Review of The DeLone and McLean Model of Information Systems Success' Background and it's An application in The Education Setting, and Association Linking with Technology Acceptance Model

Samar Zaineldeen[*]
Li Hongbo[**]
Aka Lucien Koffi[***]

Abstract

Evaluation for the success of the Information System (IS) considerable importance; furthermore, the success of the IS is subject to the proper implementation of technology by human-resource. Currently, there are a variety of models to assess the success of IS, such as the Technology Acceptance Model (TAM), Delone and McLean model of IS success, and many more. A number of models can be utilized as a basis to assess the success of IS, Updated DeLone and McLean model, and DeLone and McLean's model are examples that are used extensively as references, which apply six factors in measuring IS execution. This paper provides a general idea of the current state of research on the IS Success Model. Thus, it gives a brief point of entry into the background of theories and its adoption in the education setting. Moreover, this paper presents an interesting association linking between the DeLone and McLean model, in addition to the Technology Acceptance Model was revealed.

Keywords:

DeLone and McLean Models;
Information System;
 Education;
TAM.

Author correspondence:

Samar Zaineldeen,
School of Management
Jiangsu University, xuefu Rd,JinKou,Zhenjiang,Jiangsu, China

1. Introduction

The expansion of the world wide web, universalizing of business, plus the climb of the information economy have risen the value of information systems across institutions. Therefore there is an urgent need that scholars distinguish how should information-technology outline the commerce globe. The study area of management information systems emerged in the 1970s to emphasize the utility of computer systems in the industry, enterprises in addition to authorities organizations [1]. There are various approaches to address the conceptual progress of the management information systems discipline. One is to highlight those elementary contributions to the management information systems literature [2,3]. A second approach analyzes the development and growth of primary MIS textbooks Information system (IS) scientists have been working to determine the features that can cause IS success, this leading researcher to establish models regard to evidence-based to develop IS to become more efficient [4], this led DeLone and McLean to create an IS

[*]School of Management, Jiangsu University, xuefu Rd,JinKou,Zhenjiang,Jiangsu, China
[**]School of Management, Jiangsu University, xuefu Rd,JinKou,Zhenjiang,Jiangsu, China
[***]School of Management, Jiangsu University, xuefu Rd,JinKou,Zhenjiang,Jiangsu, China

success model [5]. The IS success model was first developed in 1992 by [6] and provides an extended and comprehensive definition of IS success.

To estimate the success of IS a number of scholars have determined IS success. Investigators' perception is surely dissimilar in identify IS success. Therefore there are many measurements to assess IS success. Assessment of IS success is determined by which viewpoint will be evaluated, for instance, from the user's view, so this evaluated, for example, associated with contentment. The developer viewpoint can be said to be satisfactory if the IS result is punctual, and it's less than or equal to the budget. Moreover, in evaluating the success of IS, it can be seen from which extent to be assessed [7]. Delone and McLean (D&M) model [8] defines the dimension of success in IS with three extents: system, utilization of the system as well as the effect of the utilize itself.

This paper provides a general idea of the current state of research on the IS Success Model. Thus, it gives a brief point of entry into the background of theories and its adoption in the education setting. Moreover, this paper presents an interesting association linking between the DeLone and McLean model, in addition to the Technology Acceptance Model was revealed.

Delone And Mclean IS Success Model

Come into existence a variety of models to describe the success of IS, for instance, Technology Acceptance Model (TAM) by [9,10], Theory of Planned Behavior (TPB) by [11] and Theory of Reasoned Actions (TRA) by [12], however, these models are to develop the process of adoption of technology. Barely approval of technology unable to identify the success of IS; it is only a requirement. Therefore [6] created a model in 1992 to determine the success of IS. This novel D&M model was referring [13] that were on the basis of the computational hypothesis of communication; these models essentially recognized their categories of information; semantically level (capability to transmit message) technological level (efficiency, the accuracy of the system), in addition to effective level (effect on the recipient) [13]. After that, Mason (1978) [14] extended effectual level and increased three subgroups; influence on the system, influence on recipient plus receipt of information. Subsequent to reviewing the issued study from 1981-1987, they generated six factors to assess the success of IS; these are quality of information, use, quality of system, satisfaction of user, organizational impact, in addition to individual impact.

After the publication of the initial information system success model by [6], various researchers have attempted to set up its re-definition or even criticized it as a whole, e.g., [15, 16, 17]. The criticizers put forth demands that the model is insufficient and needs the incorporation of further dimensions. It encourages keeping the validity of the D&M model and states that it could sufficiently measure IS success, e.g. [18, 19]. Figure [1]. Shows the origin D&M IS success model.
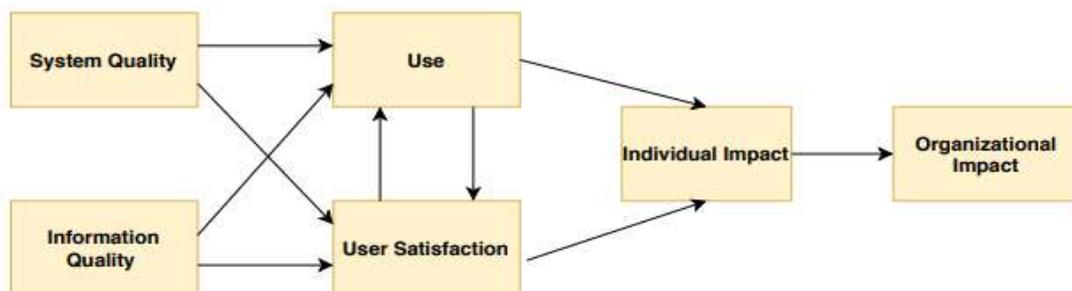

Figure [1]. D&M IS success model (1992) [6]

Updated De-Lone And Mclean IS Success Model

D&M [6] fail to present experiential confirmation of the model they suggested and propose more improvement, plus validation is considered necessary for their categorization [6]. Nevertheless, Seddon [17] incorporated several participations related to the information system Success model, particularly concerning brings together prior research, he offers a method for categorizing the diverse measures of information system success models that had been suggested in the literature into six factors. Also, Seddon [17] proposes a model of temporally and causality inter-related among the recognized categories. Moreover, he measured a suitable base for further experimental and hypothetical research, in addition to acquired extensive approval amongst IS researchers, who try to investigate and confirm the diverse aspects of the model. From another point of view, scholars state that the D&M model incomplete and require to be modernized because the measurement dimensions are regarded as inadequate. Stated by [8] that D&M model was not easy to merge causal perceptions and process perceptions[20]. By adding quite a few modifications, in particular adding a quality of system dimension, net benefit dimensions, and intention to use. See figure (2).
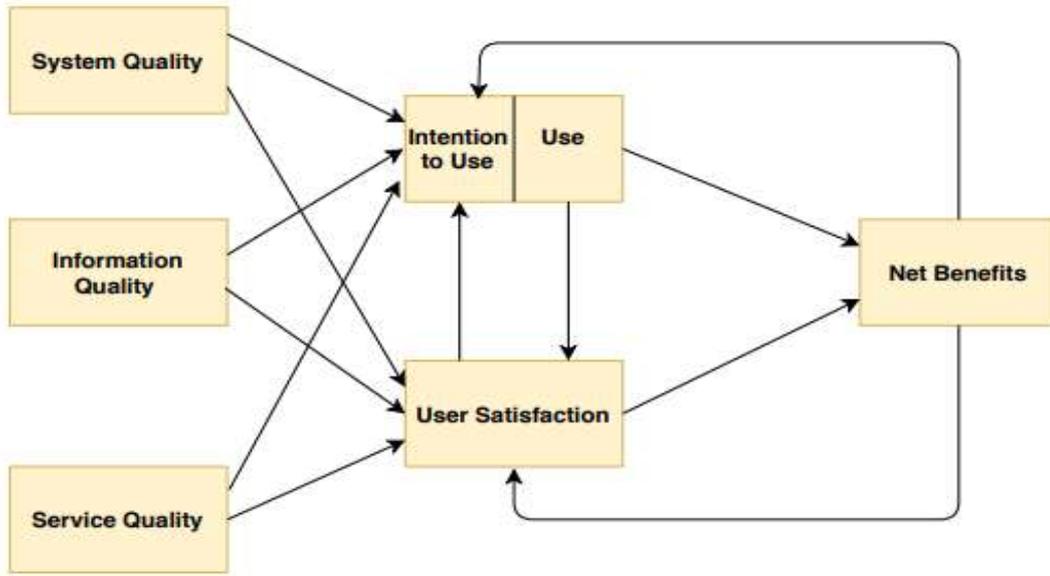
:

Figure [2].Updated D&M IS success model [21].

Constructs and Measures

The modernized model, which came ten years after the primary model was created, includes the declaration of the advantages and drawbacks of the previous model. The novel model of D&M (2003) was the consequence of disapproval and criticism in the earlier literature, e.g. [15, 16, 17]. The first development of the revised IS success model is the integration of the quality of service aspect. Simultaneously, the factor of intention to use is selected to assess usage, although the [21] united the organizational and an individual impact into a single factor of net benefits [5,22].

The different factors of this model are described as-

- System Quality (SQ) is "concern with know if there are bugs in the systems, the reliability of the user-interface, rate of response during interactional with systems, ease of use , credentials, maintainability as well as the quality of the program code. See (Table 1).

Table (1) shows measurement variables for evaluating quality of system.

Constructs	Definition	Measurement Variable	References
(SQ)	D&M [6] distinct (SQ) as: "the preferred features of the IS itself, which generates the information.	Accessibility	[6, 21,23]
		Response time	[5,6,21,24,25,26,27]
		User friendly	[8,29,23,29]
		Reliability	[5,6,21,22,23,24,26]
		Accuracy system	[5,6,23,30]
		Adaptability & Availability	[5,6,21,23]
		Ease of learning	[5,6,23,26,31]
		Ease of use	[5,6,22,24,26,29,31,32]
		Efficiency	[23]
		Flexibility	[5,6,23,24,25,26,27,30,31]
		System features	[5,23,31]
		Integration of systems	[5,6,23,25,27,31,32]
		Sophistication	[23,31]
		Interactivity	[29]

- Information Quality (IQ) is "concern with an issue as relevance, timeliness, design of information generated by IS as well as accuracy" [8]. Typical measurement items are presented in (Table 2).

Table (2) shows measurement variables for evaluating quality of information

Constructs	Definition	Measurement Variable	References
(IQ)	(IQ) identified as "appropriate features of the system results [26]	Accuracy	[6,22,25,26,34,35]
		Adequacy	[29]
		Availability	[5,23,31,33]
		Completeness	[5,6,21,25,26,27,33,34]
		Understandability	[5,6,29,31,33]
		Timeliness	[5,6,25,29,32,34,35]
		Reliability	[5,6,27,29]
		Relevance	[23,26,27,29,34,35]
		Precision	[5,6,26,27]
		Format	[5,6,23,27,31,34]
		Uniqueness	[23]
		Usability	[23,31]
		Usefulness	[29]
		Conciseness	[6,23,26,31,33,35]

- Service quality (ServQual) distinct as: "Quality of the service that users obtain from the information system association and IT support individuals generally or for a particular information system. A number of measurement variables have been suggested. Table (3) shows a sample of those variables.

Table (3) shows measurement variables for evaluating quality of service

Constructs	Definition	Measurement Variable	References
(ServQual)	(SQUAL) identify as the quality of service described by the IS department throughout of its services" [26]	Assurance	[5,16,21,26,36,37]
		Empathy	[5,16,21,26,36,37]
		Reliability	[5,16,21,26,36,37]
		Responsiveness	[5,16,21,26,36,37,38]
		Tangibles	[5,16,21,26,36,37]
		Flexibility	[38]
		Interpersonal quality	[38]
		Intrinsic quality	[38]
		IS training	[38]

- User Satisfaction (US) concurring with [32], user contentment is "the professional approach towards a particular PC program." Seddon [17] depicted the user contentment as "an affective consideration on an attractive continuum of different results. Variables have been created to evaluate the satisfaction of user with an IS exclusive, see table(4).

Table (4) shows measurement variables for evaluating the satisfaction of the user

Constructs	Definition	Measurement Variable	References
US	D&M [6] distinct the Satisfaction of the User as: "receiver response to the employ of the production of IS	Overall satisfaction with IS applications	[5,6,19,28,33,39,40]
		User information satisfaction	[6,23]
		Overall satisfaction as singles measurement	[6,8,23]
		Adequacy	[8,39,40]
		Effectiveness	[8,39,40]
		Efficiency	[8,39,40]
		Enjoyment	[23]

- The system uses as a success factor. Intention to Use is an attitude. Meanwhile, Use is behavior. Besides, the use is action by the consumer to operate of IS. Petter et al. [26] defined " Intention to Use or the users' belief about their likelihood to use the IS." D&M proposed intention to use as another assessment to use for some environment. Table (5) shows measurement variables for this success aspect.

Table (5)) shows measurement variables for evaluating the intention to use and use

Constructs	Definition	Measurement Variable	References
(intention to) use	Also,[22]identified "Intention to Use predictable future consumption of an IS or its product" .Use of the system is identified as: "the extent to which employees and clients use the facilities of an information system.	Actual use	[9]
		Intention to (re)use	[9,22,41]
		Frequency of use	[5,6,25,26,40]
		Daily use	[25,40]
		Number of transactions	[21]
		Navigation patterns	[21]
		Number of site visits	[21]
		Nature of use	[21]

- Net Benefits, D&M [21] classified the two dimensions, which are organization impact in addition to Individual impact into one and called it Net Benefit. Net Benefits "degree to which IS are contributing to the success of organizations, groups, individuals, enterprises as well as countries." Provided sample measurement variables for the impact of individuals in Table (6) as well as the impact of organizational in Table(7).

Table (6) shows measurement variables for evaluating the individual impact

Constructs	Definition	Measurement Variable	References
Individual Impact	This construct indicates users' better understanding of IS context and its influence over users' performance.	Decision effectiveness	[23,31]
		Individual productivity	[5,6,21,23,26]
		Job effectiveness	[10,25]
		Job performance	[10,25]
		Job simplification	[10,25]
		Learning	[23,31]
		Task Usefulness	[10,25]
		Task innovation	[42]
		Performance	[10]

Table (7) shows measurement variables for evaluating the organizational impact

Constructs	Definition	Measurement Variable	References
Organizational Impact	The profits to be gained by the the organization through using the IS system.	Business process	[23,31]
		Enhancement of communication and Collaboration	[40,43]
		Cost reduction	[23,31,40]
		Competitive advantage	[40,43]
		Enhancement of internal operations	[40,43]
		Enhancement of coordination	[40]
		Improved decision making	[23,31,40]
		Improved outcomes/outputs	[23,31]
		Enhancement of reputation	[40]
		Overall productivity	[23,31]
		Customer satisfaction	[42]
		Overall success	[40,43]
		improvement of quality	[43]

2. The D&M IS success model in educational settings

D&M model has been utilized extensively to examine quite a lot of technologies in diverse areas of study, comprising online learning systems [44], the electronic-government environment [45], the portal of campus [46], and digitalize libraries [47]. Furthermore, the model also assists in building the base for another theoretical, for instance, the Knowledge Management System (KMS) [48] in addition to the enterprise System- Success Measurement Model [49].

Regarding educational information systems [19] did an experimental investigation in quasi-voluntary IS employ circumstance related to a Student Information System (SIS). The SIS offers online accessibility to a record of students' academic information plus person-related data. The utilize of SIS was optional. The results agreed with D&M' view that IS success models it is necessary to determine accurately in a given environment. As well They propose that further studies should study how "IS success models execute from diverse perspectives.

Halonen et al. [50] expand this model to illustrate the success of knowledge distribution in an information system that integrated a part of the database of private institutions of education. As the contribution of private education is growing, it is essential to recognize if the obtainable education services support utilizes the knowledge-base and if the service is received acceptable by the end-customer. In this descriptive qualitative case study, the authors argue how the D&M' model can be employed to evaluate education services.

In the environment of e-Learning, the updated D&M model has been implemented in diverse sorts of systems. In [44], the author suggested a model to inspect the critical factors for the effective utilization of the online learning system by students. The consequences stated that quality of information, quality of system in addition to quality of service considerably affected utilization through behavioral intention, and satisfaction of the user. Lwoga [51]used the D&M model to study the variables that expect the usage of an e-learning system by students. Lwoga's investigation was about earlier work [52], which initiated a novel factor, "instructor quality" that concluded considerably impact the perceived usefulness of the e-learning systems.

Mtebe & Raisamo [53] present a model for evaluating the Learning Management System (LMS) published in institutes of higher education in countries of Sub-Saharan through embracing and expanding the updated D&M [21] model. The suggested model and the tool have been confirmed throughout a questionnaire of 200 students enrolled in a variety of coursework obtainable through Moodle LMS at University in Tanzania. The conclusions of the study helped those who are concerned with the implementation of LMS in universities in Sub-Saharan countries to assessed their accessible systems and to developed correctional measures and policy to prevent future LMS downs.

Chen & Chengalur-Smith [54] explore variables affecting undergraduates' previous, present, along with continual utilize of a Web portal of university' library using a credit-bearing course infused with information literacy (IL) elements as an intervention. Applying a varied approach and utilizing the technology recognition and IS success models as hypothetical fundamentals, the authors examined direct effects of user fulfillment, voluntariness, and competing resources on portal utilization, in addition to associations between current utilize, user fulfillment as well as sustained use.

Yakubu & Dasuki [55] studied is based on the D&M' model, which was customized to conclude the success variables liable for the recognition by the students' University of Nigeria for the e-learning system called Canvas. The study presents the gap in research about the lake of investigations of the embracing of e-Learning in the least developed countries that have a focus on the employment of eLearning systems.

3. Linking D&M IS success model with Technology Acceptance Model (TAM)

The TAM created by [9] is utilized to evaluate the recognition, embracing, and employ of information technology. It is well-known, and two factors are being used in TAM, perceived ease of use (PEOU), along with perceived usefulness (PU). PU identifies as the extent to which a person accepts that employing a particular application framework will raise his or her work functioning inside an organization environment [10]. PEOU measures the level to which a person assumes that employing a system is easy [9]. The TAM model obtained a wide reputation amongst scholars. TAM is dissimilar to other models because it does not evaluate success; however, it is utilized to investigate and forecast the user' intention to employ information technologies.

An interesting association linking between D&M IS success model with TAM was also highlighted in the literature. The TAM has been base on TRA [12], plus TPB [11], which are two of the most widely used models applied to clarify IS behavior. According to TAM, Perceived Usefulness as well as Perceived Ease of Use impact users' behavioral intentions as a consequence, this effect impacts on IS Use [19]

Chang [56] utilized factors from updated D&M model [21] plus the TAM [9], he suggested a model study the consequence of quality antecedents on students' intention to use an E-learning system.

Adeyemi & Issa [57] study suggested a model of students' fulfillment in regard with Web portal for the incorporation of D&M model and TAM. The study supposes that quality of information, quality of service, quality of system, plus perceived usefulness independently identify students' contentment with a web portal.

Mohammadi [58] study an incorporated D&M model with the TAM to investigate the impact of perceived usefulness, quality of service, perceived ease of use on users' intentions, in addition to fulfillment, beside the usability towards employment as a mediator of E-learning in Iran. The sample collected from four government universities in Iran The outcome exposed that user fulfillment, along with intention, both had a positive impact on actual utilize of E-learning. Quality of system and quality of information was found to be the main variables leading to users' intentions and fulfillment towards the utilization of E-learning. Eventually, perceived usefulness plays the role of mediator in the relationship among users' intentions with ease of use.

Wixom & Todd [59] proposed a model that integrated the TAM and user satisfaction model as two models symbolize additional steps in a causal chain from the main feature of system design to attitude and potential about consequences that eventually identify utilization. Chung [60] study success model is based on the TAM model, and D&M model incorporated with key project management standards.

Abdel [61] Study customized the variables of the D&M Model with TAM also added two further success factors, i.e., management support and training. An incorporated model for assessing IS success was produced; the suggested model has been confirmed by an experimental study referring to a survey and interview.

4. Conclusion

The most important subject for recent scholars IS success. D&M initiated IS success model to present a full and comprehensive description of IS success. Till now, a large number of academic articles have quoted the IS success model. In the present paper, we present the original as well as the updated D&M Model of IS Success. The first version of D&M model has six interdependent variables of success: Quality of System, Quality of Information, Satisfaction of User, Use, Impact of Organizational, furthermore Impact of Individual. The variables of Quality of Service, as well as Intention to Use, added to the updated D&M model; also, the original variables of Impact of Organizational and Individual were united into one innovative variable, Net Benefits.

IS success model offers a realistic approach to assess, for instance, the satisfaction of users and the consequences of that satisfaction on the employment of IS. The D&M model is well-known compare to all models provided previously. Also, The TAM model considers widespread to investigate the readiness of the end-user towards adopting computer technology. Although it is challenging to assert which model is preferable, however, a suitable model can be chosen according to the condition of the study to be carried.

References

1. Davis, G. B. (1974). Management information systems: conceptual, foundations, structure, and development.
2. Aron, J. D. (1969). Information systems in perspective. *ACM Computing Surveys (CSUR), 1*(4), 213-236.
3. Penrose, E., & Penrose, E. T. (2009). *The Theory of the Growth of the Firm*: Oxford university press.
4. Sørum, H., Medaglia, R., Andersen, K. N., Scott, M., & DeLone, W. (2012). Perceptions of information system success in the public sector: Webmasters at the steering wheel? *Transforming Government: People, Process and Policy, 6*(3), 239-257.
5. Urbach, N., & Müller, B. (2012). The updated DeLone and McLean model of information systems success *Information systems theory* (pp. 1-18): Springer.
6. DeLone, W. H., & McLean, E. R. (1992). Information systems success: The quest for the dependent variable. *Information systems research, 3*(1), 60-95.
7. Bradley, R. V., Pridmore, J. L., & Byrd, T. A. (2006). Information systems success in the context of different corporate cultural types: an empirical investigation. *Journal of Management Information Systems, 23*(2), 267-294.

8. Seddon, P., & Kiew, M.-Y. (1996). A partial test and development of DeLone and McLean's model of IS success. *Australasian Journal of Information Systems, 4*(1).

9. Davis, F. D. (1989). Perceived usefulness, perceived ease of use, and user acceptance of information technology. *MIS quarterly*, 319-340.

10. Davis, F. D., Bagozzi, R. P., & Warshaw, P. R. (1989). User acceptance of computer technology: a comparison of two theoretical models. *Management science, 35*(8), 982-1003.

11. Ajzen, I. (1991). The theory of planned behavior. *Organizational behavior and human decision processes, 50*(2), 179-211.

12. Ajzen, F. (1980). Theory of reasoned action (TRA) in information seeking behavior and technology adoption: theories and trends: IGI Global.

13. Shannon, C. E., & Weaver, W. (1949). A mathematical model of communication. *Urbana, IL: University of Illinois Press, 11*.

14. Mason, R. O. (1978). Measuring information output: A communication systems approach. *Information & management, 1*(4), 219-234.

15. Kettinger, W. J., & Lee, C. C. (1994). Perceived service quality and user satisfaction with the information services function. *Decision sciences, 25*(5-6), 737-766.

16. Pitt, L. F., Watson, R. T., & Kavan, C. B. (1995). Service quality: a measure of information systems effectiveness. *MIS quarterly*, 173-187.

17. Seddon, P. B. (1997). A respecification and extension of the DeLone and McLean model of IS success. *Information systems research, 8*(3), 240-253.

18. Molla, A., & Licker, P. S. (2001). E-commerce systems success: An attempt to extend and respecify the Delone and MacLean model of IS success. *J. Electron. Commerce Res., 2*(4), 131-141.

19. Rai, A., Lang, S. S., & Welker, R. B. (2002). Assessing the validity of IS success models: An empirical test and theoretical analysis. *Information systems research, 13*(1), 50-69.

20. Gao, L., & Bai, X. (2014). An empirical study on continuance intention of mobile social networking services. *Asia Pacific Journal of Marketing and Logistics*.

21. DeLone, W. H., & McLean, E. R. (2002). *Information systems success revisited.* Paper presented at the Proceedings of the 35th Annual Hawaii International Conference on System Sciences.

22. Petter, S., & McLean, E. R. (2009). A meta-analytic assessment of the DeLone and McLean IS success model: An examination of IS success at the individual level. *Information & management, 46*(3), 159-166.

23. Gable, G. G., Sedera, D., & Chan, T. (2008). Re-conceptualizing information system success: The IS-impact measurement model. *Journal of the Association for Information Systems, 9*(7), 18.

24. Hamilton, S., & Chervany, N. L. (1981). Evaluating information system effectiveness-Part I: Comparing evaluation approaches. *MIS quarterly*, 55-69.

25. Iivari, J. (2005). An empirical test of the DeLone-McLean model of information system success. *ACM SIGMIS Database: the DATABASE for Advances in Information Systems, 36*(2), 8-27.

26. Petter, S., DeLone, W., & McLean, E. R. (2013). Information systems success: The quest for the independent variables. *Journal of Management Information Systems, 29*(4), 7-62.

27. Bailey, J. E., & Pearson, S. W. (1983). Development of a tool for measuring and analyzing computer user satisfaction. *Management science, 29*(5), 530-545.

28. Eldrandaly, K. A., Naguib, S. M., & Hassan, M. M. (2015). A model for measuring geographic information systems success. *Journal of Geographic Information System, 7*(04), 328.

29. McKinney, V., Yoon, K., & Zahedi, F. M. (2002). The measurement of web-customer satisfaction: An expectation and disconfirmation approach. *Information systems research, 13*(3), 296-315.

30. DeLone, W., & McLean, E. (2008). Measuring information systems success: models, dimensions, measures, and interrelationships. *European journal of information systems, 17*(3), 236-263.

31. Sedera, D., Gable, G., & Chan, T. (2004). *A factor and structural equation analysis of the enterprise systems success measurement model.* Paper presented at the Proceedings of the 10th Americas Conference on Information Systems

32. Doll, W. J., & Torkzadeh, G. (1988). The measurement of end-user computing satisfaction. *MIS quarterly*, 259-274.

33. Petter, S., DeLone, W., & McLean, E. (2008). Measuring information systems success: models, dimensions, measures, and interrelationships. *European journal of information systems, 17*(3), 236-263.

34. Jaafreh, A. (2017). Evaluation information system success: Applied delone and McLean information system success model in context banking system in KSA. *International Review of Management and Business Research, 6*(2), 829-845.

35. Rainer Jr, R. K., & Watson, H. J. (1995). The keys to executive information system success. *Journal of Management Information Systems, 12*(2), 83-98.

36. Parasuraman, A., Zeithaml, V. A., & Berry, L. L. (1985). A conceptual model of service quality and its implications for future research. *Journal of marketing, 49*(4), 41-50.

37. Parasuraman, A., Zeithaml, V. A., & Berry, L. L. (1988). Servqual: A multiple-item scale for measuring consumer perc. *Journal of retailing, 64*(1), 12.

38. Chang, J. C.-J., & King, W. R. (2005). Measuring the performance of information systems: A functional scorecard. *Journal of Management Information Systems, 22*(1), 85-115.

39. Seddon, P., & Yip, S.-K. (1992). An empirical evaluation of user information satisfaction (UIS) measures for use with general. *Journal of Information Systems, 6*(1), 75-92.

40. Almutairi, H., & Subramanian, G. H. (2005). An empirical application of the DeLone and McLean model in the Kuwaiti private sector. *Journal of Computer Information Systems, 45*(3), 113-122.

41. Wang, Y. S. (2008). 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.

42. Torkzadeh, G., & Doll, W. J. (1999). The development of a tool for measuring the perceived impact of information technology on work. *Omega, 27*(3), 327-339.

43. Sabherwal, R. (1999). The relationship between information system planning sophistication and information system success: an empirical assessment. *Decision sciences, 30*(1), 137-167.

44. Lin, H.-F. (2007). Measuring online learning systems success: Applying the updated DeLone and McLean model. *Cyberpsychology & behavior, 10*(6), 817-820.

45. Hussein, R., Karim, N. S. A., Selamat, M. H., & Mamat, A. (2007). The Relationship between Organisational Factors and Information Systems Success in the Malaysian Electronic-Government Agencies. *Asia-Pacific Journal of Information Technology and Multimedia, 4*(1).

46. bin Masrek, M. N. (2007). Measuring campus portal effectiveness and the contributing factors. *Campus-Wide Information Systems*.

47. Shen, X., Li, D., & Shen, C. (2006). Evaluating China's university library Web sites using correspondence analysis. *Journal of the American Society for Information Science and Technology, 57*(4), 493-500.

48. Wu, J.-H., & Wang, Y.-M. (2006). Measuring KMS success: A respecification of the DeLone and McLean's model. *Information & management, 43*(6), 728-739.

49. Sedera, D., Chian, F. T. T., & Dey, S. (2006). dentifying and evaluating the importance of multiple stakeholder perspective in measuring ES-success.

50. Halonen, R., Thomander, H., & Laukkanen, E. (2010). DeLone & McLean IS success model in evaluating knowledge transfer in a virtual learning environment. *International Journal of Information Systems and Social Change (IJISSC), 1*(2), 36-48.

51. Lwoga, E. (2014). Critical success factors for adoption of web-based learning management systems in Tanzania. *International Journal of Education and Development using ICT, 10*(1).

52. Lee, B.-C., Yoon, J.-O., & Lee, I. (2009). Learners' acceptance of e-learning in South Korea: Theories and results. *Computers & Education, 53*(4), 1320-1329.

53. Mtebe, J. S., & Raisamo, R. (2014). A Model for Assessing Learning Management System Success in Higher Education in Sub-Saharan Countries. *The Electronic Journal of Information Systems in Developing Countries, 61*(1), 1-17.

54. Chen, Y.-H., & Chengalur-Smith, I. (2015). Factors influencing students' use of a library Web portal: Applying course-integrated information literacy instruction as an intervention. *The Internet and Higher Education, 26*, 42-55.

55. Yakubu, M. N., & Dasuki, S. (2018). Assessing eLearning systems success in Nigeria: An application of the DeLone and McLean information systems success model. *Journal of Information Technology Education: Research, 17*, 183-203.

56. Chang, C.-C., Yan, C.-F., & Tseng, J.-S. (2012). Perceived convenience in an extended technology acceptance model: Mobile technology and English learning for college students. *Australasian Journal of Educational Technology, 28*(5).

57. Adeyemi, I. O., & Issa, A. O. (2020). Integrating Information System Success Model (ISSM) And Technology Acceptance Model (TAM): Proposing Students' Satisfaction with University Web Portal Model. *Record and Library Journal, 6*(1), 69-79.

58. Mohammadi, H. (2015). Investigating users' perspectives on e-learning: An integration of TAM and IS success model. *Computers in human behavior, 45*, 359-374.

59. Wixom, B. H., & Todd, P. A. (2005). A theoretical integration of user satisfaction and technology acceptance. *Information systems research, 16*(1), 85-102.

60. Chung, B., Skibniewski, M. J., & Kwak, Y. H. (2009). Developing ERP systems success model for the construction industry. *Journal of construction engineering and management, 135*(3), 207-216.

61. Zaied, A. N. H. (2012). An integrated success model for evaluating information system in public sectors. *Journal of Emerging Trends in Computing and Information Sciences, 3*(6), 814-825.