A meta-analysis of the quantitative studies in continuance intention to use an information system

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Abstract

Purpose

This study aims to describe, synthesise, and clarify the findings of published studies on individual continuance intention to use an information system (IS), considering the fact that the number of studies in the continuance intention context are growing exponentially and cover several different subjects.

Design/methodology

The research uses meta- and weight analysis by taking 115 empirical studies from continuance intention to use an IS. The data are presented in different views using significant and non-significant relationships from all the studies. Furthermore, it uses hierarchical linear meta-analysis to analyse potential moderators that can influence continuance intention.

Findings

The results reveal that affective commitment, attitude, satisfaction, hedonic value, and flow are the best predictors of continuance intention to use an IS. Sample size, individualism, uncertainty avoidance, and long-term orientation moderate the relationship of perceived usefulness on continuance intention. Power distance, masculinity, and indulgence moderate relationship satisfaction on continuance intention.

Practical implications

The results reveal that continuance intention to use an IS has been studied in different countries, with different cultures; therefore, IS providers should have diversified managing strategies, to ensure the satisfaction of users and long-term usage of their IS.

Originality/value

The study provides a systematic overview of the most relevant variables used in the literature, including a temporal analysis of the theoretical models, highlighting the evolution of the constructs and presents a moderation analysis.

Keywords: IS Continuance intention; IS post-usage; Literature review; Meta-analysis; Weight analysis.

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1. Introduction

The evolution of information systems (IS) has offered the opportunity to different types of institutions to advance the capability, efficiency, and responsibility of their services and products, thereby streamlining the day to day activities of their customers (Laukkanen 2007). Its use is growing exponentially, considering the usefulness of IS in society. However, the adoption of IS is not enough to keep them in the market, continuous use is necessary (Bhattacherjee, 2001), to bring a return on the investments that companies make, and to help the users in their activities. Continuous use of IS refers to the decision of the user to continue to use the IS. This behaviour is noted after the user has the first experience with IS. Understanding what factors influence an individual to continue to use IS has become necessary for researchers and companies (Bhattacherjee, 2001; Shaikh and Karjaluoto, 2015). In recent years, the number of studies in continuance intention to use an IS has grown rampantly and now covers several subjects such as continuance intention in mobile banking services, mobile payment, e-learning, social networking, health applications, e-government, mobile commerce, among others. Considering that the number of studies is growing, different technologies, theories and contexts are being studied, there is plenty of scattered information and different results. With that much information in the background, the process of searching for studies became more difficult, and the need for comprehensive and synthesised information about IS continuance intention became essential.

Therefore, it is crucial and necessary to highlight, summarise and clarify the results of existing studies in order to provide a comprehensive picture of continuing to use IS (Fettke, 2006). This process enables theory development and reveals new relationships and gaps (Hamari and Keronen, 2017). There are some literature reviews on IS continuous intention (e.g., Bhattacherjee and Barfar, 2011; Shaikh and Karjaluoto, 2015; Nabavi *et al.*, 2016), that explore different aspects of prior studies such as theories, technologies, and used contexts. However, most of them are narrative and descriptive; none of them has used meta-analysis. This study will use meta- and weight analysis to derive for more empirical results. The meta-analysis is a process of summarising, evaluating, and analysing quantitative research findings (Zhang et al., 2012), even if the outcome is non-significant or inconsistent, it can contributes to a pooled conclusion,

reinforcing the general validity of the interpretations (Hamari and Keronen, 2017; Wu et al., 2011). According to earlier research meta-analysis and weight analysis are considered appropriate methods to review empirical data (Baptista and Oliveira, 2016; Rana et al., 2015; Schmidt and Hunter, 2016; Zhao et al., 2018). We describe the most critical variables in the field, using findings reported in existing research combined with weight analysis of the constructs to identify the best predictors (Zhao et al., 2018) to highlight the best predictors of continuance intention to use an IS, improvements of theories, and the strength of the variables.

According to our knowledge, no research addresses: (i) meta-analysis combined with weight analysis in the context of continuance intention to use an IS, or (ii) temporal analysis to understand the evolution of the theoretical models over time. This study can extrapolate broader theoretical implications relating to the positioning and understanding of IS. Contributing to the research, we illustrate the most used relationships, best predictors, most used technologies during a period, the evolution of the number of papers per year, and the evolution of the theoretical model. The overall variables to be used to predict continuance intention to use an IS were illustrated. Beyond synthesising the main findings of the studies, we also created models to understand the temporal evolution of the constructs better. Additionally, we analysed possible moderators in the relationship between perceived usefulness and satisfaction on continuance intention to use IS.

The article is organised as follows: in Section 2, is presented the literature review, Section 3 describes the research methodology; in the next section, we present the results of the research followed by a discussion of the findings; the conclusion and future recommendations follow this section.

2. Information system continuance intention (ISCI) background

Continuance intention of IS refers to factors that contribute to IS usage for a long time. It involves understanding the long-term factors that contribute to the success of the IS (Bhattacherjee, 2001; Lin et al., 2017; Wang, 2015). The first ISCI model was developed by Bhattacherjee, (2001), who proposed that (1) confirmation of the expectations positively influences perceived usefulness and user satisfaction. (2) Perceived usefulness positively influences user satisfaction and continuance intention to use an IS, and (3) user satisfaction positively influences continuance intention to use an IS. Additionally, after Bhattacherjee, (2001) proposed the expectation-confirmation model

(ECM), it has been extensively tested in several studies and confirmed that it is a robust model to explain ISCI (Carillo et al., 2017; Hadji and Degoulet, 2016; Hong et al., 2017a; Hsiao et al., 2016; Zheng, 2019). Thereby, many of the early studies used ECM as a base model, and integrated other theories to study different technologies. Susanto et al., (2016) used it to explain smartphone banking services. Lee (2010) applied it to explain e-learning. Alraimi et al., (2015) used it to explain MOOCs. Gao et al., (2015) used it to explain mobile purchases.

Prior studies have conducted literature reviews in the context of IS. However, most of these studies have explored and summarised the literature on a specific IS such as Zolotov et al., (2018) in e-participation, Shaikh and Karjaluoto, (2015) in m-banking, Bayramusta and Nasir, (2016) in cloud computing, Albuquerque et al., (2016) in m-payment. Therefore, in the context of ISCI, we found some reviews that address several issues around ISCI such as theories used, scientific journals published, technologies used, regions studied, number of publications per year, among others (Bhattacherjee and Barfar, 2011; Nabavi et al., 2016; Shaikh and Karjaluoto, 2015). However, none of the studies used meta-analysis in the context of ISCI, thus, becoming essential to review empirical data to bring more insights to the literature (Frohberg et al., 2009). A literature review is a process of summarising and highlighting research results. There are different types of review, such as narrative reviews, literature reviews, meta-analysis, to name a few. A narrative review is broader than a literature review, and meta-analysis is more empirical than a literature review (Frohberg et al., 2009; Shaikh and Karjaluoto, 2015).

Despite finding some qualitative reviews that addressed several issues of ISCI (Bhattacherjee and Barfar, 2011; Nabavi et al., 2016; Shaikh and Karjaluoto, 2015), and the relevant contribution of qualitative studies, the results did not exhibit conclusive and generalised findings as meta-analytic studies promote (Schmidt. and Hunter, 2004). In the literature review conducted by Bhattacherjee and Barfar, (2011), the purpose was to align the misunderstanding of the concepts, and theory concerning ISCI and extend the theoretical model. The analysis range was ten years, and they found 15 empirical articles. They identified studies that had used acceptance theories such as technology acceptance model (TAM) or unified theory of acceptance and use of technology (UTAUT), to predict continuance intention. Thus, the authors suggest that this practice may be inconsistent and inappropriate to predict ISCI. They also verified that many studies employed a

cross-sectional design, and few used a longitudinal research design. Considering that ISCI is a temporal phenomenon, the authors suggest that future studies consider a longitudinal design.

Shaikh and Karjaluoto (2015) conducted a literature review on IS technology/usage. The range of analysis was 15 years, counting 152 studies. In this study, the scope was to synthesise and segregate the major domains of ISCI according to nature and usage. The primary findings of the study were that 75% of the studies predicted continuance intention to use IT/S as a proxy for actual use. They found that 58% of the studies on IT/S were published from 2010 to 2014. 61% of the articles were found in ScienceDirect and Wiley scholarly databases. The authors classified the IT/S into four domains: Continuous Usage of Mobile Information Systems, Continuous Usage of Electronic Business Information Systems, Continuous Usage of Social Information Systems, and Continuous Usage of Electronic Learning Information Systems. Computers in Human Behaviour, Information Systems Journal, and Information and Management were identified as the publications that disseminated more articles on ISCI. Most of the studies were conducted in East Asia, followed by North America. No studies were conducted in Africa. Finally, ECM was the most used theoretical model, and most of the studies used quantitative research.

Nabavi et al., (2016) conducted a systematic review of 191 papers in the context of ISCI, in a range of 13 years. The goal of this study was to summarise the findings according to year, journal, country, author, research method, theories, to name a few. The authors verified that the journals Behaviour and Information Technology, Computers in Human Behaviour, Information and Management, Decision Support Systems, and MIS Quarterly dominate the literature use. Most of the studies were conducted in East Asia and North America, with no studies in Africa. Most of the respondents were students. Quantitative research was the most used method, and finally, the authors suggest that future studies could develop meta-analyses in the context of ISCI.

Considering that the above literature reviews in the context of ISCI were qualitative, reporting which technologies were used, methods, countries, type of respondents, theories and journals, no attempt has been made to conduct a quantitative review of ISCI. Considering that most of the studies reported in these literature reviews used a quantitative research design, it is proposed for this study to perform a meta and moderator analysis. By conducting this study, we expect to contribute to the IS discipline. From the results obtained in this investigation, it is possible to

consolidate and generalise the relationships tested with continuance intention (Schmidt. and Hunter, 2004).

3. Research methodology

The study analyses and summarises the current findings on the IS continuance intention models. The process of literature selection was based on the following criteria. First, we chose the appropriate keywords for our research, such as continuance intention, post-adoption, continuance usage, continuance behaviour, continuance usage intention, continuance intention to use, IT continuance, IS continuance, and IS continuance theory in all possible combinations. Next, we applied the keywords in different research databases (Scopus, ACM digital library, EBSCO, Emerald, Taylor & Francis, Springer, Web of Science, Science Direct, JSTOR, and Google Scholar), taking into consideration the logical operators such as AND, and OR (Hamari and Keronen, 2017).

After searching in the databases, we found more than 1000 articles related to the keywords used in the query. Some articles were duplicated; in this case, they were excluded. We opened each article, read the abstracts, verified if the articles are related to the IS, and if they presented a theoretical model, and quantitative data to validate them. After the verification, we found 181 articles. We then applied other criteria to assess the research relevance. To ensure the inclusion of relevant and current developments, we adopted the following criteria:

- The period studied ranges from 2001 to 2017;
- The studies were published under a peer review process;
- The studies analysed at an individual level;
- The type of study had to be quantitative;
- The studies had to show correlation coefficients between the variables used to support the theoretical model;
- The construct continuance intention or continuance behaviour had to be the outcome of the theoretical models;
- The datasets (databases) of the studies had to be independent;

- Studies that used secondary databases or samples or databases that other studies had already used were excluded in order to avoid biases (Baptista and Oliveira, 2016; Wood, 2007).

Research that had multiple independent databases or samples (longitudinal studies) were included. E.g., Zhou et al., (2015) contributed with four datasets; Lee et al., (2007) contributed with three datasets; Lowry et al., (2015) contributed with three datasets. After this, we found 115 articles and 129 datasets for our research. This approach is considered suitable sampling compared to other studies published in top-level journals, e.g. Zhao et al., (2017) with 35 studies, Hamari and Keronen, (2017) with 48 studies, Zhang et al., (2012) with 53 studies, Šumak et al., (2011) with 42 studies, Gerow et al., (2014) with 30 studies, Wu et al., (2011) with 128 studies, Baptista and Oliveira, (2016), which included 57 studies, and Rana et al., (2015) with 63 studies. Figure 1 summarises the process to select the relevant articles for our research.

<< Insert Figure 1 here >>

According to Rana et al., (2015) and Baptista and Oliveira, (2016), the relationships that were examined three or more times in the studies were selected, summarising 60 relationships. Weight analysis for each relationship was performed based on the number of significant relationships and the total number of relationships (Rana et al., 2015). We have used a random effect to calculate the estimated effect size variability between studies. We consider random effect appropriate because it considers the variation between studies and variation between study methods. Fixed effect methods only consider the variation between studies because of the sampling participation (Schmidt. and Hunter, 2004).

After the extraction of the correlation coefficients of the variable relationships, a single cumulative value was calculated for each of the relationships. These values, combined with study total sample sizes, supported the findings of the meta-analysis. We used the free software *meta-essentials 1.1* (Rhee et al., 2015) to obtain the meta-analysis results. Additional, information on the data was extracted: the country with the largest sample size, the evolution of the number of papers, technologies, and theories used in the studies, and studies used in meta-analysis and weight analysis (Appendix A). Figure 2 illustrates the sum of all samples per country.

<< Insert Figure 2 here >>

During the period of our analysis (2001 to 2017), many journals (peer-reviewed) published different numbers of ISCI articles. Appendix B illustrates the number and evolution of articles that each journal published per year. However, between 2001 and 2010, the number of articles published was lower. The number began to grow from 2011 until 2017, and the expectation is to continue growing. The journals with more than ten publications are highlighted.

In the data extraction process, the original names of the independent and dependent variables from the studies were collected. In this process, we found variables with different names but deduced that they probably have a similar definition, e.g. perceived usefulness, usefulness, usefulness expectations; user satisfaction, overall satisfaction, satisfaction; confirmation, confirmation of expectations. In these circumstances, we chose the names of the most used variables in the literature, e.g. perceived usefulness, satisfaction, confirmation). More detailed information is presented in Appendix C.

3.1. Moderator analysis

Concerning moderators, we investigated some moderating effects in different relationships. To select the relationships, we used relationships that have enough observations (> 30) (Geyskens et al., 2009; Lipsey and Wilson, 2001). Regarding the moderator variables, we have selected different moderators suggested by the literature (Hofstede and Minkov, 2010; Santini et al., 2019b). For our study, we have used methodological, economic, and cultural moderators. This analysis is essential for the literature because it provides researchers a better understanding of the effects of the relationships and provides an overview of the potential moderators that can influence the continuance intention to use IS in future studies. Appendix D presents the moderators, the descriptions, and the coding structure. Sample size was analysed as a methodological moderator, considering that it plays a significant role in varying the effect sizes in the studies (Fern and Monroe, 1996). While a small sample size is more homogeneous, this aspect tends to overestimate the effect size of the relationships (Rosenthal and Rubin, 1982). We have also analysed moderators in the economic context, (1) economic development, and (2) innovation level. Economic

development can play an important role as it tends to promote different levels of use of IS. Therefore, we expect that developed economies influence the behaviour of the intention to continue using IS, compared to developing economies (Kim and Peterson, 2017). On regards innovation level, it is considered a potential moderator because it can influence the relationships, taking into consideration that countries with a high level of innovation tend to continue using IS as they have good skills and familiarity with systems usage (Kim and Peterson, 2017). Finally, we have analysed six cultural moderators from Hofstede, power distance, individualism, masculinity, uncertainty avoidance, long term orientation, and indulgence. These cultural dimensions are recognised as the leading indicators of people's beliefs and values that impact their behaviour, so we consider potential moderators that can influence the intention to continue using IS (Hofstede and Minkov, 2010). Our analysis was supported on a hierarchical linear meta-analysis. This analysis uses the multivariate regression format for the variables included in the model and is widely used in meta-analytic research (Geyskens et al., 2009; Santini et al., 2019b).

4. Findings

4.1. Meta-Analysis

Table 1 represents the meta-analysis and weight analysis of the 60 relationships that were most often used, and which have occurred three or more times across the 115 studies. Columns 4 to 8 (meta-analysis information) of Table 1 present the number of times that a relationship was analysed (total), the sum of samples (sample), an average of the correlation coefficient (AVG of cc), normal standard deviation (Z – value), and 95% confidence interval. In addition, we then show the relationship between the dependent constructs and the independent constructs. Several dependent constructs relate to different independent constructs, such as continuance intention, which relates to 16 different independent constructs, followed by satisfaction, which applies to 14 different constructs and perceived usefulness, which applies to 7 different constructs.

The meta-analysis results reveal that the correlation coefficient of 60 relationships is statistically significant ($p < 0.01$). The largest Z-values are satisfaction on continuance intention (75.695), confirmation on perceived usefulness (55.921), confirmation on satisfaction (48.176), attitude on continuance intention (35.602), perceived usefulness on continuance intention (34.287), and perceived usefulness on satisfaction (33.995).

4.2. Weight analysis

This method is used to estimate the importance of a predictor (i.e. independent construct) and predicts the strength of an independent construct (Jeyaraj et al., 2006). The weights of the 60 most used relationships were examined and are presented in columns 9 to 12 in Table 1.

The value of weight was computed by dividing the number of statistically significant relationships by the total number of studies used. When the weight is one (1), it shows that the relationship within the variables is significant in all the research, but if the weight is zero (0), it indicates that the relationship is not significant through all the studies examined (Jeyaraj et al., 2006).

<< Insert Table 1 here >>

In order to identify the most effective predictors to use IS continuance intention, (Jeyaraj et al., 2006) classified independent variables in two ways: the variables that were evaluated 5 (five) or more times were classified as well-utilised, and the variables evaluated less than 5 (five) times seen as experimental. Additional definitions of Jeyaraj et al., (2006) have been taken into consideration : best predictors – are the relationships that were classified as well-utilised with the weight greater than or equal to 0.8; and promising predictors – relationships that were classified as experimental with the weight equal to 1.

The outcomes of the 60 relationships assessed in the weight analysis show that 34 were classified as well-utilised, and 31 as best predictors (highlighted relationships) of the continuance intention to use an IS. Additionally, 24 out of 26 experimental relationships were classified as promising predictors, requiring more evaluation to succeed as best predictors. For future research, we encourage researchers to evaluate such promising predictors. However, in all the studies, no type of relationship was found to be not significant.

According to the findings of meta- and weight analyses, the most often used dependent variables were continuance intention, satisfaction, and perceived usefulness. Therefore, the most used independent variables to explain continuance intention (used more than ten times) were satisfaction, perceived usefulness, perceived enjoyment, attitude, and subjective norms.

4.3. Moderator analysis

The analysis of potential moderators was performed using factors from the methodological, economic, and cultural context. Thus, these factors were tested in the relationships that predict continuance intention, and present a considerable number of observations (at least 30) (Geyskens et al., 2009; Lipsey and Wilson, 2001). However, the relationships selected were perceived usefulness and satisfaction to continuance intention (Schmidt and Hunter, 2016). The results of the analysis are presented in Table 2.

The moderator sample size had a significant moderating effect on the relationship of perceived usefulness to continuance intention ($\beta = 0.338$, $M_{Low} = 0.418$, $M_{High} = 0.316$, $p < 0.05$), and had no significant moderating effect for the other relationships of satisfaction to continuance intention ($\beta = 0.502$, $M_{Low} = 0.461$, $M_{High} = 0.448$).

In the economic context, the moderator economic development had no significant moderating effect of perceived usefulness to continuance intention ($\beta = 0.467$, $M_{Low} = 0.364$, $M_{High} = 0.380$), and satisfaction to continuance intention ($\beta = 0.546$, $M_{Low} = 0.451$, $M_{High} = 0.466$). Similarly, the moderator innovation level had no significant moderating effect of perceived usefulness to continuance intention ($\beta = 0.490$, $M_{Low} = 0.330$, $M_{High} = 0.414$), and satisfaction to continuance intention ($\beta = 0.491$, $M_{Low} = 0.492$, $M_{High} = 0.438$).

In the cultural context, the power distance moderator had a significant moderating effect of satisfaction to continuance intention ($\beta = 0.455$, $M_{Low} = 0.495$, $M_{High} = 0.414$, $p < 0.05$), and had no significant moderating effect on the other relationship of perceived usefulness to continuance intention ($\beta = 0.497$, $M_{Low} = 0.320$, $M_{High} = 0.445$). The moderator individualism had a significant moderating effect of perceived usefulness to continuance intention ($\beta = 0.499$, $M_{Low} = 0.308$, $M_{High} = 0.420$, $p < 0.1$), and had no significant moderating effect on the other relationship, satisfaction to continuance intention ($\beta = 0.526$, $M_{Low} = 0.393$, $M_{High} = 0.449$). The moderator masculinity had a significant moderating effect of satisfaction to continuance intention ($\beta = 0.527$, $M_{Low} = 0.374$, $M_{High} = 0.465$, $p < 0.1$) and had no significant moderating effect on the other relationship of perceived usefulness to continuance intention ($\beta = 0.511$, $M_{Low} = 0.336$, $M_{High} = 0.435$). The moderator uncertainty avoidance had a significant moderating effect on perceived usefulness to continuance intention ($\beta = 0.361$, $M_{Low} = 0.441$, $M_{High} = 0.327$, $p < 0.1$), and had no significant moderating effect on the relationship satisfaction to continuance intention

($\beta = 0.473$, $M_{Low} = 0.433$, $M_{High} = 0.430$). Similarly, the moderator long term orientation had a significant moderating effect on perceived usefulness to continuance intention ($\beta = 0.332$, $M_{Low} = 0.420$, $M_{High} = 0.308$, $p < 0.1$), and had no significant moderating effect on the relationship satisfaction to continuance intention ($\beta = 0.540$, $M_{Low} = 0.453$, $M_{High} = 0.455$). Finally, the moderator indulgence had a significant moderating effect on the relationship satisfaction to continuance intention ($\beta = 0.584$, $M_{Low} = 0.425$, $M_{High} = 0.484$, $p < 0.1$), and had no significant moderating effect on the relationship perceived usefulness to continuance intention ($\beta = 0.394$, $M_{Low} = 0.408$, $M_{High} = 0.343$).

<< Insert Table 2 here >>

5. Discussion

Considering the number of studies on continuance intention to use an IS using theories or models, it becomes significant and suitable to analyse and discuss their collective findings. We can verify that the variables and relationships used are quite dispersed, as studies are analysing different IS technologies, studies from separate times, and different geographical spaces with distinct cultures.

The results reveal that the meta- and weight analyses for the independent variables on equivalent dependent variables are closer. The higher the weight of an independent variable, the greater is the probability that it is significant in performing the meta-analysis (Rana et al., 2015). In the meta-analysis, all the 31 best predictors, and all the 24 promising predictors were found to be statistically significant. The remaining three well-utilised relationships, namely service quality on satisfaction, perceived ease of use on attitude, and perceived ease of use on continuance intention, were also statistically significant. The results reveal that the most important relationships to predict continuance intention to use an IS are simultaneously statistically significant in meta-analysis and best predictors in weight analysis.

Additionally, the width of the confidence interval depends on the correctness of individual studies along with the number of the cumulative studies (Rana et al., 2015). We can verify that all of the best predictor and promising predictor relationships obtained a narrow interval, providing confidence to the level of variance of the correlation values.

According to the results, three theoretical models (Figure 3) were designed to support future studies on continuance intention to use an IS. The first model (A) was created using all the data from our analysis (general model), and then, to understand the model's evolution, the data were divided into two groups (from 2001 to 2010, and from 2011 to 2017), and with this information, two more models were created. The second model (B) was created using data from 2001 to 2010, and the last model (C) was created using data from 2011 to 2017. To generate the theoretical models, first, significant relationships from the meta-analysis were selected, second, the best predictors of weight analysis were selected, and finally, direct or indirect variables related to continuance intention to use an IS were selected. Moreover, the relationships such as service quality on satisfaction, perceived ease of use on attitude, and perceived ease of use on continuance intention were evaluated five or more times and with weight less than 0.8. Basically, because they were statistically non-significant in individual studies, future research is needed to prove or disapprove the existing trend (Jeyaraj et al., 2006).

According to the findings, it is possible to understand that there is an evolution of the models, just by comparing the original model of IS continuance intention (Bhattacherjee, 2001) with our general model. The general model is more complex and presents more relationships with a significant set of constructs. Going to model B, it is simpler than the general model (A). This facet means that, in that period (2001 to 2010), the key factors that influenced users to continue using IS were: satisfaction, perceived usefulness, and attitude. Continuance intention was used to predict continuance behaviour. In model B, Confirmation only explains satisfaction and perceived usefulness over time, and it starts explaining perceived ease of use and perceived enjoyment. This phenomenon also happened with perceived ease of use. It only explains satisfaction, over time, and explains perceived usefulness.

In model C, which is more complex than model B and very similar to the general model (A), we can argue that in that period (2011 to 2017), (i) the type of IS increased considerably, then, to support this phenomenon, (ii) the number of constructs also increased. In model B, we have disconfirmation explaining satisfaction and perceived usefulness, but we do not have these relationships in model C. This means that these relationships have been so well-explored that they became part of a collective body of knowledge. In model B, we have perceived ease of use explaining satisfaction; over time, the same construct started explaining perceived usefulness and

began to be explained by confirmation. In model C, we do not have continuance intention explaining continuance behaviour. From 2011 to 2017, it is possible to verify that the independent constructs increased significantly. Some constructs belong to other theoretical models, for example, attitude, subjective norms, and perceived behaviour control (Ajzen, 1985), system quality and information quality (DeLone and McLean, 1992) perceived ease of use (Davis, 1989). Two constructs do not appear in either model B or C but appear in the general model (A), such as performance and perceived behaviour control. This element means that these relationships have been explored over the whole range of our analysis (2001 - 2017). Moreover, when the dataset was divided, they did not become statistically significant in both groups.

However, over time, the theoretical models grow more complex, and new constructs appear, such as perceived enjoyment, trust, flow, subject norms, and performance, etc. Nevertheless, some constructs are in decadence because they turned into common knowledge, and some constructs like satisfaction, perceived usefulness, confirmation, perceived ease of use, and attitude remain over time. This characteristic means that these constructs are still essential to predict IS continuance intention. Now we can argue that we have a powerful model (A) to predict continuance intention to use IS, using distinct types of technologies, in different environments. In addition, the theoretical models had a significant evolution.

The dashed relationships mean that they were not statistically significant and best predictors in that period. Moreover, the performance and perceived behaviour control on continuance intention were statistically significant and best predictors only with all the dataset (model A).

<< Insert Figure 3 here >>

We also found interesting results from the moderation analysis. In the methodology context, we found that the sample size has a moderating effect in the relationship of perceived usefulness to continuance intention. This outcome was not crucial to the relationship of satisfaction to continuance intention. The result showed that studies with low sample size have a strong relationship than studies with high sample size. This result confirms our assumption that a small sample has smaller effect variations in the studies (Fern and Monroe, 1996).

Regarding the economic context, the moderator's economic development and innovation level had no moderating effect in the tested relationships. This result is similar to another study (Santini et al., 2019a). However, we consider these moderators important, considering that high economic and innovated countries tend to use more technologies (Kim and Peterson, 2017). Therefore, it is suggested that future studies use and test these moderators to bring new insights to the literature.

Concerning culture moderators, the moderator power distance had a significant moderating effect in the relationship satisfaction to continuance intention. Low power distance promoted a stronger effect than high power distance. This finding suggests that the people in this culture are more independent and accept that the power can be distributed unequally, therefore, influencing the satisfaction and continuance intention to use IS (Baptista and Oliveira, 2015; Hofstede and Minkov, 2010). The moderator individualism had a significant moderating effect in the relationship between perceived usefulness and continuance intention. The result showed that high level of individualism promotes a stronger relationship. This result highlights the fact that individualist people tend to have more perceptions of the usefulness of the systems, therefore, promoting continuance intention behaviour (Baptista and Oliveira, 2015; Hofstede, 1984).

The moderator masculinity had a significant moderating effect in the relationship between satisfaction and continuance intention. The result showed that a high level of masculinity promotes stronger relationships. This finding means that society has a high level of competitions to achieve success. Therefore, competitive people tend to use more technologies, acquire new skills, thus, promoting satisfaction and the intention to continue using IS (Hofstede and Minkov, 2010). The moderator uncertainty avoidance had a significant moderating effect in the relationship between perceived usefulness and continuance intention. The result showed that a low level of uncertainty avoidance promotes a stronger relationship. This finding is in accordance with another study (Baptista and Oliveira, 2015), suggesting that cultures that have a low level of uncertainty avoidance are more open to new technology, they improvise when necessary, tend to take risks, consequently, promoting continuance intention to use IS (Baptista and Oliveira, 2015). The moderator long term orientation had a significant moderating effect in the relationship perceived usefulness to continuance intention. The result presented that low levels of long-term orientation have a stronger influence on the relationship. This finding suggests that cultures with short term orientation tend to follow instructions, respect tradition, and focus on achieving quick results

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(Baptista and Oliveira, 2015). Finally, the moderator indulgence had a significant moderating effect in the relationship between satisfaction and continuance intention. The result revealed that a high level of indulgence promotes stronger relationships. This dimension means that people exhibit a willingness to fulfil their impulses and desires. Therefore, when they fulfil their desires, it is expected to promote satisfaction and continuance intention to use IS (Hofstede and Minkov, 2010).

5.1. Theories, contexts, and technologies used in ISCI

Studies on ISCI have used a wide range of theories such as the ECM (Bhattacherjee, 2001), expectation-confirmation theory (ECT) (Oliver, 1986), TAM (Davis, 1989), UTAUT (Venkatesh et al., 2003), Flow theory (Getzels and Csikszentmihalyi, 1978), to name a few. The results present that ECM was the most used theory, followed by TAM and ECT. Therefore, few studies used a single theory (Al-Debei et al., 2013; Chang and Zhu, 2012; Susanto et al., 2016), most of them integrated more than one theory in the context of ISCI (Chen et al., 2013; Gao et al., 2015; Hsiao et al., 2016). Additionally, the results show that some acceptance theories such as TAM and UTAUT were used in the context of ISCI (Belanche et al., 2014; Hadji and Degoulet, 2016; Joo et al., 2016; Wu and Chen, 2017). However, Bhattacherjee and Barfar, (2011) argued that it is not appropriate to use acceptance theories because it can generate misunderstandings and misapplications of the theories. We believe that instead of using traditional theories (TAM, TRA, ECT, etc.) we should import theories from other areas (e.g. psychology, medicine) and try new direct, indirect and moderation relationships, to present new results and insights (Bhattacherjee and Barfar, 2011; Nabavi et al., 2016). In the context of ISCI, ECM was the first theory proposed by (Bhattacherjee, 2001). ECM proposes that satisfaction to use IS is a crucial factor that impacts continuance intention, followed by perceived usefulness. Moreover, confirmation of expectations and perceived usefulness are important factors that influence user satisfaction. Most studies used ECM as a base theory. Some used ECM alone (Alraimi et al., 2015; Oghuma et al., 2016; Susanto et al., 2016) and others integrated with other theories and self-constructs (Chen et al., 2013; Lee, 2010; Limayem and Cheung, 2008). The results show that most studies have integrated more than one theory, so, we also agree with this practice, considering that it bestows new knowledge and enriches the theoretical models.

In the technological context, the findings demonstrate that a wide variety of systems have been studied. Previous literature reviews have categorised the different types of technologies such as mobile information systems (MIS) (e.g. mobile instant messaging, mobile banking, mobile commerce), electronic business information systems (EBIS) (e.g. public e-services, online tourism services, Knowledge management systems), social information systems (SIS) (e.g. online communities, social networking services) and electronic learning information systems (ELIS) (e.g. e-learning, educational games, teaching blogs), to name a few (Nabavi et al., 2016; Shaikh and Karjaluoto, 2015). Of the 115 studies, most of them fall into the EBIS category (27%), followed by SIS, MIS (26%), and ELIS (21%). Our findings are similar to those of Shaikh and Karjaluoto (2015), however, the SIS and MIS categories are booming, revealing a trend in recent years.

Regarding the region, the results are similar to previous literature reviews (Nabavi et al., 2016; Shaikh and Karjaluoto, 2015). The most studied regions were East Asia (e.g. Taiwan, China, Korea and Hong Kong), North America (e.g. USA), Europe (e.g. Spain, Germany, UK and France), Middle East (e.g. UAE, Kuwait), one in South America (Brazil) and Southeast Asia (The Philippines), however, no studies on ISCI were found in any African region (Nabavi et al., 2016; Shaikh and Karjaluoto, 2015).

5.2. Implications for research

The different studies have several implications for the literature. This research provides a complete image of all types of constructs, which were already studied in various subject areas on continuance intention to use IS. The findings from the meta-analysis and weight of the variables illustrated in this study aid researchers in making a careful selection of variables, contributing to future research (Hamari and Keronen, 2017). The results reveal that system quality, information quality, confirmation, disconfirmation, perceived ease of use, perceived usefulness, and perceived enjoyment are the most important constructs to influence satisfaction. The results further show that perceived ease of use can mediate the relationship between confirmation and satisfaction, and confirmation and perceived usefulness.

Additionally, perceived enjoyment can mediate the relationship between confirmation and satisfaction. Satisfaction can mediate the relationship between perceived enjoyment and continuance intention. Attitude can mediate the relationship between satisfaction and continuance

intention. Affective commitment can mediate the relationship between utilitarian value, the hedonic value on continuance intention.

Moreover, the results show that there is a wide variety of constructs, coming from different theories and contexts, that can significantly influence continuance intention. These include affective commitment (Zhou et al., 2012, 2015), hedonic value (Hong et al., 2016a; Hong et al., 2016b), attitude (Hong et al., 2008; Liang et al., 2013), trust (Liao et al., 2006; Susanto et al., 2016), performance (Al-Debei et al., 2013; Chiu and Wang, 2008), habit (Liao et al., 2006; Limayem and Cheung, 2008), perceived behaviour control (Kim, 2010; Lee, 2010), flow (Chang and Zhu, 2012; Gao et al., 2015), and subjective norm (Bhattacherjee and Lin, 2014; Mouakket, 2015), thus, demonstrating that different theories and self-constructs can be integrated into the ISCI context. However, researchers can use our findings for future research, e.g. to those relationships that are statistically significant and have been classified as promising predictors (e.g. service quality on confirmation, performance on satisfaction, etc.) to become best predictors. Finally, the moderation analysis highlighted interesting results. The variables sample size, individualism, uncertainty avoidance, and long term orientation moderate the relationship between perceived usefulness and continuance intention. Furthermore, the variables power distance, masculinity, and indulgence moderate the relationship between satisfaction and continuance intention.

5.3. Implications for practice

The results of this paper have important practical implications. For practitioners, it is crucial to recognise the best predictors of continuance intention to use an IS, for better design and implementation of the IS, thus, ensuring long-term usage (Bhattacherjee, 2001; Shao, 2018; Yu et al., 2018). The best predictors such as system quality, information quality, and perceived ease of use on satisfaction, and perceived usefulness, perceived enjoyment, and satisfaction on continuance intention are relevant for practitioners. A practitioner should ensure the best implementation of IS for users, with proper infrastructure to use the system and information with quality to ensure user satisfaction (Zhao et al., 2018). Our results reveal that continuance intention to use an IS has been studied in different countries, with different cultures. Therefore, practitioners

should have different managing strategies to ensure the satisfaction of the users and long-term usage of the IS (Zhang et al., 2012).

The results establish that system quality, information quality, perceived ease of use, perceived usefulness, perceived enjoyment, and confirmation of expectations are important factors to ensure user satisfaction. Thus, practitioners should ensure that the IS works, that users can perform an operation end-to-end, that the IS has no interruptions, that users navigate on the IS easily, that the information provided in the IS is useful, understandable and accurate, thus making the user realise the quality of the IS. Managers and decision-makers should provide all the necessary information, such as user guides, advertisements, flyers that explain the services and functionalities of the IS, to accelerate the understanding of the services. Managers should also provide IS that are interactive, easy to use, accessible, and fast. For instance, in the case of online banking, managers should be able to provide all the basic information such as short videos explaining how to use the system, guides, and functional helplines, to ensure that users will not face difficulties using the IS, thus, facilitating the interaction between the user and the IS. Users should realise all the benefits of the IS and be happy to use it. Our results indicate that different constructs can be used to influence continuance intention and show that different technologies were studied. However, managers must ensure that IS attract users, and make them feel part of the IS; for instance, by showing the user that he/she is vital to keep the IS. Advertise the best features or services to attract more users, through practical examples, show the user that the IS is pleasant, that it has a cheerful atmosphere, thus making the user feel pleasure and comfort when using it.

In some communities or companies, the responsible members, such as community leaders, managers, or directors are important people who influence other group of people. However, it is essential that IS managers identify these people and showcase the main benefits of the IS in order to influence others to use it, thereby increasing and attracting more users. The user needs to feel involved when using IS and be curious to use it more often. Thus, the use of IS should become automatic, so that whenever the user needs to fulfil a requirement, think of the IS first. Managers should ensure that users do not have difficulty using IS, by giving them control, resources, and the knowledge and ability to use it. The user should be attracted, in order to have the attitude to use the IS, enjoy using it, enjoy the idea of the IS, and feel comfortable using it. Thus, potential users will continue using the IS.

Additionally, the results attest that the studies were conducted in different regions; in this sense, it is important to realise that communities have different habits and customs. For instance, the study of Chou et al., (2010) presents that in the context of continuance intention for knowledge creation in an online community, perceived identity verification is significant to influence performance expectancy in China (Baidu). However, it is not significant in Taiwan (Yahoo+). Ahmad and Sun, (2018) illustrate that in the context of continuance intention in social media mobile applications, social risk is significant to influence utilitarian value and hedonic value in Pakistan, but it is not in China. Therefore, practitioners should have different managing strategies, considering the region and therefore accommodate the habits, customs, satisfaction of the users and long-term usage of the IS (Zhang et al., 2012).

The results underscore that small sample size, high levels of individualism, low levels of uncertainty avoidance, and low levels of long-term orientation positively moderate the relationship between perceived usefulness and continuance intention. Regarding individualism, managers should focus on the task and autonomy of the individual. Individual management is more important than group management (Hofstede and Minkov, 2010). For uncertainty avoidance, the results are important for managers to promote the usability of the IS, considering that they are more receptive to new technology (Baptista and Oliveira, 2015). For long term orientation, the results are pivotal for managers because people with a low level of long-term orientation follow instructions, and respect rules and traditions. However, the results determine that a low level of power distance, a high level of masculinity, and a high level of indulgence positively moderate the relationship between satisfaction and continuance intention.

Concerning power distance, independence is a cardinal characteristic, and power should be distributed unequally (Baptista and Oliveira, 2015; Hofstede and Minkov, 2010). For masculinity, managers should promote competitions and training to motivate people. For indulgence, impulses and desires are more important. Managers should satisfy people according to their desires (Hofstede and Minkov, 2010).

5.4. Limitations and recommendation

The research contains several limitations. First, we did not include certain studies because of the unavailability of their quantitative data, or because they were qualitative. For example, some

studies did not report the effect size when the relationships were statistically non-significant. Integrating these studies could generate relevant information in terms of the significance of the constructs. Secondly, in the previous research if the data are biased on IS continuance intention, then the effect of the mean presented through meta-analysis will also reflect this bias, and in this study, the handling publication biases are missing. Moreover, we used meta-essentials, a meta-analysis tool. This tool has limitations, considering that meta-essentials is not able to perform more advanced analyses, like linear model or structured equation model (Rhee et al., 2015), future research should consider a more advanced tool to provide more insights and a different approach to research.

Future research should consider relationships like service quality on confirmation, hedonic outcome expectation, and intrinsic motivation on continuance intention, satisfaction on habit, trust, hedonic benefits and performance on satisfaction as they were classified as promising predictors and were statistically significant with a high average correlation coefficient. Culture has an important impact on IS continuance intention, and future research should incorporate a culture variable such as subjective norms, habit or attitude, to provide additional insights. Considering that some IS such as mobile payments and gamification are growing exponentially, future research could contemplate a meta-analysis to synthesise and provide more findings in these subjects.

6. Conclusions

The goal of our research was to collect and analyse different studies on continuance intention to use IS, by using meta-analysis combined with weight analysis. The systematic review of existing studies comprised 115 papers, which constituted the basis for the analysis of our research. The most used technology was e-learning, followed by social network services. In the process of collecting data for our analysis, we found more than 600 relationships and selected the relationships that had been examined three or more times, totalling 60 different relationships. 34 out of the 60 most used relationships have been examined five or more times. We identified the most used variables in the literature and highlighted their relevance, contributing to the current state of the art (Hamari and Keronen, 2017; Wu et al., 2011; Zhao et al., 2018).

Concerning moderation analysis, we presented noteworthy results. The relationship perceived usefulness to continuance intention was moderated with sample size, individualism, uncertainty avoidance and long term orientation. Furthermore, the relationship satisfaction to continuance intention was moderated with power distance, masculinity and indulgence. According to our empirical result, the evolution of the theoretical models was presented, using the best predictors and the significant relationships to predict continuance intention to use an IS. This study works as a reference basis for future research that seek to develop the area of continuance intention to use any type of IS. Moreover, among the most used constructs, we found constructs from the expectation confirmation model (Bhattacherjee, 2001), technology acceptance model (Davis, 1989), the theory of planned behaviour (Ajzen, 1985), and the DeLone and McLean IS success model (DeLone and McLean, 1992). According to Jeyaraj et al., (2006) criteria, 31 relationships were classified as *best predictors* (examined five or more times, and weight ≥ 0.8), and 24 relationships were classified as *promising predictors* (examined fewer than five times, and weight $= 1$), needing more tests to qualify as the best predictors.

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A meta-analysis of the quantitative studies in continuance intention to use an information system

Highlights

- Meta-analysis and weight analysis were used to obtains the findings.
- The most important predictors of continuance intention to use IS are presented.
- A temporal analysis of the theoretical models is presented.
- The evolution of the constructs over time is presented.
- A moderation analysis is presented.

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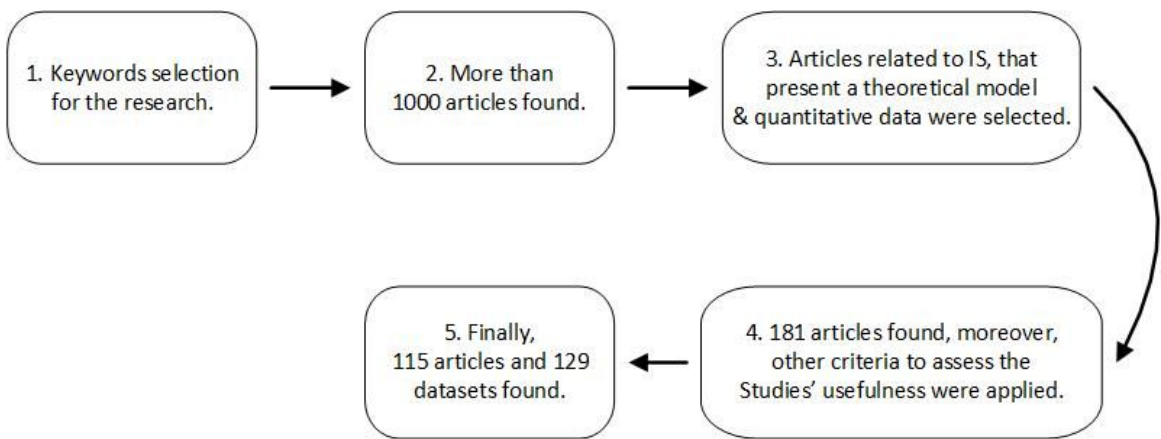
Figure 1 - Process to select articles for our research.
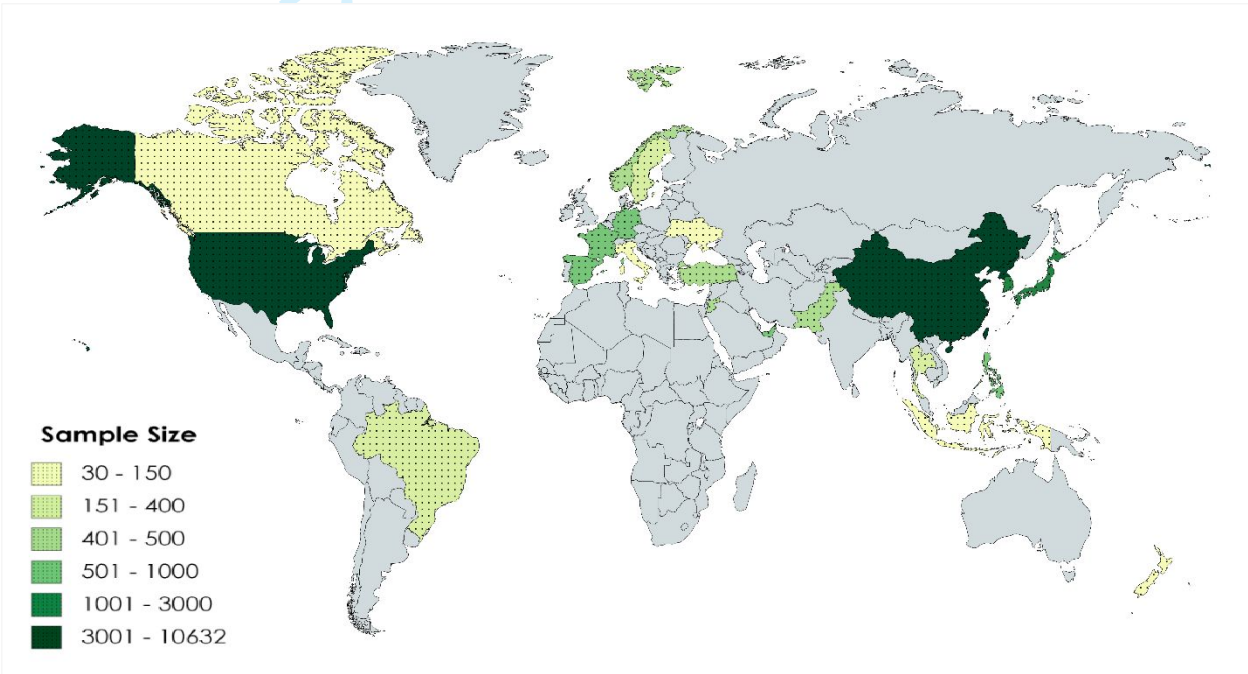
Figure 2 – Countries and sample size used in studies.

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Table 1 – The most frequently used relationships for meta-analysis and weight-analysis (Ordered by dependent constructs).

Nº (1)	Independent Constructs (2)	Dependent Constructs (3)	Meta-analysis				95% confidence interval (low - high) (8)		Weight analysis			
			Total (4)	Σ Sample (5)	AVG of cc (6)	Z – value (7)			Non-signifi cant (9)	Signif icant (10)	Total (11)	Weight (Significant/ Total) (12)
1	**Hedonic Value**	**Affective Commitment**	5	1266	0.339	12.536	0.198	0.301	**0**	**5**	**5**	**1.000**
2	**Relational Capital**		5	1266	0.258	9.381	0.206	0.309	**0**	**5**	**5**	**1.000**
3	**Utilitarian Value**		5	1266	0.112	3.997	0.057	0.166	1	**4**	**5**	**0.800**
4	Perceived Ease of Use	Attitude	5	1209	0.162	5.676	0.095	0.210	2	3	5	0.600
5	**Perceived Usefulness**		13	4535	0.408	29.164	0.362	0.414	1	12	13	0.923
6	**Satisfaction**		6	2580	0.481	26.615	0.451	0.510	**0**	**6**	**6**	**1.000**
7	Service Quality	Confirmation	4	1244	0.339	12.434	0.282	0.394	0	4	4	1.000
8	**Continuance Intention**	**Continuance Behaviour**	5	1526	0.375	15.385	0.331	0.417	**0**	**5**	**5**	**1.000**
9	**Affective Commitment**	**Continuance Intention**	5	1266	0.556	22.284	0.517	0.593	**0**	**5**	**5**	**1.000**
10	**Attitude**		14	5657	0.441	35.602	0.409	0.458	**0**	**14**	**14**	**1.000**
11	Effort Expectancy		3	1075	0.253	8.467	0.196	0.308	1	2	3	0.667
12	**Flow**		5	1243	0.358	13.207	0.308	0.406	1	**4**	**5**	**0.800**
13	**Habit**		5	1691	0.255	10.713	0.210	0.299	**0**	**5**	**5**	**1.000**
14	**Hedonic Outcome Expectations**		7	1951	0.437	20.679	0.435	0.567	**0**	**7**	**7**	**1.000**
15	Intrinsic Motivation		3	508	0.453	10.977	0.381	0.520	0	3	3	1.000
16	**Perceived Behaviour Control**		7	3021	0.296	16.763	0.263	0.328	**0**	**7**	**7**	**1.000**
17	Perceived Ease of Use		6	2280	0.074	3.538	0.013	0.104	2	4	6	0.667
18	**Perceived Enjoyment**		16	5808	0.187	14.417	0.158	0.210	3	13	16	**0.813**
19	**Perceived Usefulness**		41	13686	0.285	34.287	0.265	0.297	4	37	41	**0.902**
20	**Performance**		5	3707	0.241	14.962	0.210	0.271	1	4	5	**0.800**
21	**Satisfaction**		74	29220	0.416	75.695	0.399	0.419	2	72	74	**0.973**
22	**Subjective Norm**		11	4379	0.179	11.970	0.150	0.208	1	10	11	**0.909**
23	**Trust**		7	2353	0.239	11.814	0.175	0.260	1	6	7	**0.857**
24	**Utilitarian Value**		9	498	0.242	5.493	0.157	0.323	**0**	**9**	**9**	**1.000**
25	Perceived Usefulness	Disconfirmation	3	1149	0.133	4.529	0.076	0.189	0	3	3	1.000
26	Satisfaction	Habit	3	755	0.456	13.499	0.397	0.511	0	3	3	1.000
27	**Confirmation**	**Perceived Ease of Use**	6	1511	0.458	19.214	0.471	0.548	**0**	**6**	**6**	**1.000**
28	Context		3	5121	0.233	16.981	0.207	0.259	0	3	3	1.000
29	Individualism		3	5121	0.300	22.143	0.275	0.325	0	3	3	1.000
30	Time perception		3	5121	0.177	12.797	0.150	0.203	0	3	3	1.000
31	Uncertainty Avoidance		3	5121	-0.137	-9.863	-0.164	-0.110	0	3	3	1.000
32	**Confirmation**	**Perceived Enjoyment**	7	2145	0.622	33.705	0.607	0.663	**0**	**7**	**7**	**1.000**
33	Context		3	5121	0.157	11.325	0.130	0.184	0	3	3	1.000
34	Individualism		3	5121	0.223	16.226	0.197	0.249	0	3	3	1.000
35	Uncertainty Avoidance		3	5121	-0.137	-9.863	-0.164	-0.110	1	2	3	0.667
36	Context	Perceived Monetary Value	3	5121	0.200	14.504	0.174	0.226	0	3	3	1.000
37	Individualism		3	5121	0.323	23.965	0.298	0.347	0	3	3	1.000
38	Time Perception		3	5121	0.190	13.760	0.163	0.216	0	3	3	1.000
39	Uncertainty Avoidance		3	5121	-0.233	-16.981	-0.259	-0.207	0	3	3	1.000
40	**Confirmation**	**Perceived Usefulness**	33	10168	0.504	55.921	0.492	0.522	**0**	**33**	**33**	**1.000**
41	Context		3	5121	0.223	16.226	0.197	0.249	0	3	3	1.000
42	**Disconfirmation**		6	1825	0.555	26.703	0.593	0.652	**0**	**6**	**6**	**1.000**
43	Individualism		3	5121	0.287	21.125	0.262	0.312	0	3	3	1.000
44	**Perceived Ease of Use**		12	3532	0.327	20.166	0.268	0.329	1	11	12	**0.917**
45	Time Perception		3	5121	0.177	12.797	0.150	0.203	0	3	3	1.000
46	Uncertainty Avoidance		3	5121	-0.170	-12.281	-0.196	-0.143	0	3	3	1.000
47	**Confirmation**	**Satisfaction**	35	10918	0.431	48.176	0.395	0.427	**0**	**35**	**35**	**1.000**
48	**Disconfirmation**		9	2576	0.576	33.299	0.550	0.601	**0**	**9**	**9**	**1.000**
49	Hedonic Benefit		3	928	0.349	11.080	0.291	0.404	0	3	3	1.000
50	**Information Quality**		5	1735	0.248	10.541	0.203	0.292	1	4	5	**0.800**
51	**Perceived Ease of Use**		10	7112	0.188	16.042	0.148	0.194	**0**	**10**	**10**	**1.000**
52	**Perceived Enjoyment**		12	8018	0.251	22.962	0.230	0.271	2	10	12	**0.833**
53	**Perceived Usefulness**		46	18018	0.248	33.995	0.217	0.245	8	38	46	**0.826**
54	Perceived Value		3	1158	0.203	6.996	0.147	0.258	0	3	3	1.000
55	Performance		3	2579	0.390	20.901	0.357	0.422	0	3	3	1.000
56	Service Quality		5	2608	0.296	15.574	0.058	0.151	2	3	5	0.600
57	Social Benefit		3	928	0.334	10.563	0.160	0.282	0	3	3	1.000
58	**System Quality**		7	2477	0.279	14.255	0.242	0.315	**0**	**7**	**7**	**1.000**
59	Trust		3	880	0.313	9.591	0.252	0.371	0	3	3	1.000
60	Utilitarian Benefit		3	928	0.182	5.598	0.119	0.244	0	3	3	1.000

Note: The highlighted relationships are the best predictors of the weight analysis.
AVG of cc = average of the correlation coefficient; Z-value = normal standard deviation.

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Table 2 – Moderations analysis

Moderator Level		Perceived Usefulness to Continuance Intention			Satisfaction to Continuance Intention		
		β	R	P_value	β	R	P_value
Sample size	Intercept	.338		.001	.502		.001
	High	1	.316		1	.448	
	Low	.159	.418	.038**	.049	.461	.409
Economic development	Intercept	.467		.001	.546		.001
	High	1	.380		1	.466	
	Low	-.067	.364	.454	-.026	.451	.712
Innovation Level	Intercept	.490		.001	.491		.001
	High	1	.414		1	438	
	Low	-.125	.330	.163	.094	.492	.113
Power Distance	Intercept	.497		.001	.455		.001
	High	1	.445		1	.414	
	Low	-.125	.320	.158	.143	.495	.015**
Individualism	Intercept	.499		.001	.526		.001
	High	1	.420		1	.449	
	Low	-.166	.308	.055*	.015	.393	.836
Masculinity	Intercept	.511		.001	.527		.001
	High	1	.435		1	.465	
	Low	-.138	.336	.153	-.118	.374	.060*
Uncertainty avoidance	Intercept	.361		.001	.473		.001
	High	1	.327		1	.430	
	Low	.159	.441	.096*	.018	.433	.772
Long Term orientation	Intercept	.332		.001	.540		.001
	High	1	.308		1	.455	
	Low	166	.420	.055*	-.020	.453	.769
Indulgence	Intercept	.394		.001	.584		.001
	High	1	.343		1	.484	
	Low	.063	.408	.431	-.115	.425	.053*

Note: *** $p < 0.01$; ** $p < 0.05$; * $p < 0.10$
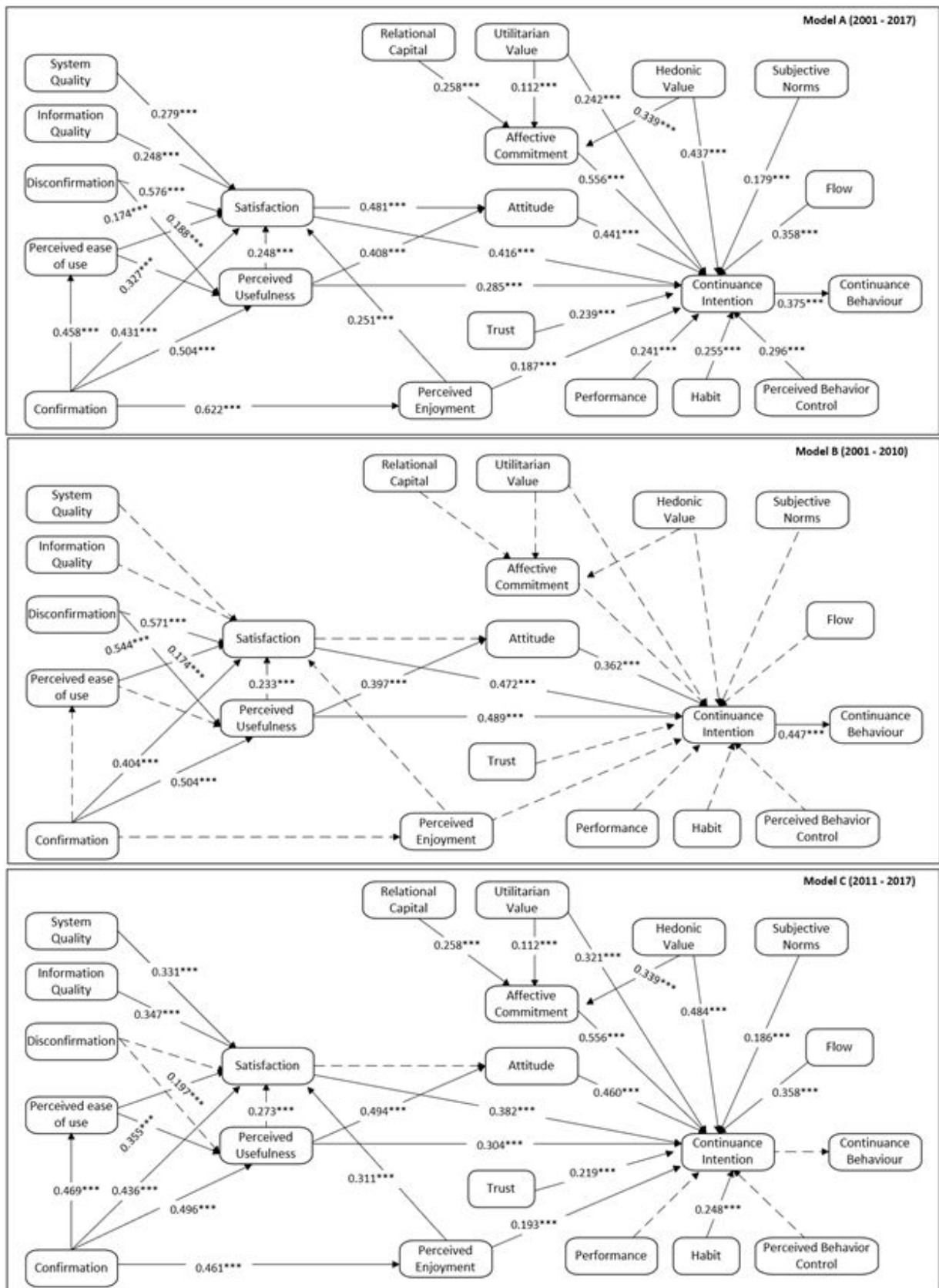
Figure 3 - Theoretical models based on meta- and weight analysis (*** p < 0.01; ** p < 0.05; * p < 0.10).
Note: The dashed relationships represented above were not statistically significant and best predictors in the period of analysis.

Appendix A – Research studies used in meta-analysis and weight analysis (Ordered by sample size).

Study	Country	Sample	Theory	Technology
Mohammadyari and Singh, 2015	New Zealand	34	Digital literacy and unified theory of acceptance and use of technology	E-learning
Bhattacherjee et al., 2008	Ukraine	81	Theory of reasoned action, theory of planed behaviour and expectation confirmation model	DMS – lotus notes
Ifinedo, 2017	Canada	108	Social-cognitive theory, technology acceptance model and motivation theory	Blogs for learning
Gallego et al., 2016	Spain	116	Gratifications theory	Social virtual worlds
Bhattacherjee, 2001	United States of America	122	Expectation confirmation theory	Online banking
Sørebø et al., 2009	Norway	124	Self-determination theory and expectation disconfirmation model	E-learning
Cheung et al., 2013	Hong Kong	124	Knowledge sharing, expectation disconfirmation theory and social cognitive theory	Online community
Barnes and Böhringer, 2011	Germany, United States of America, United Kingdom, etc.	131	ECM, habit and critical mass	Microblogging twitter
Budiardjo et al., 2017	Indonesia	131	DeLone and Mclean information system success model and ECM	Knowledge management system
Hong et al., 2016b	Taiwan	132	Cognitive-Affective Theory of Learning with Media	YouTube
Larsen et al., 2009	Norway	135	ECM, task technology fit	E-learning
Hsu and Chiu, 2004	Taiwan	149	TPB	Web-based tax filing service
Hong et al., 2017b	Taiwan	150	ECM	Government E-learning
Yoon and Rolland, 2015	South Korea	150	ECT	Social networking services
Carillo et al., 2015	Italy	150	Information system continuance model	Ubiquitous media systems - smartphone
Chang et al., 2014	Taiwan	166	SCT and Flow theory	Online games
Joo et al., 2018	Korea	166	Self-determination theory, TAM, and ECM	K-MOOC
Kaewkitipong et al., 2016	Thailand	169	UTAUT and ECM	Social media
Roca et al., 2006	Spain	172	TAM, TRA and TPB	E-learning
Premkumar and Bhattacherjee, 2008	United States of America	175	TAM and ED	Computer-based training
Bøe et al., 2015	Norway	177	ECM and Agency theory	E-learning Technology
Chiu et al., 2005	Taiwan	183	EDT, Perceived performance component	E-learning
Sällberg and Bengtsson, 2016	Sweden	192	Motivational model	Computer and smartphone
Kim et al., 2009	Korea	192	Social learning theory and theory of innovation	Mobile banking
Chen et al., 2015	Taiwan	195	ECM, Perceived voluntariness and habit	Teaching blogs
Pereira et al., 2015	Brazil	197	EDT and Virtual learning environment	E-learning
Hong et al., 2016a	Taiwan	200	Gratifications theory	Educational games
Chiu et al., 2007	Taiwan	202	Subjective task value and fairness theory	E-learning
Hong et al., 2015	Taiwan	203	ECM and Social anxiety	Facebook
Kim, 2010	South Korea	207	ECM and TPB	Mobile data service
Joo et al., 2016	Korea	222	TAM and ECM	Mobile learning management system
Limayem et al., 2007	Hong Kong	227	ECM, Habit, Frequency of past behaviour and comprehensiveness of usage	World Wide Web
Lin et al., 2011	Taiwan	230	TRA, negative critical incident and satisfaction	E-learning
Song et al., 2017	United States of America	236	TPB	Smart-connected sports products
Jin et al., 2010	China	240	ECM	Online communities
Zhang et al., 2017a	China	240	Theory of community social organisations and motivation theory	Social network services

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Study	Country	Sample	Theory	Technology
Wu and Chen, 2017	China	252	TAM and TTF	MOOCS
Warkentin et al., 2016	United States of America	253	PMT and ECT	Software - zedalert
Choi, 2016	Korea	253	TAM, UTAUT2 and ubiquitous connectivity	Smartphone – social networking services
Lin, 2016	Taiwan	255	TRA, NCI and satisfaction	E-learning
Lin, 2011	Taiwan	256	TRA and NCI	
Vedadi and Warkentin, 2016	United States of America	256	ECT	Mobile banking
Ku and Chen, 2015	Taiwan	256	TAM, ECM and satisfaction	E-tourism Website
Lu and Lee, 2011	Taiwan	268	UTAUT and social-psychological	Blog sharing
Zhou, 2011	China	269	ECT and TAM	Mobile services
Shin and Biocca, 2017	South Korea	271	Trans-theoretical model of behaviour change and ECT	Quantified self (Health)
Zhang et al., 2017b	China	273	ECM, Elaboration likelihood model	Mobile healthcare applications
Sun and Mouakket, 2015	China	275	D/M ISSM and ISCM	Enterprise systems
Hong et al., 2017a	Taiwan	276	diffusion of innovation theory, TAM, ECT, and flow theory	Smartwatch
Chang and Zhu, 2012	China	283	ECT	Social Networking sites
Chiu and Wang, 2008	Taiwan	286	UTAUT	E-learning
Chiu et al., 2007	Taiwan	289	D/M ISSM and fairness theory	E-learning
Kim, 2011	South Korea	292	ECM and subjective norm	Social-networking services
Zhao and Lu, 2012	China	294	EDT	Micro-blogging service
Susanto et al., 2016	Korea	301	ECM	Smartphone banking services
Liao and Shi, 2017	Hong Kong	302	TAM and ECM	Online tourism service
Wang, 2015	Taiwan	304	ECM and TAM	Mobile value-added service
Alraimi et al., 2015	74 countries (United States America, India, Greece, Azerbaijan, etc)	316	ECM	MOOCS
Budner et al., 2017	Germany	321	ECM	Cloud service
Zhou and Li, 2014	China	330	ECM	Mobile social network
Seol et al., 2016	Korea	333	Communicative ecology theory	Social networks sites
Huang, 2016	Taiwan	333	Social penetration theory	Facebook
Lehto and Oinas-Kukkonen, 2015	Finland	333	Persuasive systems design	Health web-based
Oghuma et al., 2016	South Korea	334	ECM	Mobile instant messaging
Belanche et al., 2014	Spain	336	TAM, TPB, Trust transfer	Public e-services
Barnes, 2011	United Kingdom	339	TAM and ECM	Virtual worlds
Hsiao and Chiou, 2012	Taiwan	340	Social capital theory	Massive multiplayer online game
Cho, 2016	Korea	343	post-acceptance model and TAM	Health apps
Choi and Joo, 2016	United States of America	345	D/M ISSM and sense of community	Social cataloguing sites
Hong et al., 2008	Korea	345	TAM, TRA and TPB	Hanaro telecom
Chen, 2007	Taiwan	360	Cognitive dissonance theory, EDT and ECT	Virtual communities, forum, newsletters
Lee, 2010	Taiwan	363	ECM, TAM, TPB and Flow theory	E-learning
Chen et al., 2013	Taiwan	368	Technology readiness and ECM	Mobile services
Hsiao et al., 2016	Taiwan	378	TRA, TPB, TAM, UTAUT and ECM	Mobile social apps
Chen, 2012	Taiwan	390	ECM, SERVQUAL, perceived risk and technology readiness	Mobile banking
Mouakket, 2015	United Arab Emirates	397	ECM	Facebook
Mouakket, 2016	United Arab Emirates	397	ECM	Facebook
Hsu et al., 2006	Taiwan	401	TPB and EDT	Online Shopping, PC home Online
Al-Debei et al., 2013	Jordan	403	TPB	Facebook
Chen et al., 2012	Taiwan	409	ECT and TRA	Web 2.0

Study	Country	Sample	Theory	Technology
Chong, 2015	China	410	ECM, perceived ease of use, perceived usefulness, Trust and perceived cost	M-commerce
Lee and Kwon, 2011	Korea	420	ECM, familiarity and intimacy	Online shopping service
Steelman and Soror, 2017	United States of America	436	ECT and cognitive dissonance theory	Mobile phone
Zhou et al., 2012	China	438	Dedication-constraint framework	Social virtual world services
Liao et al., 2006	Taiwan	446	Trust, habit and continuance intention	B2C web site
Yang and Lin, 2017	Taiwan	451	Theory of consumption values	Social network services, location-based services, and mobile technologies
Gao et al., 2015	China	462	D/M ISSM, flow theory and trust	Mobile purchase
Dałhan and Akkoyunlu, 2016	Turkey	467	Technology continuance theory, cognitive model and ECM	E-learning
Lowry et al., 2015	Hong Kong, China and Taiwan	477	EDT and ECM	Gaming website, Wikipedia, amazon mechanical Turk
Chen et al., 2009	Taiwan	481	TAM, TPB and technology readiness	E-reservation/ticketing, kiosks, ATM, internet or mobile banking/finance/investment
Lin and Bhattacherjee, 2010	Taiwan	485	ECM and interactive hedonic systems	Online video games
Krasnova et al., 2017	Germany	488	ECM, gratification theory, and self-construal theory	Social networking sites
Limayem and Cheung, 2008	Hong Kong	505	ECM, habit and prior behaviour	Internet-based Learning
Limayem and Cheung, 2011	Hong Kong	505	ECM and Habit	Internet-based learning
Hsiao and Chang, 2014	Taiwan	508	ECM, TRA and TAM	Mobile advertising
Abbas and Hamdy, 2015	Kuwait	512	SERVQUAL	Mobile service provider
Bhattacherjee and Lin, 2014	Taiwan	514	ECM	Insurance company
Lin et al., 2017	United States of America	523	ECM and social network sites construct	Facebook
Amoroso and Lim, 2017	Philippine	528	ECM	Mobile applications
Zhong et al., 2015	China	543	TPB and ECM	Mobile travel booking service
Hadji and Degoulet, 2016	France	571	TAM, UTAUT and ECM	Clinical information system
Lu et al., 2017	United States of America	584	UTAUT2 and ECT	Mobile application
French et al., 2017	United States of America	593	TPB, self-determination theory and social capital	Social networking tourism sites
Kang and Lee, 2015	Korea	600	SCT	IM service - NateOn
Lankton and McKnight, 2012	United States of America	600	EDT and performance	Microsoft access
Bhattacherjee and Premkumar, 2004	United States of America	613	EDT and TAM	Computer-based training, rapid application development software
Liang et al., 2013	Taiwan	623	TTF and TPB	Mobile services
Lin et al., 2014	United States of America	742	Self-regulation theory	Facebook
Kang, 2014	United States of America	755	Motivational communication theory and TAM	Mobile application
Zhou et al., 2015	United States of America, Great Britain, etc	828	Perceived benefits, affective commitment and ECM	Social virtual world
Zhou et al., 2014	China	928	Fulfilment perspective, and Social benefits	Social virtual world
Ahmad and Sun, 2018	China and Pakistan	496, 441	ECM, Perceived risk and perceived value	Social media mobile applications
Zhao et al., 2012	China	1075	SERVQUAL and justice	Mobile value-added services
Chou et al., 2010	China, Taiwan	2229	ECT, Perceived identity verification and perceived usefulness	Baidu and yahoo
Lee et al., 2007	Korea, Hong Kong, Taiwan	5121	TAM and interaction theory	Mobile internet

Notes: Unified theory of acceptance and use of technology (UTAUT), theory of reasoned action (TRA), theory of planed behaviour (TPB), expectation confirmation model (ECM), technology acceptance model (TAM), expectation confirmation theory (ECT),

expectation disconfirmation model (EDM), social cognitive theory (SCT), task technology fit (TTF), media system dependency theory (MDT), expectation disconfirmation theory (EDT), negative critical incident (NCI), information system continuance model (ISCM), protection motivation theory (PMT), DeLone and Mclean information system success model (D/M ISSM), diffusion of innovation theory (DIT), post-acceptance model (PAM), technology continuance theory (TCT), service quality (SERVQUAL), and self-determination theory (SDT).

Appendix B – Number of research studies by Journal.

Nº	Journal	2001 - 05	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	Total
1	AIS Transactions on Replication Research												1	1	2
2	**Behaviour and Information Technology**	**1**					**2**	**4**			**1**	**2**	**1**		**11**
3	**Computers and Education**	**1**		**1**		**1**	**1**	**1**				**3**	**2**	**1**	**11**
4	**Computers in Human Behaviour**					**1**			**2**		**1**	**5**	**5**	**8**	**22**
5	Computers in Industry											1			1
6	Cyberpsychology, Behaviour, and Social Networking							1		1					2
7	Decision Support Systems								2	1	1		1		5
8	Educational Technology Research and Development												1		1
9	Electronic Commerce Research and Applications							1							1
10	European Journal of Information Systems										1	1			2
11	Expert Systems with Applications						1								1
12	Industrial Management and Data Systems				1								1		2
13	**Information and Management**				**2**			**1**	**1**		**2**	**2**		**3**	**11**
14	Information Systems Journal			1		1	1								3
15	Information Technology for Development												1		1
16	International Journal of Business and Management											1			1
17	International Journal of Electronic Commerce			1											1
18	International Journal of Human-Computer Studies		2												2
19	International Journal of Information Management		1										1		2
20	International Journal of Medical Informatics											1			1
21	International Journal of Mobile Communications								1	1	1				3
22	Internet Research										1				1
23	Journal of Biomedical Informatics											1			1
24	Journal of Computer Information Systems				2			1		1	1	1	1	1	7
25	Journal of Global Information Technology Management												1		1
26	Journal of High Technology Management Research												1		1
27	Journal of Information Science			1											1
28	Journal of Information Systems and Technology Management											1			1
29	Journal of Management Information Systems								1						1
30	Journal of the American Society for Information Science and Technology									1					1
31	Journal of the Association for Information Science and Technology											1			1
32	Journal of the Association for Information Systems								1		1				2
33	Journal of Retailing and Consumer Services												1		1
34	Journal of Strategic Information Systems												1		1
35	Knowledge Management and E-Learning: An International Journal												1		1
36	MIS Quarterly	2		1											3
37	Omega				1										1
38	Service Business											1			1
39	Sport Management Review													1	1
40	Telematics and Informatics											2			2
	Total	4	3	5	5	4	5	9	8	5	8	19	18	22	115

Note: The highlighted journals have more than ten publications.

Appendix C: Definition of variable names

Study	Original variable name	Selected variable name
Wang, 2015 Hong et al., 2017b Zhou and Li, 2014 Susanto et al., 2016 Ku and Chen, 2015 Lowry et al., 2015 Bhattacherjee, 2001 Lin and Bhattacherjee, 2010	Continuance Intention Continuance intention to use Continuance usage Continuance Use Intention Continued Usage Intention Intention to continue IS continuance intention Usage Intention	Continuance intention
Yoon and Rolland, 2015 Oghuma et al., 2016 Lankton and McKnight, 2012	Perceived Usefulness Usefulness Usefulness Expectations	Perceived usefulness
Susanto et al., 2016 Lin et al., 2011 Yoon and Rolland, 2015	User Satisfaction Overall Satisfaction Satisfaction	Satisfaction
Chong, 2015 Chen et al., 2013	Confirmation Confirmation of Expectations	Confirmation
Lu et al., 2017 Chong, 2015	Enjoyment Perceived Enjoyment	Perceived enjoyment
Premkumar and Bhattacherjee, 2008 Kang, 2014	Performance Performance Expectancy	Performance

Appendix D: Moderators description

Variable	Description	Coding
Sample size	The sample was classified in two groups: small or large. From the sample number presented in each study, we adopted the median of the sample sizes as the cut-off point.	0 = small 1 = large
Economic development	Economic development was classified using the country reported in the methodology of each study. We checked whether the studies came from developed or developing countries (Zarantonello et al., 2013).	0 = developing 1 = developed
Innovation Level	The innovation level was coded using information from the Bloomberg Innovation Index 2019. In this case, we obtained the median values of each country of origin of the studies analysed.	0 = low innovation 1 = high innovation
Power Distance	The power distance was classified using the level (low vs high). The groups were created using the origin of the study and were based on the parameters established by (Hofstede and Minkov, 2010) obtained from the median of the indices of each country.	0 = low power distance 1 = high power distance
Individualism	We coded the degree of individualism (low vs high). The groups followed the same procedures mentioned in the power distance item.	0 = low degree of individualism 1 = high degree of individualism
Masculinity	The degree of masculinity was identified (low vs high). The groups followed the same procedures mentioned in the power distance item.	0 = low degree of masculinity 1 = high degree of masculinity
Uncertainty avoidance	We coded the groups associated with a low level and a high level of uncertainty avoidance. The procedure followed the logic established and quoted in the power distance dimension.	0 = low uncertainty avoidance 1 = high uncertainty avoidance
Long Term orientation	We classified the long-term orientation in two groups (low vs high). Then we have followed the same procedures mentioned in the power distance.	0 = low long-term orientation 1 = high long-term orientation
Indulgence	The procedures mentioned in the power distance was also used in this cultural dimension (low and high level of indulgence).	0 = low indulgence 1 = high indulgence