Information Systems Success Model: A Review of Literature

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The most significant topic for current researchers and scholars is Information Systems (IS) success. DeLone and McLean developed an IS success model and introduced it to provide a complete and extended definition of IS success. To-date, thousands of scholarly articles have cited the IS success model. However, despite its evident impact, only a few researchers have reviewed these studies. Hence, the purpose of this study is to perform a comprehensive literature review of past research papers that have utilised the IS success model as a theoretical foundation. Using the Scopus database, the review of literature is based on 114 scholarly articles and conference papers from the years 2012 to 2018. The analysis covers demographics, methodology, significance and limitations of association of the variables. The results show that developing countries are the major sources of the primary data; while, e-government, enterprise resources planning and e-learning systems are the most examined systems. The review shows that the methodologies most used are survey and cross-sectional approaches. The analysis also indicates a lack of longitudinal work and use of homogeneous samples, as among the limitations highlighted by prior researchers. The results of this study will add to the extant knowledge of the past studies which have incorporated the IS success model.

Keywords: *DeLone & McLean, IS Success Model, IS Success, Literature Review*

Introduction

In the contemporary global world, the growth rate of IS usage is high, and it has now become an agent of development for individuals, organisations, and governments at large and has an impact on all facets of life. The performance of organisations and governments and their ability to withstand the competitive power depends on the extent to which they deploy IS usage. Therefore,

the implementation of IS and its success has long been a subject of interest in the IS field (Delone & McLean, 2016). Molla and Licker (2001) stated that there are numerous definitions of and measures for IS success. However, the definition of IS success is not the same for all stakeholders and varies according to their perspective (DeLone & McLean, 2003). Hence, the multi-dimensional concept of IS and its success can be investigated based on several perspectives (Molla & Licker, 2001).

Since the 1980s, IS scholars have been struggling to identify the factors that can lead to IS success, as well as conducting research to build models based on empirical evidence to improve IS and make it more successful (Sørum, Medaglia, Andersen, Scott, & DeLone, 2012). This phenomenon led to the creation of an IS success model classification by DeLone and McLean (Urbach & Müller, 2012). The IS success model was first developed in 1992 by DeLone and McLean and provides an extended and comprehensive definition of IS success.

DeLone and McLean (1992) established six categories or major dimensions of IS success, i.e., information quality, system quality, use, user satisfaction, individual impact, and organisational impact. This general theory of IS, as mentioned by Tam and Oliveira (2016), posits that system quality and information quality may be positively correlated to performance if the end-user is satisfied and makes use of the system. Thus, the model, in general, gives a widely acceptable taxonomy for measuring IS success determinants.

Following the publication of the initial IS success model by DeLone and McLean, numerous scholars in the field have endeavoured to establish its extension and re-definition, or even criticised it as a whole (e.g., Kettinger & Lee, 1994; Pitt, Watson, & Kavan, 1995; Seddon & Kiew, 1996; Seddon, 1997). The opponents put forth claims that the model is inadequate and requires the inclusion of more dimensions, and that there are better alternatives to IS success models. Its advocates meanwhile maintaining the validity of DeLone and McLean's model and claim that it could adequately measure IS success (e.g., Molla & Licker, 2001; Rai, Lang, & Welker, 2002).

Later, DeLone and McLean (2003) updated their initial IS success model. The updated model, which came about a decade after the first model was developed, incorporates the identification of the strengths and weaknesses of the earlier model. The new model of DeLone and McLean (2003) was the result of criticism in the prior literature (e.g., Kettinger & Lee, 1994; Pitt et al., 1995; Seddon, 1997). The major enhancement of the revised IS success model is the incorporation of the service quality element. Meanwhile, the construct of intention to use is designated for measuring usage, while the authors combined individual and organisational impacts into a single construct of net benefits (Petter & McLean, 2009; Urbach & Müller, 2012). Figure 1 abelow shows the updated version of DeLone and McLean's (2003) IS success model.

Figure 1. IS Success Model (DeLone & McLean, 2003)
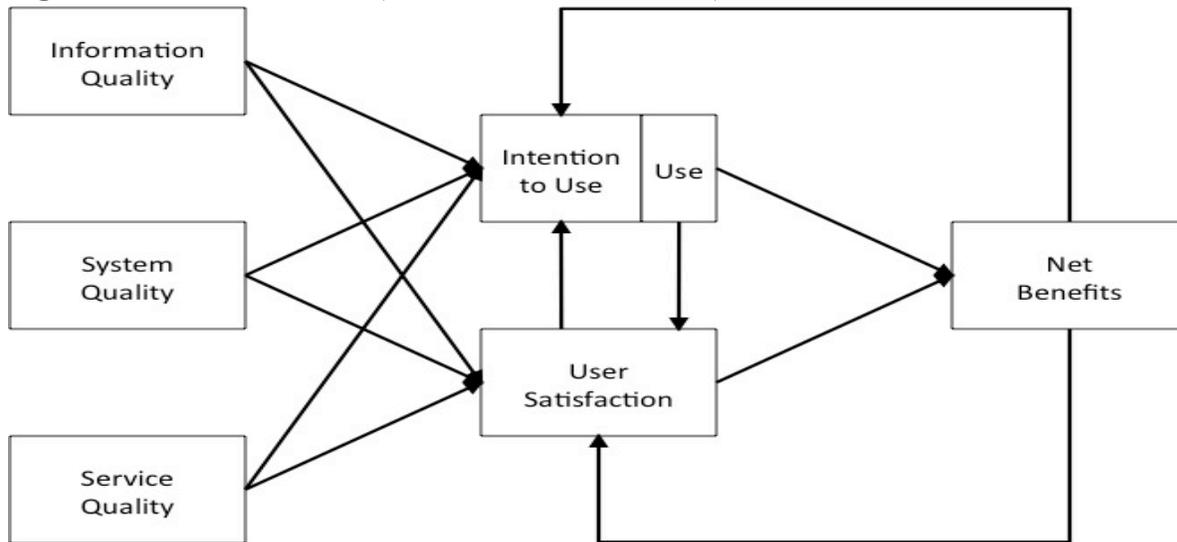
Although various models have been proposed for measuring IS success, the studies on IS success have been largely influenced by the updated IS Success Model (Urbach & Müller, 2012). The model provides a complete set of guidelines and a comprehensive framework to enable the conduct of further research on IS success (Ghobakhloo & Tang, 2015; Petter, Delone, & McLean, 2008, 2013). Apart from that, it further helps to explain the benefits of IS usage by individuals and organisations (Wang, Wang, Lin, & Tsai, 2018).

As thousands of scholarly articles have cited the IS success model to date, this model is therefore known to be among the most influential theories in modern IS research. Despite this evident impact, to the best of our knowledge, only a few researchers have either reviewed or surveyed the IS success model's performance, or explored the results, limitations, and possible future directions of this model. For example, Petter and McLean (2009) conducted a comprehensive meta-analysis by reviewing 52 empirical researches on the different associations of IS success model analysis at the individual level. Later, Petter, DeLone, and McLean (2013), who reviewed 140 studies published between 1992 and 2007, revealed the potential determinants of IS success model and 43 constructs from past literature having a possible impact on several dimensions of IS success. Also, Petter et al. (2013) determined 12 variables that have a moderate or somewhat strong support level with a specific measure of IS success. More recently, Nguyen, Nguyen, and Cao (2015) employed a multi-dimensional approach to analyse IS success studies. A review of 45 research papers published between 1992 and 2005, indicates that "success" is denoted in the form of individual benefits and DeLone and McLean's model is the most widely used by prior studies.

In response to the call for an ongoing analysis of IS success studies from different contexts and by using different sources (DeLone & McLean, 2016; Nguyen et al., 2015; Petter et al., 2013), this paper provides an extensive review of the literature to uncover the current status of the research in

this area and to highlight potential gaps that researchers need to address. It also provides the impetus to encourage researchers to carry out such investigation.

This article is organised as follows. Section two describes the research methodology employed in the current study, by specifying search procedures and selection criteria of relevant prior studies. Following that, section three reports the results and discussions by explaining demographic characteristics, the topics of focus, methodologies employed, and limitations specified by the earlier studies. Finally, section four offers a conclusion of the study, its limitations, and directions for future research.
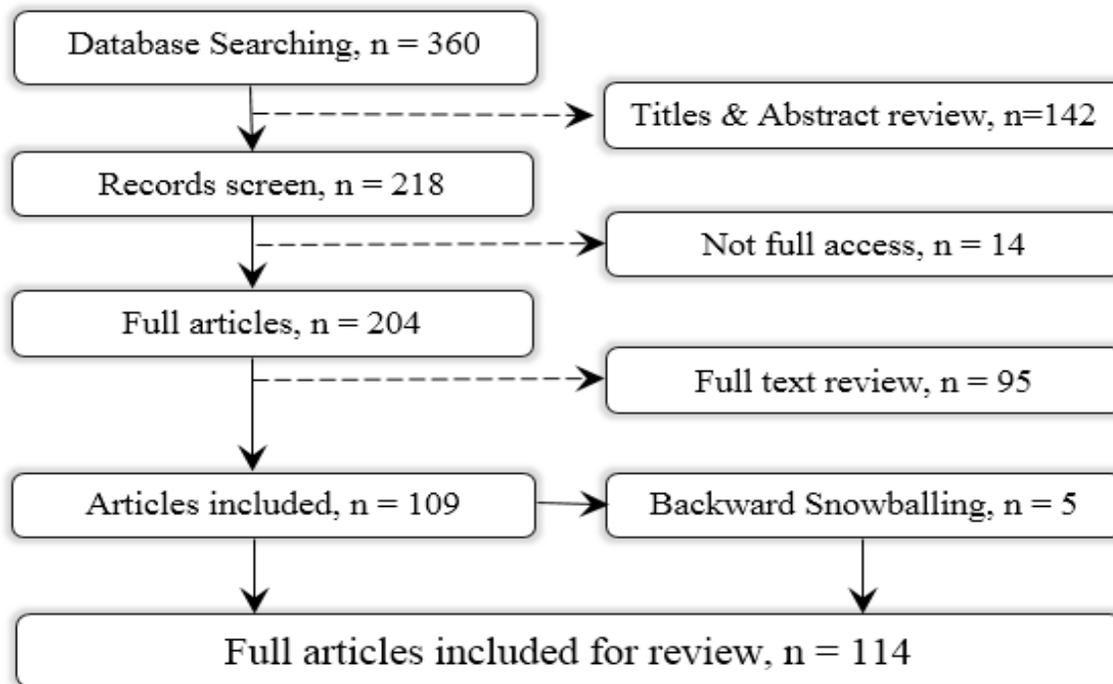
Methodology

The literature review analysis started with the collection of articles related to the topic of interest. To narrow down the search results while generating a higher percentage of relevant articles from the search results, the authors truncated the databases, document types, and subject areas in the search process. Webster and Watson (2002) indicated that the main papers should be made available in major journals; hence, for this study, the authors searched the "Scopus" databases, which included major scientific databases, like Wiley-Blackwell, IEEE, Elsevier, and Springer-link.

This literature review was executed from January to April 2019, the strings were run on the electronic databases in February 2019. The identification of related literature was typically done using keyword searches (Cronin, Ryan, & Coughlan, 2008). Using keywords is an effective way to locate relevant articles for a specific topic (Ramdhani, Ramdhani, & Amin, 2014). Since the wording that is most relevant to this paper's theme, namely "IS success model", did not deliver too many results, following Cronin et al.'s (2008) suggestions, we chose alternative keywords but with similar meanings to elicit more related articles. Hence, the search process employed the "DeLone and McLean" term in combination with ''IS success model''. By using Scopus databases, the search strategy included the terms, "IS success model" and/or "DeLone * McLean" (as it appears in article title, abstract, or keywords) and published within the timeframe of 2012 and 2018. The authors further limited the selection to articles written in English and which were empirical in nature (covering both quantitative and qualitative research designs). More importantly, only empirical studies were targeted that have employed the updated DeLone and McLean (2003) IS success model as a theoretical foundation.

The initial literature search produced 360 publications on DeLone and McLean's IS success model. The second phase involved the review of titles and abstracts of each article identified in the initial search phase. The second stage review led to the exclusion of 142 articles as they did not meet the specified criteria or are not empirical in nature, leaving 218 articles for further analysis. This led the authors to have full access to only 204 studies. Upon reviewing the full texts, only 109 studies

were found to be relevant for analysis. Following Wohlin's (2014) suggestion, this study employed backward snowballing to identify additional related papers to be considered for analysis. Backward snowballing means using the reference list to identify the inclusion of new papers (Wohlin, 2014). This resulted in the addition of another five papers. Overall, a total of 114 relevant articles were considered for this study. Figure 2 below illustrates the complete literature search processes and the outcome of each process.

Figure 2. Literature review information flow diagram

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┌──────────────────────────────┐
│ Database Searching, n = 360  │
└──────────────────────────────┘
          │           ┌──────────────────────────────────┐
          │ ─ ─ ─ ─ ─▶│ Titles & Abstract review, n=142  │
          ▼           └──────────────────────────────────┘
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│ Records screen, n = 218      │
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          │           ┌──────────────────────────────────┐
          │ ─ ─ ─ ─ ─▶│ Not full access, n = 14          │
          ▼           └──────────────────────────────────┘
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│ Full articles, n = 204       │
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          │ ─ ─ ─ ─ ─▶│ Full text review, n = 95         │
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┌──────────────────────────────┐    ┌──────────────────────────────────┐
│ Articles included, n = 109   │──▶ │ Backward Snowballing, n = 5      │
└──────────────────────────────┘    └──────────────────────────────────┘
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┌────────────────────────────────────────────────────────────┐
│ Full articles included for review, n = 114                 │
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For data analysis, several tools have been identified as useful for summarising, analysing, and synthesising the main articles (Ramdhani et al., 2014). Microsoft Excel has been widely used as a tool to help researchers to analyse papers and write-up the results (Bandara, Furtmueller, Gorbacheva, Miskon, & Beekhuyzen, 2015; Ramdhani, et al., 2014). The researchers extracted the necessary information from the published articles and tabulated the information to facilitate data analysis. The information captured from each article were name of the author(s), title of the study, year of publication, keywords, research topic, the country in which the research was conducted, study objectives, methodology employed, the independent and dependent variables examined, key findings, and authors' recommendations. This systematic and critical review was ultimately categorised into several parts, for example, the major research methodology applied, the industry/sector focused on, the major variables examined, and the findings. These data were analysed in several different ways, as reviewed in Section 3.

Results and Discussion

This section describes the analysis of IS studies, where the results and discussions of the literature review are assembled and shown, as follows: 1) demographic characteristics; 2) research topics of IS and types of systems studied; 3) research methodologies employed; and 4) limitations reported by previous studies.

Demographic characteristics

Source Title

From 2012 to 2018, several articles were identified from international conferences and academic journals on a similar theme as represented in Table 1 below. This includes Hawaii International Conference on System Sciences (2.6%), the International Conference on Soft Computing, and Intelligent System and Information Technology (1.7%), Similarly, several major journals, such as the Journal of Theoretical and Applied Information Technology (9%), Int. J. Business Information Systems (3.5%), and Information & Management (3.5%) have done so. The remaining 65 journals/conferences have only one paper. All this shows the varied and extensive publishing scenario for IS success model researchers.

**Table 1:** Publishers of IS success model research articles

Source title (Journal/Conference)	No. of Articles	(%) of 114
Journal of Theoretical and Applied Information Technology	10	9
International Journal of Business Information Systems	4	3.5
Information & Management	4	3.5
Telematics and Informatics	3	2.6
Computers in Human Behavior	3	2.6
Hawaii International Conference on System Sciences	3	2.6
International Journal of Mechanical Engineering & Technology	2	1.7
IOP Conference Series: Materials Science and Engineering	2	1.7
Indonesian Journal of Electrical Engineering and Informatics	2	1.7
Procedia Computer Science	2	1.7
International Conference on Soft Computing (ICSIIT)	2	1.7
Internet Research	2	1.7
Information Systems Management	2	1.7
Industrial Management & Data Systems,	2	1.7
Information Technology for Development	2	1.7
Healthcare informatics research	2	1.7
International Journal of Information Management	2	1.7

Note: Only journals with more than one publication are presented in this Table.

Date of publication

This section presents the number of works on IS success model published between 2012 and 2018. Specifically, 14 articles were published in 2012 and 13 in 2013, with the lowest number of nine articles and the highest of 24 articles in 2014 and 2018, respectively. Figure 3 below presents a detailed timeline of the published works over the seven years.

Figure 3. No of articles by year of publication
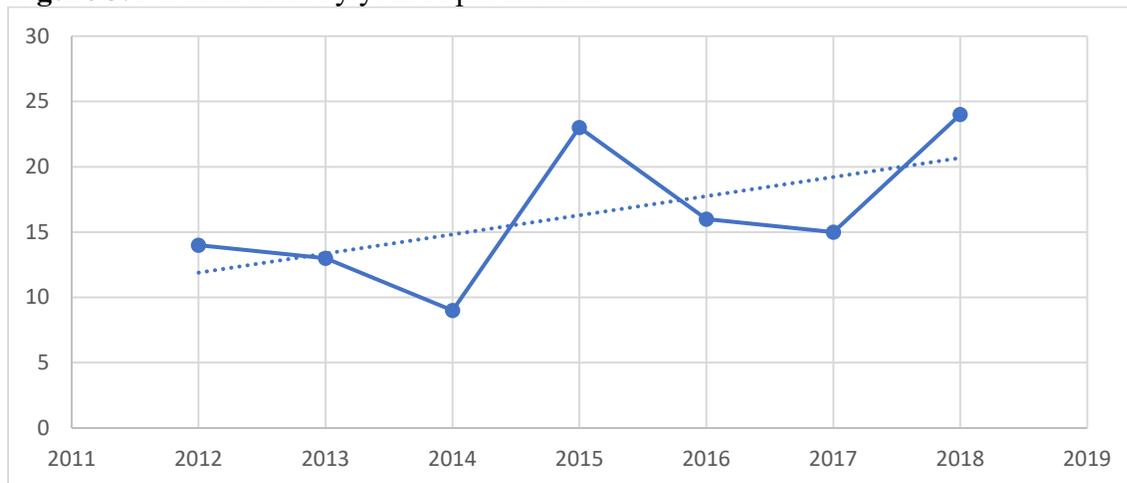
From 2012, this analysis was carried out to determine the overall trend for the subsequent years. The upward trend in the number of studies using the IS success model as a theoretical foundation is expected to continue with further increases after 2018. Tis research proposition is due to the fact that governments, businesses, and people rely more on adopting and using IS over time, especially in developing countries.

Number of authors

The results regarding the number of authors is that there are one to seven authors per article. Two authors have the highest number of publications (41 publications), while one research paper was issued by a seven-author group (i.e., Martins et al., 2018). Moreover, individual authors published about 14 articles, three authors issued 34 papers, four authors published 12 research papers, five authors published nine articles, and six authors published four research articles. This comprehensive analysis also found that almost 321 article writers contributed to 114 research studies. Table 2 below reveals the names of authors who have three or more publications.

Table 2: Most productive authors

Prolific authors	University	No. of Articles
Yogesh K. Dwivedi	Swansea University	6
Nripendra P. Rana	Swansea University	5
Michael D. Williams	Swansea University	5
Thurasamy Ramayah	Universiti Sains Malaysia	4
Jengchung Victor Chen	University of Hawaii	4
Vishanth Weerakkody	Brunel University	3
Lisa Y. Chen	I-Shou University	3
Tiago Oliveira	Universidade Nova de Lisboa	3

With the abovementioned authors publishing 20 out of the 114 selected papers, there is clear indication that research on the IS success model has yet to gain the attention of prolific scholars. Such works are dispersed among a wide group of authors, with each only contributing a few articles, except for one group which has four papers, i.e., Rana, Dwivedi, and Williams (Rana et al., 2015; Rana et al., 2014; Rana et al., 2013a; Rana et al., 2013b). This research analysis reveals that one study (i.e., Cho et al., 2015) entailed a government initiative to assess the performance of new IS in South Korea's public hospitals, which is based on the IS success model introduced by DeLone and McLean.

Review based on country

The reviewed articles deal with studies conducted in five continents, comprising Asia, Europe, North America, Africa, and South America. Studies are allocated in this section according to the geographic distribution of "Sources of primary data". As detailed in Figure 4 below, the highest number of researchers in the field of IS success model in the period under review emanate from Asia. Specifically, 84 articles (e.g., Chen, 2012; Cho et al., 2015), representing 74% of the studies, is from the Asian continent. This could possibly be due to the fact that many countries in Asia are developing countries with medium or high level of adoption of IS with a low level of technological advancement.

Figure 4. Review based on continents
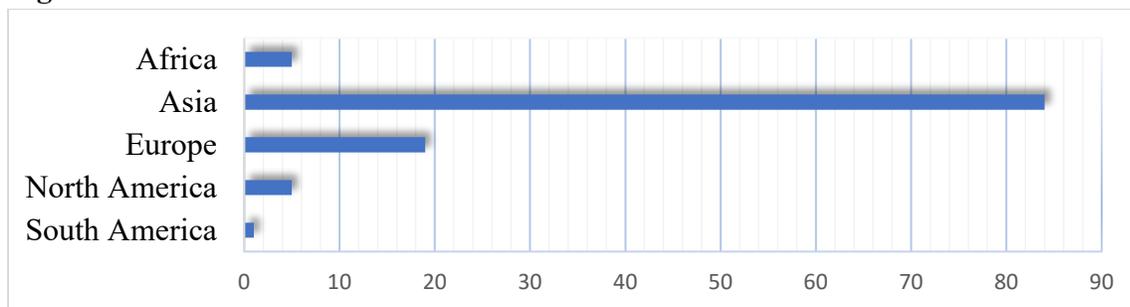
The reviewed articles from Europe, North America, and Africa account for 17%, 4%, and 4%, respectively. The lowest number of articles from South America. The low level of research in these advanced continents may possibly be as a result of a high level of IS adoption comprising a high level of technological advancement that does not pose a problem to the countries.

A total of 36 countries across these continents were studied. When categorised by ranking, Indonesia is ranked top with 21 studies (18%), Taiwan with 12 (10%), and Malaysia with 9 (7.5%). Table 3 shows the geographical distribution of the studies. Comparative studies on the IS success factors were also conducted involving two or three nations. However, we counted these as two or three different studies (example, e.g., Chen et al., 2013; Ghobakhloo & Tang, 2015; Wie &

Widjaja, 2017) as the survey results are independent of one another. Table 3 below shows the countries commonly used for the collection of primary data.

Table 3: Review based on Country

Country	No.	(%) of 118*	Country	No.	(%) of 118
Indonesia	21	18	Portugal	5	4
Taiwan	12	10	China	4	3.5
Malaysia	9	7.5	UK	4	3.5
India	8	6.5	Iraq	3	2.5
South Korea	7	6	Thailand	3	2.5
USA	5	4	Iran	3	2.5

* Comparative studies considered as more than one study.

From the review of previous studies, developing countries contribute by more than 79% from the previous studies, while low-income countries (World Bank, n.d.) contribute by just six studies (4.5%), especially from Yemen (Aldholay et al., 2018a; Aldholay et al., 2018b), Uganda (Namisango et al., 2017), Ethiopia (Borenaa & Negashb, 2015), Nepal (Manandhar et al., 2015), and Tanzania (Lwoga, 2013). Hence, the findings are consistent with previous researcher proposition (i.e., Borenaa & Negashb, 2015) on the validation of the IS success model in high-income nations and the lack of similar studies in low income nations. As a result, these are the gaps for scholars from the low-income countries to research further on the IS success model.

IS research topics and types of systems examined

Keyword analysis

In this analysis, unique keywords were identified. As expected, "IS success model" appeared most often, followed by "user satisfaction", "IS success", "DeLone and McLean", and "structural equation modelling". In addition, various constructs of IS success model, such as "system quality", "information quality", and "service quality", appeared 10 or more times.

The consistent use of certain terms and words, like "IS success", "e-government", "e-learning", "enterprise resource planning", "education" and "e-commerce", suggests that the studies have focused on examining the success of IS in various education, business, and government sectors. Table 4 belwo presents the 20 most used keywords in this analysis.

Table 4: Most frequently used keywords

Keywords	No.	Keywords	No.
IS success model	56	Service quality	10
User satisfaction	32	Education	10
IS success	27	Net benefit	10
DeLone and McLean	27	Trust	9
Structural equation modelling	16	PLS	9
e-Government	14	Use	8
System quality	13	Enterprise resource planning	8
Information quality	13	e-commerce	7
e-learning	11	Intention to use	6
Performance	10	Seddon	6

Review based on the systems examined

IS implementation could involve a lot of resources, time, and money, which makes the measurement of the success of IS a very important thing to do (Pringgandani et al., 2018). Scholars have developed several models to measure the success of IS. These models must be valid and in accordance with the needs and characteristics of the IS to be measured (Surya & Gaol, 2018). The indicator-based IS success model, suggested by DeLone and McLean in 2003, evaluates IS success and performance. This model might be applicable for studying the individual or organisational impact of systems, particularly on the aspect of performance. Thus far, this model has been utilised to evaluate IS in numerous fields (DeLone & Mclean, 2016; Petter et al., 2008; Rana & Dwivedi, 2018; Widjaja et al., 2018).

Many studies have used and supported the validity of the DeLone and Mclean framework in different applications, such as enterprise resource planning (ERP) (Hsu et al., 2015), e-health (Cho et al., 2015), e-learning systems (Aldholay et al., 2018a), knowledge management systems (KMS) (Wang & Yang, 2016), e-procurement systems (Ramantoko & Irawan, 2017), e-commerce (Ali et al., 2018), and e-government systems (Stefanovic et al., 2016). Results from this analysis show that 114 systems have been tested by the researchers. To facilitate the analysis, we grouped them under common characteristics. Table 5 below lists the most frequent types of IS in our analysis.

Table 5: Review based ISs

Type of IS	No.	%	Type of IS No.		%
e-government systems	26	23	e-library	2	1.75
e-learning	20	17.5	e-insurance	2	1.75
e-commerce	10	9	Social network sites (SNS)	2	1.75
ERP	9	8	Radio frequency identification	2	1.75
e-banking	8	7	Academic IS	2	1.75
e-health	6	5	KMS	2	1.75
Websites portal	3	2.6	Others[a]	17	15
Business intelligence	3	2.6			

[a]Others include: CyberAirport; e-Cargo; e-Prosata.

E-government systems were the most frequently examined (e.g., Al-Sulami & Hashim, 2018; Al Athmay et al., 2016); followed by e-learning systems (e.g., Seta et al., 2018). The least tested systems include e-Prosata (Surya & Gaol, 2018); Billing and Revenue Management Systems (Tangsuwan & Mason, 2018); e-Cargo (Monika & Goal, 2017); and e-Tourism (Samsi et al., 2016). However, our result contradicts Rana et al. (2013a, 2015), who indicated that only limited research has been carried out to assess the success level of e-government systems.

From the above results, it is observed that IS success model is applicable for different technological applications and demonstrates certain power to explain the success or failure of these IS. This result is consistent with that of Legner, Urbach and Nolte (2016), who explained that the IS success model is not dependent on technological features, but rather on the quality of dimensions as perceived by the users. This, therefore, enables the comparison of the success factors for various technologies and applications (Legner et al., 2016). The review found one study which indicates the inability of the IS success model to explain success. Pringgandani et al. (2018) aimed to measure the success of an e-learning system in the Indonesian educational sector; the results of this study are that six out of the eight hypotheses developed are insignificant. Hence, Pringgandani et al. (2018) suggested further research to find the determinant variables of the success of IS in order to create a suitable success model, especially in a place where the use of IS is mandatory.

Review based on the Sector

In this synthetic and critical review, the industries/sectors identified in the literature were classified into 16 sectors, comprising public sector, educational sector, banking industry, small and medium enterprises (SMEs), health sector, the insurance industry, and others , depending on the type of activities as presented in Figure 5 below.

Figure 5. Review based on Sector
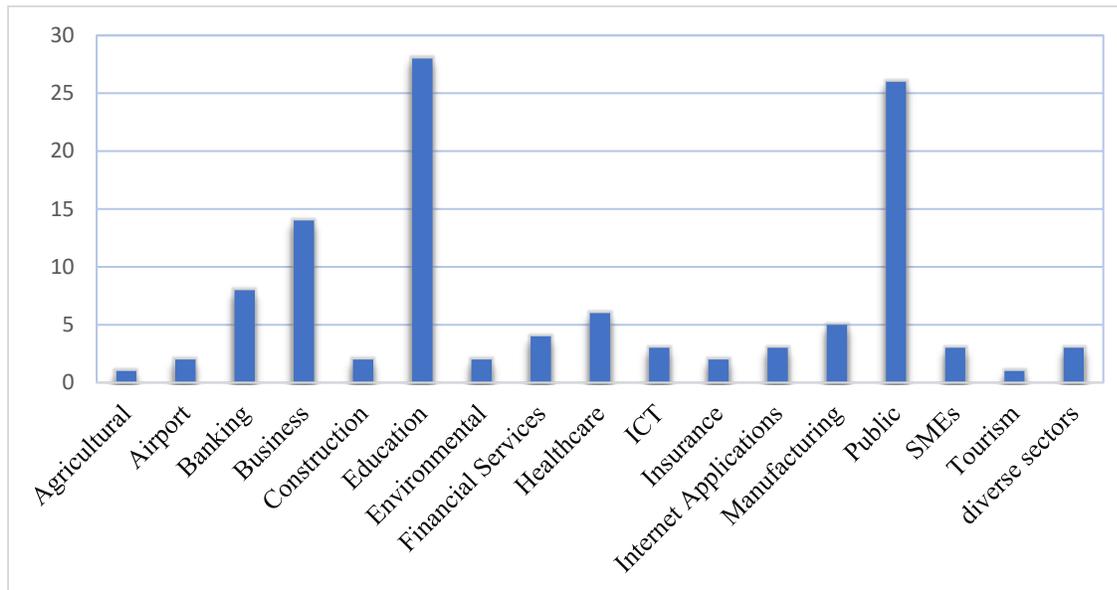
Twenty-eight articles, representing 25% of the total articles reviewed, have been conducted in the educational sector (e.g., Lwoga, 2013; Seta et al., 2018). The concentration of many studies on the educational sector is in respect of e-learning, and the respondents were mostly undergraduate students. Twenty-six articles, representing 23% of the total articles reviewed, have been conducted in the public sector (e.g., AL-Sulami & Hashim, 2018; Stefanovic et al., 2016). However, studies emanating from the tourism or agricultural industries constitute less than 1%.

This research analysis also shows that little consideration has been given to the manufacturing industry as compared to other sectors (e.g., public; education, and banking). This could be due to the fact that manufacturers reportedly employ a broader range and more advanced computer and communication technologies, thus attracting less attention from researchers. The result seems consistent with the results reported by Ghobakhloo and Tang (2015). Similar to Ulhas et al. (2015), only a few studies have been conducted in software industries. Further it was found that numerous studies on measuring the public sector systems used the IS success model, which is not in tandem with the findings obtained by several other researchers (Rana et al., 2013b; Rana et al., 2015; Sørum et al., 2012),

Research methodologies used by previous studies

Research approach used

Regardless of the recognised merit of longitudinal research when analysing the attitude of users toward technology over time, our findings reveal that only one study has employed the longitudinal approach (i.e., Cho et al., 2015). Meanwhile, the majority of the studies (113) employed a cross-sectional approach (e.g., Gorla & Somers, 2014; Rana & Dwivedi, 2018).

It is therefore suggested that more longitudinal studies are required in the future. Rana et al. (2015) suggested further longitudinal studies to be carried out regarding IS success as the longitudinal assessments enable the researchers to carry out in-depth investigations into the actual application of IS and its results. Mohammadi (2015a) also advocated longitudinal surveys as the perception and inclinations of individuals toward IS are expected to change, commensurate with their increased experience. Numerous other researchers in the fields of enterprise IS, e-commerce, and e-government, amongst others, are in line with this suggestion (Alexandre & Isaías, 2012; Lee & Lee, 2012; Sørum et al., 2012).

Methodological approach used

Based on the summarised information obtained from the reviewed published articles as presented in Table 6 below, the majority of the studies have used a quantitative approach to obtain data from the respondents in relation to the IS, followed by the mixed-method approach, while few studies have employed the qualitative approach.

Table 6: Research Methodology

Method Used	Number of Articles	Percentage (%)
Quantitative	104	91
Qualitative	2	2
Mixed Method	8	7
Total	114	100

As presented in Table 6, 104 articles, representing 91% of the total articles, have used the quantitative method (e.g., Samsi et al., 2016; Hsu et al., 2015), followed by eight articles on the mixed-method (e.g., Vancauter et al., 2017; Widjaja et al, 2018). Only two articles have used the qualitative method (i.e., Chang & Hsiao, 2017; Syahidi & Asyikin, 2018). Therefore, the main approach used in measuring IS success is quantitative analysis. This result is consistent with that obtained by Nguyen et al. (2015).

In the quantitative studies, 81 studies have used the face-to-face data collection approach, while 19 have used the online method. Four studies have combined both the aforementioned approaches. Meanwhile, two studies that did not test the hypotheses (merely tested the reliability and validity of the instruments) were included in this analysis (i.e., Ali et al., 2018; Jung & Jung, 2018).

The analysis also indicates that only 9% of the studies have applied the interview method as compared to the survey-based studies, which represent 91%. Venkatesh, Brown, and Bala (2013) suggested that the use of varied data collection methods in the IS field can result in the development and use of a new measure for the research model. In this case, a combination of the

various data collection methods have extended the model introduced by DeLone and McLean (Marjanovic et al., 2015). This finding is therefore consistent with that of Al-Debei et al. (2013), Alexandre and Isaías (2012), and Widjaja et al. (2018). As a consequence, further studies on the IS success model are required using different data collection methods. The rationale behind this is that the mixed methodology can help to develop richer insights into various phenomena of interest that cannot be fully understood by using only the quantitative or qualitative method exclusively (Venkatesh et al., 2013).

Review based on unit of analysis and respondents

IS success has long been a subject of investigation (Delone & McLean, 2016). It has been defined in several ways with many measures established for its assessment (Nguyen et al., 2015). The notion of success varies with the stakeholders involved as their perspectives are different and influenced by the factors of finance, time, costs, performance, functionality, and security, amongst others (Alexandre & Isaías, 2012; DeLone & McLean, 2003; Kofahe, Hassan & Mohamad, 2019). Hence, IS success is deemed as a multi-dimensional concept that can be measured from various perspectives (Al-Debei et al., 2013; Budiardjo et al., 2017). As a result, IS implementation would have an effect on the users, organisations, industries, and economies at large.

The results of this study show that 110 studies (96%) assessed the success of IS at an individual or user level (e.g., Mohammadi, 2015b; Tam & Oliveira, 2017), while four studies have focused on the organisation level (e.g., Chen, 2012; Harold & Thenmozhi, 2014). The analysis further indicates that none of the studies has analysed IS success at both individual and organisational levels. The current finding is in line with the results of numerous IS scholars that most studies that applied the IS success model, have primarily focused on the individual level (Ghobakhloo & Tang, 2015; Legner et al., 2016; Nguyen et al., 2015; Petter et al., 2008; Petter & McLean 2009; Urbach & Mu¨ller, 2012). In this regard, there is a need to assess IS success at the organisational level or at both the individual and organisational levels as managers can have a more practical perspective in evaluating the success and effectiveness of IS from the organisational level as well.

For the research subjects, following previous scholars in the IS field (i.e., Williams, Rana, & Dwivedi, 2015), the prior IS success model studies were categorised into three groups based on the type of users, namely, general users (e.g., citizens; customers; consumers; online shoppers; Facebook users; taxpayers; tourists); professionals (e.g., CEOs; employees; doctors; managers; IS developers; teachers; staff; nurses); and students. It is worth noting that one study utilised more than one sample to test their model (i.e., Widjaja et al., 2018). Therefore, this study was considered as two different studies, which accounted for an overall total of 115 studies. The breakdown of articles for each group is shown in Table 7 below.

Table 7: Research subjects

User type	Number of Articles	Percentage (%)
Professionals	60	52
General users	29	25
Students	26	23
Total	115	100

*Approach adapted from Williams et al. (2015).

Following Sanakulov and Karjaluoto's (2015) sample classification, the results from Table 7 show that a reasonably large proportion (75%) of the data collected in these studies comes from homogeneous respondents, while just (25%) comes from heterogeneous respondents.

Limitations reported in prior studies

In terms of limitations, most of the studies have issues with data collection in that the researchers have focused on either a single subject or a single task and carried out cross-sectional studies. In addition, in majority of the studies examined, only a single IS was used at a given time, leading to issues with generalisation. The use of homogenous samples comprising students, employees, managers, or CEOs, to support the analysis, is a major barrier to the generalisation of the findings. The dominance of cross-sectional studies is also an important limitation found in our review. Despite the acknowledged value of longitudinal studies in investigating users' changing attitude toward technology over time, only one study is longitudinal in nature, implying that majority of studies have used the cross-sectional approach.

A further limitation relates to the dominance of quantitative studies (91%); hence, additional qualitative and/or mixed-method studies are needed. These type of studies will provide additional elements for explaining IS success/failure, which have not been covered by the existing IS success model studies (Vancauter et al., 2017; Weerakkody et al., 2016).

The final limitation relates to the level of analysis, whereby the findings reveal that almost 96% of the studies have considered an individual level of analysis. Future studies could give greater focus to the organisational level so as to gain more comprehensive results concerning the net benefits of IS success.

Conclusion, limitations, and future work

This study was carried out to cater to the demand for an ongoing analysis of IS success studies from different contexts using different sources (DeLone & McLean, 2016; Nguyen et al., 2015; Petter et al., 2013). The purpose of this study was to provide an insight into current studies on IS success involving an in-depth review of 114 studies published between 2012 and 2018. This study reports the findings in four main subsections, i.e., demographic characteristics, research topics and

system types, research methodology-related analysis, and assessment of reported limitations of the studies. The study intends to offer a valuable input and future direction for researchers through the provision of key information presented in past IS success model studies.

It is revealed that studies on IS success model are largely available in many journals and conference proceedings published in numerous regions, with developing countries being the major sources of primary data. Based on the analysis, it is also found that the most used research methodologies are the cross-sectional and survey methods. Limitations-wise, the analysis highlights that the lack of longitudinal work, and the use of professional samples are the main hindrances to gaining more comprehensive findings.

Several limitations to the research must be acknowledged. Firstly, solely studies that have used the IS success model by DeLone and McLean as their theoretical foundation were the focus. Thus, studies that used other success models were excluded in the analysis. Secondly, the analysis focused on articles published between 2012 and 2018. Hence, studies prior to 2012 or after 2018 are not part of this analysis. Furthermore, while this study focused on empirical research for data analysis, the need to exclude some studies (e.g., conceptual researches) could have truncated the overall theme of the literature. Thirdly, this study does not include a wide range of scholarly journals and global conferences and in fact, is restricted to only using Scopus database as the primary source of reference.

Fourthly, the chosen keywords might have also limited the data collection procedure and while many studies do not carry specific keywords in their titles, abstracts or keyword search, this may have initiated a focused on the IS success model in other ways as the authors of these studies may have used different terminologies to describe their studies, therefore and therefore the preliminary search process could not capture those articles. Finally, only studies written in English were included in the literature selection which possibly could have led to the rejection of a number of interesting sources in other languages.

Based on our research limitations, it is suggested that future studies expand the material sources by reviewing papers from multiple databases (e.g., Google Scholar). Google Scholar has been acknowledged as a good source for avoiding bias in support of certain publishers (Wohlin, 2014). Furthermore, a more comprehensive research search using other applicable keywords (e.g., IS success, IS effectiveness) is required, which may generate more relevant results.

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