IS continuance intention; PEOU – perceived ease of use; TR – trust; ENJ – enjoyment; ATTI – attitude. All coefficients are significant at $p < 0.001$]

5.4 MASEM for the proposed model

The proposed research model had additional variables of PEOU, attitude, trust, and enjoyment. MASEM results revealed that all the relationships were significant in this model. The model fit indices were reasonable and met the recommended values. The MIs suggested an extension of the proposed model with two new paths (Satisfaction → Attitude and Trust → Enjoyment). We considered the appropriateness of suggested paths based on theoretical reasoning and extant literature.

First, the highest MI (653.22) was found for the relationship Satisfaction → Attitude, which was included in the model. Prior literature suggests that satisfaction plays a vital role in predicting consumers' attitudes (Hong et al., 2006; Venkatesh et al., 2011). We considered the second highest MI (326.49) for path Trust → Enjoyment to be included in the model. We find empirical evidence of the positive and significant influence of trust on enjoyment in past research (e.g., Chong, 2013). The results of the final emergent model are presented in Table 4. The model fit indices for this model are reasonable and meet the recommended values (Bentler, 1990; Hu & Bentler, 1999; Sabherwal et al., 2006): GFI = 0.955, CFI = 0.961, NFI = 0.96, SRMR = 0.053, RMSEA = 0.054.

Based on the emergent model, all the hypothesized paths were supported. The relationships mentioned in the original model (Bhattacherjee, 2001a) were significant. Satisfaction had a positive association with IS continuance (H1, $\beta = 0.165$, $p < 0.001$). PU positively influenced satisfaction (H2a, $\beta = 0.121$, $p < 0.001$), IS continuance (H2b, $\beta = 0.218$, $p < 0.001$), and attitude (H2c, $\beta = 0.453$, $p < 0.001$). Confirmation of expectations showed a positive impact on perceived usefulness (H3b, $\beta = 0.379$, $p < 0.001$) and satisfaction (H3a, $\beta = 0.224$, $p < 0.001$). The proposed paths in the extended model were also significant. PEOU positively affected PU (H4a, $\beta = 0.207$, $p < 0.001$), satisfaction (H4b, $\beta = 0.174$, $p < 0.001$), and attitude (H4c, $\beta = 0.117$, $p < 0.001$). Trust and enjoyment were influential antecedents to users' satisfaction (H5a, $\beta = 0.101$, $p < 0.001$ and H6a, $\beta = 0.151$, $p < 0.001$) and continuance intentions to use technology (H5b, $\beta = 0.94$, $p < 0.001$ and H6b, $\beta = 0.167$, $p < 0.001$). Post-consumption satisfaction resulted in a favorable attitude toward technology, which further influenced IS continuance (H7, $\beta = 0.438$, $p < 0.001$). Two additional relationships emerged significant during the analysis. Trust had a direct effect on enjoyment ($\beta = 0.446$, $p < 0.001$) and satisfaction had a significant effect on attitude ($\beta = 0.219$, $p < 0.001$). There was a noticeable increase in the variance explained by the proposed model (see Fig. 3): PU (29%), attitude (28%), satisfaction (44%), and continuance intention (49%).

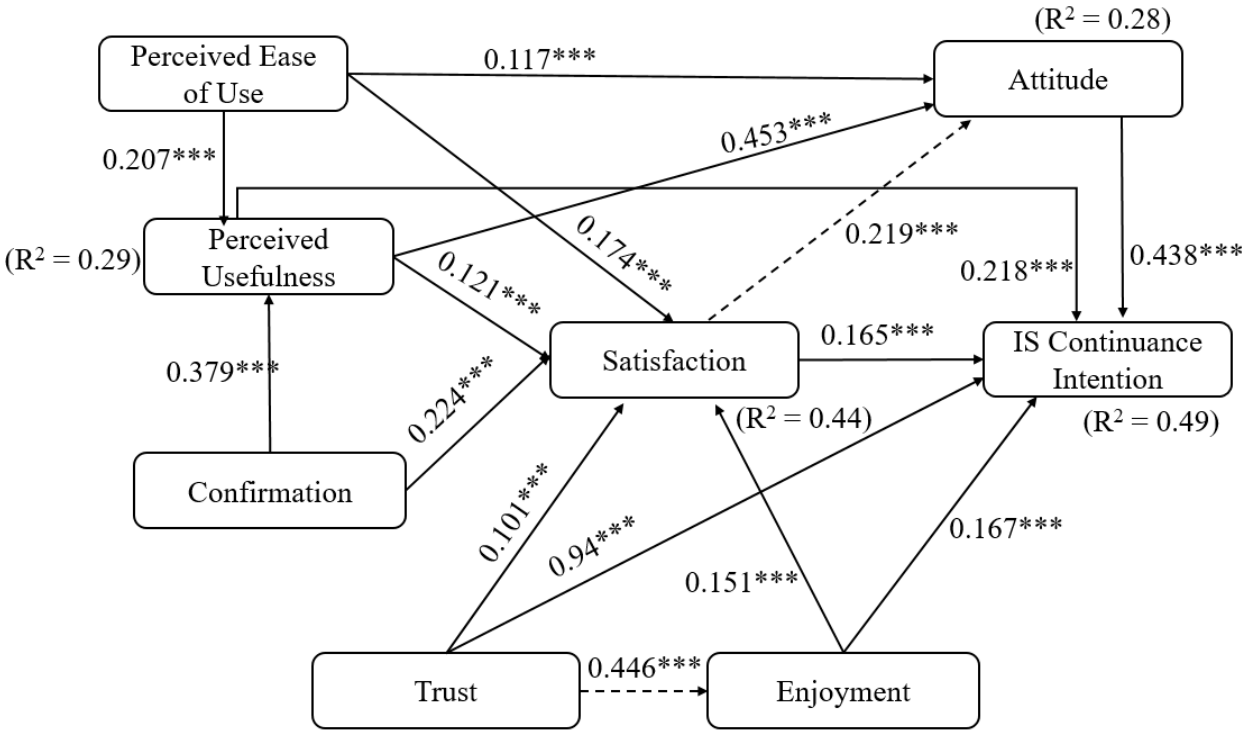


Fig. 3. MASEM results for the proposed model

***$p < 0.001$, dotted line represent relationships based on emergent model

6. Discussion

This meta-analytic study critically reviewed the post-acceptance model of IS continuance and proposed an extended model. All the relationships of the original model and extended model were supported. Two additional relationships emerged from the analysis: satisfaction influences attitude, and trust leads to more enjoyment.

Satisfaction emerged as a strong determinant of IS continuance. When users are satisfied with the performance of IS, they are more likely to continue to use it. The finding confirms the confirmation of expectation concept proposed by Bhattacharjee (2001a). When a system meets (or exceeds) users' expectations of perceived performance, it has higher chances of continuous usage. The results are consistent with prior studies that examined the role of satisfaction in the context of technologies such as social media, instant messaging services, and mobile gaming apps (Ambalov, 2018; Gong et al., 2020; Zheng, 2020). Furthermore, satisfaction positively impacts attitude (emergent path), which confirms prior findings (Hong et al., 2006; Venkatesh et al., 2011).

Perceived usefulness has a significant influence on satisfaction, IS continuance, and attitude. Consistent with prior findings, mobile apps and e-learning systems that are perceived

useful result in higher levels of satisfaction (Che et al., 2021; Chen, 2018). Usefulness reflects users' positive evaluation of IS where highly useful systems are adopted and used by many users (Kang et al., 2009). In line with TCT, our findings indicate that perceived usefulness has a positive impact on user's attitude (Liao et al., 2009).

Confirmation significantly predicted satisfaction and perceived usefulness. In case, when expectations are not met, disconfirmation arises leading to dissatisfied users (Ambalov, 2021). Prior research suggests that it is highly unlikely that users are satisfied with IS that performs below their expectations. Technologies like digital wallets and portfolio management services strongly focus on performance to meet users' demands leading to a higher number of satisfied users (Hsieh et al., 2015; Puspitasari et al., 2021). Furthermore, our results confirm the positive association between confirmation and PU (Foroughi et al., 2019; Weng et al., 2017).

In the extended model, PEOU was significantly related to PU, satisfaction, and attitude. The confirmation of relationship between PEOU and PU highlights the similarity between TAM and post-acceptance model. Technologies that are easy to use are perceived as useful (Cai et al., 2021). Simpler technologies reduce the cognitive load of users and help users to accomplish tasks efficiently. When users can do more with lesser effort, they feel satisfied and appreciate the technology. That is why having a simpler and intuitive user interface is one of the most critical parameters for the success of a mobile banking or gaming app (Puspitasari et al., 2021).

Trust and enjoyment were found to predict users' satisfaction and IS continuance. Trust is important for technologies that are critical to users' health or financial security (Akter et al., 2013). The rise in digital banking can be attributed to the robust performance and extremely high levels of data security offered by online websites or apps (Chong, 2013). Similarly, when users enjoy using a technology they are more likely to continue their usage. Moreover, higher levels of trust in technology reduce the risks and ensure that users enjoy the technology without any fear or apprehension. Thus, our findings corroborate the positive impact of trust and enjoyment on continuous IS usage (Kang et al., 2010; Steelman & Soror, 2017; Yoon & Rollanad, 2015).

Finally, post-consumption satisfaction resulted in a favorable attitude toward technology, which further affected IS continuance. A similar finding was reported in a meta-analysis of UTAUT by Dwivedi et al. (2019), where attitude had a positive impact on pre-adoption intentions. The findings reaffirm the significance of various relationships in the original post-acceptance model (Bhattacharjee, 2001a). In addition, the new proposed relationships emerge significant. The

critical role of trust and enjoyment on users' satisfaction and IS continuance is confirmed and hence the extended model is validated.

6.1 Implications for theory

From a theoretical perspective, our research acknowledges the shift in users' attitude toward technology and emphasizes the hedonic value of IS usage as users report a higher degree of satisfaction toward responsive, easy to use, and enjoyable technologies (Jeyaraj & Zadeh, 2020; Mishra et al., 2021). For example, the focus of technology usage shifted from increasing productivity and efficiency to providing personal gratifications (Jeyaraj, 2022). Our results are in line with TCT, where PEOU has a positive impact on PU, satisfaction, and attitude (Cai et al., 2021; Cheng, 2018, Liao et al., 2009).

A majority of IS research provides empirical evidence on the substantial link between attitude, behavioral intention, and IS use behavior (Dwivedi et al., 2021; Jeyaraj, 2021). Our research contributes by reaffirming the positive and significant association between user satisfaction and IS usage as well as attitude and IS continuance. Extant research offers varying opinions and debates on the antecedents to these two variables (Fang et al., 2014). The proposed research model suggests attitude, trust, and enjoyment as important factors for increasing users' satisfaction and continuance behavior. Hence, our research extends and compliments the earlier studies related to the hedonic value of technology usage (Jeyaraj, 2022; Oliveira et al., 2014; Tamilmani et al., 2019).

Prior research has examined the role of trust and enjoyment in acceptance and continued use of technology (Nguyen, 2021; Venkatesh et al., 2011). Trust is a multifaceted construct having its origin in psychology research (McAllister, 1995). Trust in IS context represents users' belief in the system and expectations that the system will work for the well-being of the user (Ambalov, 2021). Trust also reflects the ability of the system to take care of users' concerns about data privacy, security, and transactional completeness (Chong, 2013). Technologies like online retailing and mobile payments have faced resistance in the introduction phase due to users' negative perceptions about data security and financial frauds (Talwar et al., 2020). Our findings integrate the multiple aspects of trust and confirm the positive impact of trust on users' continuance intentions. Our results add to the theoretical conceptualization of trust in IS literature that focuses on the competence or performance of technology against users' expectations (e.g., Oliveira et al., 2016).

Furthermore, technology has greater chances of acceptance and success if it offers an element of playfulness or enjoyment (Mishra et al., 2021). The proliferation of social media and streaming services are a few examples of viral adoption and diffusion of technologies that people find enjoyable. Similarly, the growing adoption of recent technologies like smart wearables and intelligent voice assistants cement the critical role of enjoyment (Park, 2020). Our meta-analysis demonstrates that people are more satisfied with enjoyable technology leading to continued usage.

Another interesting finding is the relatively higher effect of enjoyment (than trust) on satisfaction and IS continuance. We attribute this finding to the consistent efforts of firms that have successfully addressed the concerns of users related to security and privacy. We believe that the various aspects of perceived trust such as competency, honesty, performance, and integrity have become a pre-requisite (rather than factors of competitive advantage) for technology usage (Fang et al., 2014). The growing importance of enjoyment reflects the notable shift in users' attitude toward technology where they put more emphasis on the 'positive user experience' manifested in the enjoyment of using technologies like social commerce and online purchases (Dwivedi et al., 2021). Finally, we believe that the extended model can serve as a foundation for future work in technology acceptance and continuance, especially for technologies that are used personally and fulfill users' hedonic gratifications.

6.2 Implications for practice

Our findings reveal that trust and enjoyment are important factors affecting the users' satisfaction and continuance intentions. Further, post-adoption satisfaction explains the anomaly of IS-acceptance-discontinuance (Bhattacherjee, 2001a). Users may display enthusiasm and higher intent to use a technology based on perceptions of usefulness, novelty, and contextual factors such as acceptance among peers or extensive marketing promotions (Dwivedi et al., 2021; Fang et al., 2014; Jeyaraj, 2022). However, the industry reports indicate a high rate of discontinuance of products and services after the launch. A good example is mobile apps, where users install many apps but abandon them after using them only a few times. Hence, technology features are not the only driving factor for the successful adoption or continued usage (Mishra et al., 2021). Users have certain expectations with technology that depend on the usage context. For example, users may expect a fitness app to correctly keep track of physical activities and parameters like heart rate, whereas users of a mobile payment service may prefer a fast and secure way to transact. Thus,

marketers should align users' expectations with their offerings to increase users' satisfaction and the likelihood of continuance.

Perceived utility and benefits further enhance users' post-adoption satisfaction. This offers an opportunity for marketers to carefully tailor their marketing communications. Marketers should communicate the benefits of technology in a concise and precise manner. We notice many firms use vague communications that create false perceptions of technology such as a one-stop-solution to all problems. Such communication may help a firm to get a few early adopters. But after initial usage, users will experience post-adoption dissonance leading to a loss of trust in the firm and technology. The disgruntled users may share negative experiences on social media and online platforms and recommend others to not buy or use the technology. Hence, marketers should derive communication strategies to create perceived benefits that can be successfully matched by the technology.

While a majority of IS research focuses on success/failure outcomes, post-adoption factors can offer better insights into individuals' intrinsic motivations to adopt a technology (Tamilmani et al., 2019). Trust and enjoyment are individual characteristics and may differ from person to person. Managers should focus on efforts to enhance users' perceived trust, which could be a combination of taking care of privacy and security concerns along with building a reliable and competent system. We find that trust in technology enhances users' overall experience with the technology. Users are more likely to be satisfied when they enjoy the technology. For example, voice assistants like Alexa and Google Home have seen substantial adoption and continuous usage within a short timeframe (Park, 2020). Though the voice assistants offer numerous functional benefits, many users derive hedonic gratifications and have fun with such technologies leading to increased usage (Mishra et al., 2021). Hence, firms must utilize the concepts of gamification to increase users' engagement with technology (Yang et al., 2017). The elements of gamification are widely used by education technology firms in their online courses to substantially increase learners' engagement and overall satisfaction with the technology platforms. Thus, enjoyment should be a critical feature of technology to fulfill users' hedonic motives.

6.3 Limitations and future research directions

The major contribution of this study is to complement and extend the IS continuance literature. In our paper, we have considered and followed the recommendations for doing a meta-analysis (e.g., Jeyaraj & Dwivedi, 2020). However, like any other research, this study has certain limitations that

should be considered while interpreting the findings. These limitations can be explored in further research as future research opportunities. First, we have included published studies, conference papers, and unpublished work that provide correlation and regression coefficients to stress the rigor and robustness. However, we did not consider moderating variables such as age, gender, and culture that have been used in prior IS adoption literature (e.g., Dwivedi et al., 2019; Jadil et al., 2021; Tamilmani et al., 2019). We believe that further research can examine the role of moderating variables to get deeper insights. Second, prior research has utilized the post-acceptance model with additional variables such as system quality, self-efficacy, habit, expectancy, social influence, performance, innovativeness, technostress, etc. to suit the research context (Dwivedi et al., 2019; Fuglseth & Sørebø, 2014; Kang & Lee, 2010; Liao et al., 2009). However, it was not feasible to include all of them in the paper. We selected the variables based on the highest frequency of usage so that we can gather the required data and meet the minimum number of criteria for any given relationship. Hence, we dropped the other variables. We recommend that these variables can be investigated in future studies. Third, a small number of studies (especially conference papers) did not report required statistics (e.g., reliabilities, mean, and standard deviations of constructs). These statistics are required for conducting meta-analysis and MASEM. We calculated the mean values and used them as a substitute for missing values to address this issue (e.g., Dwivedi et al., 2019). Furthermore, the ratio of Chi-square value to the degree of freedom was much higher than the recommended value of '3' (Sabherwal et al., 2006). We noticed a similar higher ratio in prior MASEM studies as well (e.g., Dwivedi et al., 2021). These results do not significantly affect the outcomes, but it can be treated as a limitation of this research. Finally, we did not differentiate the type of IS system studied in the research articles. Future research may categorize IS systems as utilitarian or hedonic (e.g., ERP vs. smart wearables) and study the role of enjoyment on continuance usage. Similarly, further studies can also investigate the organizational use of IS (or IS continuance intention) among employees in the organizational context.

7. Conclusions

The paper critically reviewed the original post-acceptance model of IS continuance and proposed an extended model. Specifically, we added four new constructs – perceived ease of use, attitude, trust, and enjoyment to the existing post-acceptance model. The proposed model was tested using MASEM, which included 1,056 observations on fifteen relationships from 214 independent studies with a combined sample of 84,343. The findings reveal that perceived ease of use directly

predicts perceived usefulness, satisfaction, and attitude. Satisfaction leads to a favorable attitude, which further influences IS continuance. Furthermore, trust and enjoyment positively influence users' satisfaction and IS continuance. Enjoyment has a relatively higher impact than trust. In addition, trust positively influences enjoyment with technology. Thus, this research confirms the extended post-acceptance model and offers valuable insights to marketers to improve the likelihood of continuance usage of IS/IT systems. Moreover, the emergent model can be used as an alternative model to address the challenges related to the adoption and usage of emergent technologies (e.g., AR, VR, and voice assistants) having the inherent characteristics of playfulness, fun, entertainment, and enjoyment.

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