2013

Information Systems Success - A Quantitative Literature Review and Comparison

Sebastian Dörr
University of Bayreuth, Chair of Information Systems Management, Bayreuth, Germany, seb.doerr@gmx.de

Sebastian Walther
University of Bayreuth, Chair of Information Systems Management, Bayreuth, Germany, s.walther@uni-bayreuth.de

Torsten Eymann
University of Bayreuth, Chair of Information Systems Management, Bayreuth, Germany, torsten.eymann@uni-bayreuth.de

Follow this and additional works at: http://aisel.aisnet.org/wi2013

Information Systems Success - A Quantitative Literature Review and Comparison

Sebastian Dörr, Sebastian Walther, and Torsten Eymann

University of Bayreuth, Chair of Information Systems Management, Bayreuth, Germany
`seb.doerr@gmx.de,`
`{s.walther,torsten.eymann}@uni-bayreuth.de`

Abstract. Despite the outstanding economic relevance of information systems in business and society, there exists no consensus among academics and practitioners how to measure the success of information systems. Therefore this paper makes a contribution to structure and classify the most recent research in IS success. This is done by providing an exhaustive overview of literature in the field of IS success capturing the empirical and non-empirical publications between 2007 and 2011. With regard to theoretical foundation, object of analysis, unit of analysis, evaluation perspective, data gathering method, and data analysis, 26 empirical articles are classified. The 11 non-empirical studies are classified by theoretical foundation, methodological type and object of analysis. The results show that in most cases a type of IT or IT application is investigated by applying the DeLone and McLean IS success model. Most of the studies focus on IS users and the individual perspective of analysis, whereas the most prominent data analysis method is structural equation modeling.

Keywords: Information Systems Success, Literature Review

1 Introduction

Information is the basis for economic decisions within the whole value chain, making enterprises dependent on the implementation of modern information systems (IS) to stay competitive [1], e.g. by enabling real-time data access or providing business intelligence functions. Simultaneously, the amount of business realms using sophisticated IS rises: among others, IS comprises e-commerce systems, knowledge management systems, and decision support systems.

In this context, measuring what makes an IS successful is of utmost importance. However, no consensus among practitioners and academics exists, how to measure the success of IS. Therefore, many success models have been developed, complicating the validation and comparison of the antecedents of IS success. Previous research on IS success has found three models to be predominant: the IS success model proposed by DeLone and McLean (D&M success model) [17], which is the most widely used IS success model [65], the updated D&M success model [18], as well as the

Technology Acceptance Model (TAM) [16], which was generally applied in the context of IS adoption.

This paper summarizes the current state of research of IS success by employing a structured literature review according to Webster and Watson [69] with focus on multidimensional IS success models. The review is limited to the years between 2007 and 2011 and includes empirical, as well as non-empirical articles. Chronologically, but also content-related, it continues the literature review provided by Urbach et al. [65].

Empirical articles are analyzed according to theoretical foundation, object of analysis, unit of analysis, evaluation perspective, data gathering, and data analysis. Theoretical articles are classified according to theoretical foundation, object of analysis, and methodological type.

Our paper is built as follows. First of all, the theoretical foundations are introduced. Secondly, the methodology of the structured review is described, including literature selection and framework analysis. The results are then divided into "results of empirical literature" and "results of non-empirical literature". Finally, the interesting findings and limitations are discussed, whereas the results of our literature analysis are compared to the results of Urbach et al. [65].

2   Theoretical Foundation

During the first International Conference on Information Systems in 1980, Keen highlighted five aspects which are relevant for establishing Management Information Systems (MIS) as a particular field of research. Among them was the quest for the dependent variable to measure IS success.

Measuring IS success poses a challenge to researchers, because its definition varies depending on the perspective of evaluation [65]. Therefore, a multidimensional IS success model is necessary to capture all stakeholder's perspectives [17], [65]. Furthermore, it is necessary to isolate IS success to enable its explicit attribution to the object of study. In praxis this is frequently not possible or avoided due to the increased effort [17]. Especially the D&M success model [17], the updated D&M success model [18], and TAM [16] are of high importance for this review. Urbach et al. [65] additionally mention the Seddon success model [63]. However, the Seddon success model was found to be irrelevant for the following study.

2.1   DeLone and McLean Success Model

The D&M success model consists of six interdependent variables which are theoretically connected (see Figure 1).

The following definitions are according to [17]. *System Quality* measures the quality of the information processing within the system. The IS output is measured by *Information Quality*. *Use* is seen as the demand or consumption of IS output. *User Satisfaction* describes the reaction of the recipient to the use of the IS output. The impact of information on user / receiver behavior is measured by *Individual Impact*.

Finally, *Organizational Impact* describes the influence of information on overall organizational success.

DeLone and McLean commented on the model: "This success model clearly needs further development and validation before it could serve as a basis for the selection of appropriate I/S measures" [17]. Referring to this limitation, IS success research conducted meta-analyses (e.g. [7], [53]) and standardized measuring methods to validate the IS Success Model (e.g. [60], [47]). Seddon [57] criticizes DeLone and McLean's attempt to comprise too much in one model. That is why Seddon describes it as confusing and erroneously specified [57]. The IS Succes Model gathers success using a depiction of process but also causal factors [17]. Furthermore, Seddon problematizes the ambiguity of *Use*, "Meaning 1: Use as a Variable in a Variance Model of Future IS Use"; "Meaning 2: IS Use as the Dependent Variable in a Variance Model of Future IS Use"; "Meaning 3: IS Use as an Event in a Process Leading to Individual or Organizational Impact" [57]. Seddon clarifies the meaning of *Use* and introduces four new variables (*Expectations*, *Consequences*, *Perceived Usefulness* and *Net Benefits to Society*) [57]. Additionally, a classification of the variables in "Measures of Information and System System Quality", "General Perceptual Measures of Net Benefits of IS Use", and "Behavior with Respect to IS Use" are considered [57].
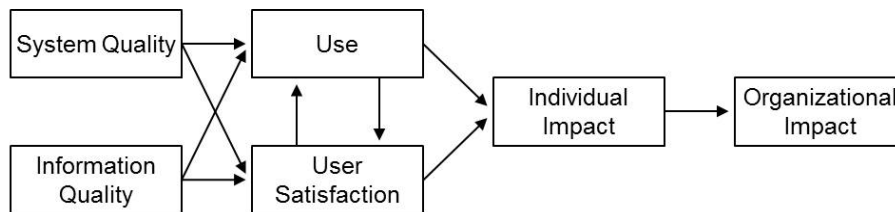

Fig. 1. D&M Success Model

2.2 Updated DeLone and McLean Success Model

In their 10-year-update, DeLone and McLean discussed which hypotheses had been found to be significant [18]. In descending order, these are: *System Use – Individual Impacts*; *System Quality – Individual Impacts*; *Information Quality – Individual Impacts* [18]. With one exception (*System Use – Organizational Revenues*), the other interdependencies have been confirmed as well [18]. DeLone and McLean reject the Seddon's criticism about *Use* being no success factor [18]. Instead, the difficulty is to be seen in the complexity of the *Use* variable and therefore a missing, simple definition (DeLone and McLean 2003, [16]). Especially e-commerce, where system use by costumers is essential, clarifies the importance of *Use* [14], [31], [45].

Besides *Organizational Impact* and *Individual Impact*, further entities could be affected by IS activities. Therefore, researchers suggested considering *Group Impacts* (e.g. [30], [41]), *Inter-organizational and Industry Impacts* (e.g. [12-13]), *Consumer Impacts* (e.g. [8], [27]), and *Society Impacts* (e.g. [57], [18]). Instead of a model extension, DeLone and McLean decided to consolidate all impacts as *Net Benefits* [18]. As a quid pro quo, this generalization requires a defined frame of reference (e.g.

sponsor, user, stock holder) [18]. Despite the cancellation of *Individual Impact* and *Organizational Impact,* the analysis perspective must still be mentioned (e.g. *Individual Perspective*, *Industrial Perspective*) [18].

Pitt et al. [48] criticized that IS success is focused on products but not on services. Therefore, the system characteristics were extended by *Service Quality* [18]. Figure 2 illustrates the updated D&M success model.
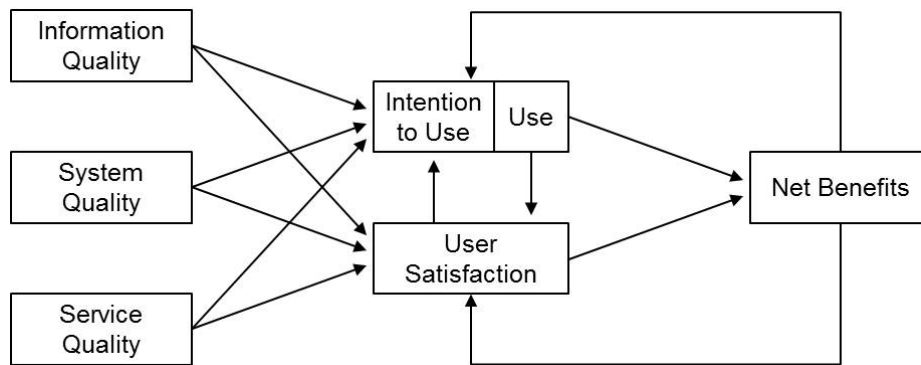

Fig. 2. Updated D&M Success Model

2.3 Technology Acceptance Model

Missing user acceptance often impairs the business' performance [16]. Therefore, Davis developed a model to predict user acceptance. TAM was subject of his dissertation [15] and was published in MIS Quarterly in 1989 [16]. The model is mainly based on the Theory of Reasoned Action (TRA) ([15], [19]).

Davis concentrates his research on the measurement of key constructs [16]. He proposes forecasting *Use (Intention)* by focusing on two theoretical constructs: *Perceived Usefulness* and *Perceived Ease of Use* [16]. According to Davis, users are more willing to use a system or program, if they see an occupational advantage [16]. This variable is measured by *Perceived Usefulness* [16]. Similar to the TRA, the TAM plans to predict behavior. If the system is perceived of being useful, there is still a danger that the system is conceived to be too difficult or complicated [16]. The use would not outweigh the effort. This consideration is measured by *Perceived Ease of Use* [16]. Figure 3 displays the TAM.
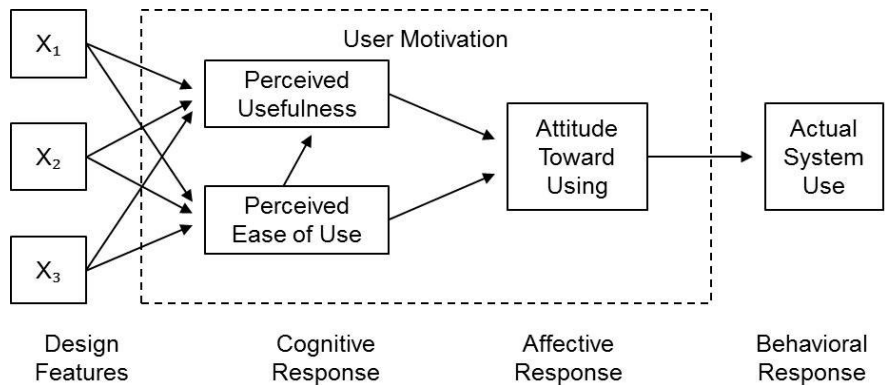
Fig. 3. Technology Acceptance Model

3 Methodology

A well-designed literature review is the foundation for scientific insights [69]. An analysis should simplify the development of theories and models and conclude research areas, where a plethora of research exists, and disclose areas, where research is needed [69]. Due to the rising amount of publications the need to describe, summarize, validate, and categorize the results increases [65].

According to the publication manual of the American Psychology Association, a literature review defines and clarifies the problem, summarizes previous research with intent to convey the current state of research, identifies relationships, contradictions and gaps of relevant literature, and gives further problem solving suggestions [3]. In the following, the steps conducted within the literature review are described in detail.

3.1 Literature Selection

The literature selection is essential for the quality of the analysis. A structured review should cover the relevant articles as exhaustively as possible. In the following, the literature selection is conducted in a three step approach: timeframe definition, source limitation, and selection criteria.

First of all, the timeframe was set. DeLone and McLean reviewed the years between 1981 and 1988, as well as 1992 and 2002 concerning IS success factors ([17], [18]). Urbach et al. analyzed the publications between 2003 and 2007 [65]. This review continues Urbach et al.'s analysis by observing the years 2007 to 2011[1].

To acquire a source selection that is as comprehensive as possible, both, the journals analyzed by DeLone and McLean ([17-18]), and the leading IS journals were taken into consideration. In accordance to Webster and Watson, essential articles are mainly published in leading journals [69]. The literature selection is consistent with the selection by Urbach et al. [65], who used Saunder's MIS journal-ranking [65].

---

[1] The reviews overlap in the year 2007.

Journals with a rating value up to 30 were classified as relevant. The ranking by Saunders is a meta-analysis of nine independent journal rankings. Journals, which were ranked by only one of the nine rankings, were excluded for lacking representativeness. Further, some Journals were excluded because of subject specifications [65]. Besides journals, leading conference proceedings were taken into account to consider recent research [65]. Books are not reflected. It is assumed that authors already published their results in journals [65]. In addition to that, books are mostly not subjected to a formal review process [65]. All in all, 34 journals and four conference proceedings are reviewed. A list of the sources is attached to this article.

The sources were examined for topic-related articles. Practically, electronic databases (EBSCOhost, ScienceDirect, and ProQuest) and conference proceedings were searched for the keywords "information systems success", "IS success", information systems efficiency" and "IS efficiency". The query regarded titles, abstracts, and keywords. In total, 78 publications were recorded (39 journal articles, 39 conference articles).

3.2 Review Framework

Intending to continue the review by Urbach et al. [65], the framework was transferred into this study. The framework consists of eight categories: (1) Theoretical Foundation; (2) Research Approach; (3) Object of Analysis; (4) Unit of Analysis; (5) Evaluation Perspective; (6) Data Gathering; (7) Data Analysis; (8) Methodological Type [65].

All publications are sorted by *Theoretical Foundation*. However, only the introduced models are mentioned ([16-18]). Publications using distinct models were classified as "others". In case that the articles had no underlying models, the articles were labeled as "n/a" (not applicable).

The category *Research Approach* divides articles in empirical and non-empirical approaches. Publications are empirical, if they are based on observations and use empirical methodology of some kind (e.g. survey, interview, laboratory experiment, case study) [2]. Non-empirical studies on the other hand usually are based on ideas, speculations, literature reviews, or frameworks [65]. King and He observed a bias to the review of empirical studies [35]. Therefore, this review also considers non-empirical articles. However, the chosen categories tend to focus on empirical publications [65].

Object of Analysis classifies the articles by type of system and exemplifies the focus of the reviewed publication [65]. Seddon distinguishes between: (1) an aspect of IT use (e.g. single algorithm); (2) a single IT application (e.g. a certain data warehouse); (3) a type of IT or IT application (e.g. knowledge management systems); (4) all IT applications used by an organization or sub-organization [57].

The *Unit of Analysis* can be divided into a micro and a macro point of view [65]. According to Grover et al., for the sake of completeness, both perspectives should be considered for the evaluation of IS success [24]. A micro-perspective of IS success shows, whether the individual needs of co-workers are satisfied [65]. A macro-

perspective reflects the IS' impacts on the organization's competitiveness [65]. Therefore, this review differentiates between an individual and an organizational level.

Stakeholders represent different interests. Thus, there is a possibility that different groups of interest evaluate IS success differently [57]. The *Evaluation Perspective* therefore specifies, which group of interest was surveyed within a particular study and respectively which point of view was represented for IS success measurement [65]. Grover et al. differentiate four perspectives: users, top management, IS personnel, and external entities (e.g. subcontractor, costumers) [24]. Urbach et al. added two additional points of view to allow better differentiation: IS executives and multiple stakeholders [65]. The unit of analysis is independent from the evaluation perspective. All standpoints can be evaluated at an organizational and / or individual level [65].

Data Gathering categorizes empirical methods, which were applied within the particular study [65]. The analysis of data gathering allows statements about reliance and generalizability of study results [65]. Urbach et al. differentiate four "dominant" methods: survey, interview, case study, and laboratory experiment [65]. Further methods are declared as "others" [65].

Data Analysis distinguishes the approaches of data evaluation [65]. According to Urbach et al. for IS research the following analyses are used commonly: structural equation modeling (e.g. linear structural relationships (LISREL), partial least squares (PLS)), regression analysis, factor analysis, and cluster analysis [65]. Further methods (e.g. qualitative analysis) are summarized as "other", studies not using data analysis as "n/a" [65].

Non-empirical studies are also categorized by *Methodological Type*. Palvia et al. differentiate three non-empirical methodological types: framework / conceptual model, speculation / commentary, and library research [46]. Further methods are cumulated as "other".

The literature-pool is classified using this framework. However, certain articles do not mention needed information explicitly [65]. In these cases, the data is based on the author's interpretation [65]. A graphical display of the framework is attached to the appendix.

4   Results

By researching online databases (EBSCOhost, ScienceDirect, ProQuest) and conference proceedings, 78 articles were identified of which 20 journal articles and 21 conference articles were declared as irrelevant. Publications were sorted out when they only covered one-dimensional IS models or did not match the topic of IS success: e.g. the search items also include "IS Outsourcing Success" and "IS Planning Success Factors". The remaining articles were analyzed by referring to the introduced framework. The analysis is divided into two blocks. Firstly, the analysis of empirical literature will be shown. Secondly, the results of the non-empirical literature will be discussed.

4.1 Analysis of Empirical Literature

This review focuses on empirical literature analysis. Therefore, the framework concentrates on empirical literature analysis as well. It is crucial to point out *what* was measured in the particular study [65].

The literature classification under theoretical foundation shows a strong representation of the IS Success Model, especially the updated IS Success Model by DeLone and McLean. Nearly two-thirds of the studies under analysis use this model. Furthermore, 17 studies are to be classified as "other". It is noticeable that different theoretical foundations are often combined or adjusted. Just 10 of 26 studies are based on a single model.

Regarding the unit of analysis, all studies considered an individual level. Beyond that, nine studies also take account of an organizational level.

The evaluation of object of analysis reveals that in most cases types of IT or IT applications are observed (16 of 26 studies). Eight studies examined a single IT application. Only Leidner et al. examined IT applications in general. The IT function of an organization was the object of study in Santos et al.'s survey. Therefore, just a few universal results can be observed in the timeframe of research.

The perspective of evaluation corresponds with unit of analysis. 18 of 26 studies surveyed IS users. The opinion of users usually correlates with individual success factors. Only Gorla et al. and Lee et al. interviewed users on an organizational level. Three authors questioned IS personnel to determinate IS success. Ifinedo and Leidner et al. addressed IS executives. Multiple stakeholders are only regarded by Gable et al. and Bartis and Mitev.

Except for Bartis and Mitev (case study) every study uses surveys for data gathering. Lee et al. additionally conducted interviews.

For data analysis, structural equation modeling is most common (20 of 26 studies). In nine cases, it is combined with a variance analysis, which is used by 11 studies. Five studies combine it with a factor analysis, whereas nine factor analyses are conducted in total. Of the regarded methods, regression analysis is used least often (five of 25 studies). Teo et al. and Bartis and Mitev use "other" methods. Seven studies used one method of analysis. 14 studies combined two methods. Chiu et al., Gable et al. and Teo et al. used three or more methods.

Figure 4 and figure 5 summarize the result for empirical literature. All in all, the most evaluations are based on a type of IT or IT application and are measuring on an individual level by surveying users. As the theoretical foundation, the IS Success Model is most common, whereas the data is mostly analyzed using structural equation modeling. The complete research data is added to the attachment.
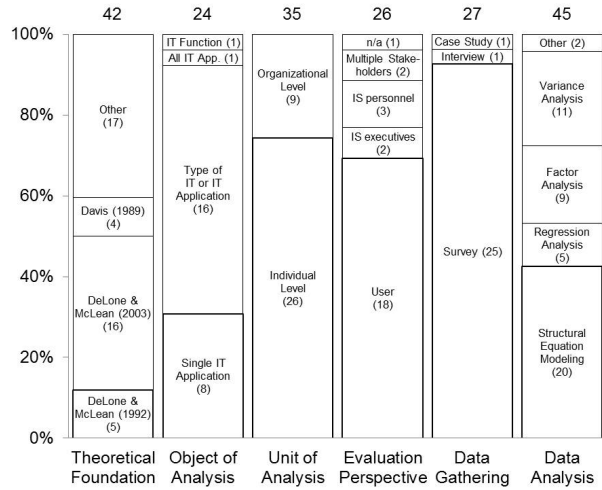
Fig. 4. Classification of Empirical Publications (1)

	Theoretical Background				Object of Analysis				Unit of Analysis		Evaluation Perspective					Data Gathering			Data Analysis				
	D&M Success Model	Updated D&M Success Model	TAM	Others	Single IT Application	Type of IT or IT Application	All IT Applications	IT Function of an Organization	Individual Level	Organizational Level	User	ISExecutive	ISPersonnel	Multiple Stakeholders	n/a	Survey	Interview	Case Study	Structural Equation Modeling	Regression Analysis	Factor Analysis	Variance Analysis	Others
Bartis & Mitev [4]				x	x				x	x				x				x					x
Bernroider [5]	x					x			x	x					x	x					x	x	
Bock et al. [6]	x					x			x	x			x			x			x		x		
Chiu et al. [11]	x		x			x			x		x					x			x		x	x	
Floropoulos [20]	x		x		x				x				x			x				x	x		
Gable et al. [22]	x		x		x				x	x				x		x			x	x	x	x	
Gorla et al. [23]	x		x			x			x	x	x					x			x		x		
Halawi et al. [25]	x					x			x		x					x				x	x		
Hong et al. [28]		x			x				x		x					x			x			x	
Ifinedo [29]	x		x			x			x	x		x				x			x				
Jin and Kim [32]			x			x			x		x					x			x				
Khayun & Ractham [34]	x	x	x		x				x		x					x				x			
Lee et al. [36]	x		x			x			x	x	x					x	x		x		x		
Leidner et al. [37]				x					x	x			x			x			x		x		
Ng et al. [42]	x		x		x		x		x		x					x			x				
Pak et al. [44]	x		x		x				x		x					x	x		x				
Polancic et al. [49]		x				x			x		x					x			x				
Prybutok et al. [50]	x		x			x			x	x			x			x			x				
Saeed & Abdinour-Helm [54]	x	x	x		x				x		x					x					x	x	
Santos et al. [55]	x							x	x		x					x			x				
Schaupp et al. [56]	x		x		x				x		x					x			x		x		
Song [63]	x		x		x				x		x					x			x				
Teo et al. [64]	x		x			x			x		x					x			x			x	x
Urbach et al. [66]	x					x			x		x					x			x		x		
Wang [68]	x					x			x		x					x			x		x		
Xu et al. [70]	x					x			x		x					x			x		x		

Fig. 5. Classification of Empirical Publications (2)

4.2 Analysis of Non-Empirical Literature

The non-empirical literature is categorized into theoretical foundation as well (see figure 6). One literature analysis can be based on multiple theoretical foundations. Again, DeLone and McLean are mostly mentioned as theoretical foundation. Six articles use models which are declared as "others". Three authors do not specify a theoretical foundation.

When categorized by methodology, the publications can be sorted into six frameworks / conceptual models and five literature analyses. Speculations, commentaries, or other methods were not included in the literature pool.

Similar to the empirical literature, the non-empirical literature is classified by object of analysis. Nearly half the articles do not point out a specific object of analysis. Three publications refer to a type of IT or IT application. The remaining three publications contain all IT applications.

	Theoretical Background				Methodology		Object of Analysis		
	D&M Success Model	Updated D&M Success Model	Others	n/a	Framework/ Conceptual	Literature Analysis	Type of IT or IT Application	All IT Application	n/a
Chae [10]	x	x	x	x	x				x
Gable and Sedera [21]					x				x
Harris and Weistroffer [26]	x	x			x	x	x		
Moeni and Lapointe [40]			x			x			x
Niemi and Pekkola [43]		x			x		x		
Petter et al. [47]	x	x				x	x		
Raeth et al. [51]			x		x		x		
Sedera and Chian [59]			x		x		x		
Seen et al. [61]			x		x				x

Fig. 6. Classification of Non-Empirical Publications

4.3 Findings

In the following, the results are compared to the review provided by Urbach et al. [65]. Both reviews confirm a domination of the D&M success. Nevertheless, the studies between 2003 and 2007 preferred the original D&M success model, whereas the studies between 2007 and 2011 mostly referred to the updated D&M success model [65]. This applies to the empirical and non-empirical literature.

In regard to the object of analysis, both reviews come to the conclusion that mainly type of IT or IT application are observed.

The examination of unit of analysis leads to a similar result as well: Urbach et al. confirmed 26 of 28 studies measuring success on an individual level [65]. 12 articles additionally measured success on an organizational level [65].

1822

The results of the evaluation perspective resemble the analysis by Urbach et al.: Both reviews' literature selection interviewed users about IS success. In case of Urbach et al., 19 of 28 articles referred to this perspective [65].

Surveys are the main method for data gathering in both literature analyses.

Finally, there is a similarity between the methods of data analysis, showing the the results between the studies are consistent.

5 Conclusion

This literature review analyzed the state of research of multi-dimensional IS success measurements and models. Therefore, literature between 2007 and 2011 was evaluated. The literature pool of relevant sources consisted of 26 empirical studies and 11 non-empirical articles. The analysis focused on empirical literature, which was analyzed in depth.

The review clarifies that the D&M success models still enjoy huge popularity. By now, the majority has switched to the updated D&M success model published in 2003. The review also shows that different models are often combined to grant justice to the subject of research.

While every empirical article analyzed an individual level, only nine of 26 studies consider an organizational point of view. Studies including both perspectives ensure a more comprehensive success measurement, but also increase the effort of data gathering. Data is usually gathered from users by conducting surveys. In general, a type of IT or IT application is evaluated. The gathered data is mostly analyzed by structural equation modeling.

The limitations mentioned by Urbach et al. [65] are also applicable in this review: on the one hand, the sources are limited to chosen journals and conference articles. Thus, relevant articles may be excluded. Further, books were not considered, as it was assumed that articles of importance were also published in leading journals and conferences. On the other hand, the approach of search using databases could distort the result. Articles of relevance may be excluded if they do not match the criteria of the search requests (referring to title, abstract, keywords). Furthermore, the search requests contain a bias towards the D&M success model. Another limitation is caused by only conducting English queries.

References

1. Al-adaile, R.M.: An Evaluation of Information Systems Success: A User Perspective – the Case of Jordan Telecom Group. European Journal of Scientific Research 37 (2), 226-239 (2009)
2. Alavi, M., Carlson, P.: A review of MIS research and disciplinary development. Journal of Management Information Systems 8 (4), 45-62 (1992)
3. American Psychology Association: Publication manual of the American Psychological Association. (6th edition), American Psychology Association, Washington (2010)

4. Bartis, E., Mitev, N.: A multiple narrative approach to information systems failure: a successful system that failed. European Journal of Information Systems 17, 112-124 (2008)

5. Bernroider, E.W.N.: IT governance for enterprise resource planning supported by the DeLone–McLean model of information systems success. Information & Management 45, 257-269 (2008)

6. Bock, G.-W., Suh, A., Shin, K.-S., Hu, A.: The factors affecting success of knowledge-based systems at the organizational level. Journal of Computer Information Systems 50 (2), 95-105 (2009)

7. Bokhari, R.H.: The relationship between system usage and user satisfaction: a meta-analysis. Journal of Enterprise Information Management 18 (2), 211-234 (2005)

8. Brynjolfsson, E.: The Contribution of Information Technology to Consumer Welfare. Information Systems Research 7 (3), 281-300 (1996)

9. Buhl, H.U., Mertens, P., Schumann, M., Urbach, N., Smolnik, S., Riempp, G.: Leserbrief: Stellungnahme zum Beitrag von Urbach et al. aus Heft 4/2009. Wirtschaftsinformatik 52 (2), 109-114 (2010)

10. Chae, H.-C.: IS Success Model and Perceived IT Value. In: Hoxmeier, J.A., Hayne, S. (eds.): Proceedings of the 13th Americas Conference on Information Systems. Association for Information Systems (2007)

11. Chiu, C.-M., Chiu, C.-S., Chang, H.-C.: Examining the integrated influence of fairness and quality on learners' satisfaction and Web-based learning continuance intention. Information Systems Journal 17 (3), 271-287 (2007)

12. Clemons, E.K., Row, M.C.: Limits to interfirm coordination through information technology: Results of a field study in consumer goods packaging distribution. Journal of Management Information Systems 10 (1), 73-95 (1993)

13. Clemons, E.K., Reddi, S.P., Row, M.C.: The impact of information technology on the organization economic activity: The "move to the middle" hypothsis. Journal of Management Information Systems 10 (2),9-35 (1993)

14. D'Ambra, J., Rice, R.E.: Emerging factors in user evaluation of the World Wide Web. Information & Management 38 (6), 373-384 (2001)

15. Davis, F.D.: A technology acceptance model for empirically testing new end-user information systems: Theory and results. Dissertation, Massachusetts Institute of Technology, Sloan School of Management (1986)

16. Davis, F.D.: Perceived Usefulness, Perceived Ease of Use, and User Acceptance of Information Technology. MIS Quarterly 13 (3), 319-340 (1989)

17. DeLone, W.H., McLean, E.R.: Information Systems Success: The Quest for the Dependent Variable. Information Systems Research 3 (1), 60-95 (1992)

18. DeLone, W.H., McLean, E.R.: The DeLone and McLean Model of Information Systems Success: A Ten-Year Update. Journal of Management Information Systems 19 (4), 9-30 (2003)

19. Fishbein, M., Ajzen, I.: Belief, Attitude, Intention and Behaviour: Am Introduction to Theory and Research. Addison-Wesley, Reading, (1975)

20. Floropoulos, J., Spathis, C., Halvatzis, D., Tsipouridou, M.: Measuring the success of the Greek Taxation Information System. International Journal of Information Management 30 (1), 47-56 (2010)

21. Gable, G.G., Sedera, D.: Formative and Reflective Measurement and Validation Mismatch in Survey Research: An Archival Analysis of Information Systems Success Constructs 1985-2007. In: Nunamaker Jr., J.F.; Currie, W.L. (eds.): Proceedings of the 30th International Conference on Information Systems. AIS (2009)

22. Gable, G.G., Sedera, D., Chan, T.: Re-conceptualizing Information Systems Success: The IS-Impact Measurement Model. Journal of the Association for Information Systems 9 (7), 377-408 (2008)
23. Gorla, N., Somers, T.M., Wong, B.: Organizational impact of system quality, information quality, and service quality. Journal of Strategic Information Systems 19 (3), 207-228 (2010)
24. Grover, V., Jeong, S.R., Segars, A.H.: Information systems effectiveness: The construct, space and patterns of application. Information & Management 31 (4), 177-191 (1996)
25. Halawi, L.A., McCarthy, R.V., Aronson, J.E.: An Empirical Investigation of Knowledge Management Systems' Success. Journal of Computer Information Systems 48 (2), 121-135 (2007)
26. Harris, M.A., Weistroffer, H.R.: A New Look at the Relationship between User Involvement in Systems Development and Systems Success. Communications of the Association for Information Systems 24 (1), 739-756 (2009)
27. Hitt, L.M., Brynjolfsson, E.: The Three Faces of IT Value: Theory and Evidence. In: DeGross, J.I., Huff, S.L., Munro, M. (eds.): Proceedings of the 15th International Conference on Information Systems, pp. 263-277. Association for Information Systems (1994)
28. Hong, S., Kim, J., Lee, H.: Antecedents of use-continuance in information systems: Toward an integrative view. Journal of Information Systems 48 (3), 61-73 (2008)
29. Ifinedo, P.: Examining the influences of external expertise and in-house computer/IT knowledge on ERP system success. The Journal of Systems and Software 84 (12), 2065-2078 (2011)
30. Ishman, M.: Measuring information system success at the individual level in cross-cultural environments. In: Garrity, E.J., Sanders, G.L. (eds.): Information System Success Measurement. Idea Group, Hershey (1998)
31. Ives, B., Olsen, M., Baroudi, J.J.: The measurement of user information satisfaction. Communications of the ACM 26 (10), 785-793 (1983)
32. Jin, S.H., Kim, Y.J.: An Empirical Investigation into the Factors Influencing the Use of E-Banking Services. In: Proceedings of the 43rd Hawaii International Conference on Systems Science. IEEE Computer Society (2010)
33. Kettinger, W.J., Lee, C.C.: Perceived Service Quality and User Satisfaction with the Information Services Function. Decision Sciences 25 (5-6), 737-766 (1994)
34. Khayun, V., Ractham, P.: Measuring e-Excise Tax Success Factors: Applying the De-Lone & McLean Information Systems Success Model. In: Proceedings of the 44th Hawaii International Conference on Systems Science. IEEE Computer Society (2011)
35. King, W.R., He, J.: Understanding the Role and Methods of Meta-Analysis in IS Research. Communications of the Association for Information Systems 16, 656-686 (2005)
36. Lee, C.S., Ko, I.S., Jeong, C.: Evaluating the Effectiveness of Information Service for SMEs on Information Orientation and Firm Performance. In: Proceedings of the 42nd Hawaii International Conference on Systems Science. IEEE Computer Society (2009)
37. Leidner, D.E., Lo, J., Gonzales, E.: An empirical investigation of IS strategy and IS contribution to firm performance. In: Sabherwal, R., Sumner, M. (eds.): Proceedings of the 31th Conference on Information Systems. Association for Information Systems (2010)
38. Li, E.Y.: Perceived Importance of Information System Success Factors: A Meta Analysis of Group Differences. Information & Management 32 (1), 15-28 (1997)
39. Mason, R.O.: Measuring information output: A communication systems approach. Information & Management 1 (4), 219-234 (1978)
40. Moeni, M, Lapointe, L.: Selecting an Appropriate Operationalization of the System Usage Construct: An IT Artifact Perspective. In: Santana, M., Luftman, J.N., Vinze, A.S. (eds.):

Proceedings of the 16th Americas Conference on Information Systems. Association for Information Systems (2010)

41. Myers, B.L., Kappelman, L.A., Prybutok, V.R.: A Comprehensive Model for Assessing the Quality and Productivity of the Information System Function: Toward a Theory for Information Systems Assessment. Information Resources Management Journal 10 (1), 6-26 (1997)

42. Ng, B.-Y., Kankanhalli, A., Yip, J.W.L.: Use of Healthcare IS by Multiple User Groups: An Empirical Study of a Medication Management System. In: Galletta, D.F., Liang, T.-P. (eds.): Proceedings of the 32nd International Conference on Information Systems, paper 4. Association for Information Systems (2011)

43. Niemi, E., Pekkola, S.: Adapting the DeLone and McLean Model for Enterprise Architecture Benefit Realization Process. In: Proceedings of the 42nd Hawaii International Conference on System Sciences. IEEE Computer Society (2009)

44. Pak, H.D., Pak, S.M., Jang, I.H., Choe, Y.C.: A Measurement of Non-linear Rela-tionship between IS Qualities and User Satisfaction. In: Santana, M., Luftman, J.N., Vince, A.S. (eds.): Proceedings of the 16th Americas Conference on Information Systems. Association for Information Systems (2010)

45. Palmer, J.W.: Web site usability, design, and performance metrics. Information Systems Research 13 (2), 151-167 (2002)

46. Palvia, P., Mao, E., Midha, V.: Research methodologies in MIS: an update. Communications of the Association for Information Systems 14, 526-542 (2004)

47. Petter, S., DeLone, W.H., McLean, E.R.: Measuring information systems success: models, dimensions, measures, and interrelationships. European Journal of Information Systems 17 (3), 236 - 263 (2008)

48. Pitt, L.F., Watson, R.T., Kavan, C.B.: Service Quality: A Measure of Information System Effectiveness. MIS Quarterly 19 (2), 173-187 (1995)

49. Polančič, G., Heričko, M., Rozman, I.: Am empirical examination of application frameworks success based on technology acceptance model. The Journal of Systems and Software 38 (4), 574-584 (2009)

50. Prybutok, V.R., Zhang, X, Ryan, S.D.: Evaluating leadership, IT quality, and net benefits in an e-government environment. Information & Management 45 (3), 143-152 (2008)

51. Raeth, P., Smolnik, S., Kügler, M.: Conceptualizing a very rich usage construct to measure the impact of organizational social web site usage on individual performance. In: Tuunainen, V.K., Rossi, M., Nandhakumar, J. (eds.): Proceedings of the 19th European Conference on Information Systems, Helsinki (2011)

52. Rai, A., Lang, S.S., Welker, R.B.: Assessing the Validity of IS Success Models: An Empirical Test and Theoretical Analysis. Information Systems Research 13 (1), 50-69 (2002)

53. Sabherwal, R., Jeyaraj, A., Chowa, C.: Information systems success: individual and organizational determinants. Management Science 52 (12), 1849-1865 (2006)

54. Saeed, K.A., Abdinnour-Helm, S.: Examining the effects of information system characteristics and perceived usefulness on post adoption usage of information systems. Information & Management 45 (6), 376-386 (2008)

55. Santos, G.D., Takaoka, H., de Souza, C.A.: An Empirical Investigation of the Relationship between Information Quality and Individual Impact in Organizations In: Santana, M., Luftman, J.N., Vinze, A.S. (eds.): Proceedings of the 16th Americas Conference on Information Systems. Association for Information Systems (2010)

56. Schaupp, L.C., Bélanger, F., Fan, W.: Examining the success of websites beyond e-commerce: an extension of the IS success model. Journal of Computer Information Systems 49 (4), 42-52 (2009)

57. Seddon, P.B.: A Respecification and Extension of the DeLone and McLean Model of IS Success. Information Systems Research 8 (3), 240-253 (1997)

58. Seddon, P.B., Staples, S., Patnayakuni, R, Bowtell, M.: Dimensions of information systems success. Communications of the Association for Information Systems 2, 1-60 (1999)

59. Sedera, D., Chian, F.T.T.: Reconceptualizing Usage for Contemporary Information System Success. In: Österle, H., Schelp, J., Winter, R. (eds.): Proceedings of the 15th European Conference on Information Systems, pp. 1344-1355. University of St. Gallen, St. Gallen (2007)

60. Sedera, D., Gable, G.G.: A factor and structural equation analysis of the Enterprise Systems Success Measurement Model. In: Agarwal, R., Kirsch, L., DeGross, J.I. (eds.): Proceedings of the 25th International Conference on Information Systems. Association for Information Systems (2004)

61. Seen, M., Rouse, A., Beaumont, N.: Explaining and Predicting Information Systems Acceptance and Success: An Integrative Model. In: Österle, H., Schelp, J., Winter, R. (eds.): Proceedings of the 15th European Conference on Information Systems, pp. 1356-1367. University of St. Gallen, St. Gallen (2007)

62. Shannon, C.E., Weaver, W.: The Mathematical Theory of Communication. University of Illinois Press, Urbana (1949)

63. Song, C.: Validating IS Success Factors: An Empirical Study on Webbased State or Local E-government Systems. In: Santana, M., Luftman, J.N., Vinze, A.S. (eds.): Proceedings of the 16th Americas Conference on Information Systems. Association for Information Systems (2010)

64. Teo, T.S.H., Srivastava, S.C., Jiang, L.: Trust in Electronic Government Success: An Empirical Study. Journal of Management Information Systems 25 (3), 99-131 (2008)

65. Urbach, N., Smolnik, S., Riempp, G.: The State of Research on Information Systems Success – A Review of Existing Multidimensional Approaches. Business & Information Systems Engineering 1 (4), 315-325 (2009)

66. Urbach, N., Smolnik, S., Riempp, G.: Improving the Success of Employee Portals: A Causal and Performance-Based Analysis. In: Alexander, P.M., Turpin, M., van Deventer, J. P. (eds.): Proceedings of the 18th European Conference on Information Systems, Pretoria (2010)

67. Vanlommel, E., DeBrabander, B.: The Organization of Electronic Data Processing (EDP) Activities and Computer Use. The Journal of Business 48 (3), 391-410 (1975)

68. Wang, Y.-S.: Assessing e-commerce systems success: a respecification and validation of the DeLone and McLean model of IS success. Information Systems Journal 18 (5), 529-557 (2008)

69. Webster, J., Watson, R.T.: Analyzing the Past to Prepare for the Future: Writing a Literature Review. MIS Quarterly 26 (2) 13-23 (2002)

70. Xu, J., Benbasat, I., Cenfetelli, R.T.: Does Live Help Service Matter? A Empirical Test of the DeLone and McLean's Extended Model in the E-Service Context.