Information Technology Evaluation: Review and Criticism

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Abstract

Nowadays almost all aspects in human life influenced by information technology. Almost all devices used by human were controlled by computer systems. Lot of investments were made, with not much of evaluation and feedback of the gained benefits were reported. This study tries to figure out how Information Technology is evaluated, approaches that been done, and critics for continually improvement. Review is started with IT-paradox, followed by IT-success, IT-values, IT-evaluations, IT-adoptions, and IT-management. Manuscript is ended with critics and discussion, implications, and conclusion.

Keywords: Information Technology, critics, evaluation, improvement

1. Introduction

Nowadays almost all aspects in human life influenced by information technology. Almost all devices used by human were controlled by computer systems. There are a lot of investments as much as improvements in the information technology field that significantly affect human life. There is an intriguing question: how far and how effective is information technology (IT) influence human life? This question can be answered as we evaluate several aspects in IT evaluation cases. Can we measure IT influences and effectiveness? How to measure it? How can IT increase human's productivity? [1]

2. IT Evaluation Review

This section will figures out what had been done in IT world, what paradox that happened in this field, evaluation approaches that had been done, and how to manage IT for further evaluations. Table 1 shows covered aspects that will be discussed in this study.

Table 1. IT evaluation review coverage.

Topic	Description	References
IT Paradox	Opposite reality than expected benefits that happened among IT investments and projects.	[1][2]
IT Success	Addressing three general questions - *what* is measured, *how* is it measured, and *where* is it measured in the IT evaluation approaches.	[3][4][5][6][7][8]
IT Value	Determining values that experienced by users and form their responses toward IT.	[9][10][11][12]
IT Evaluations	Identification aspects related to IT evaluations.	[13][14][15][16] [17][18][19][20]
IT Adoption	Describing approaches to identify factors influence toward IT adoption.	[21][22][23]
IT Management	Describing approaches to manage IT investments and projects.	[24][25][26]

2.1. IT Paradox

There is a paradox, that investment spent in IT was not resulted in significant productivity of the organization. As stated by Robert Solow, the Nobel Laureate economist, "we see computers everywhere except in the productivity statistics". Only by understanding the causes of the "productivity paradox", we can learn how to identify and remove the obstacles to higher productivity growth [2]. Roach (1991) found that service sectors use over 80% IT but exhibit of poor IT productivity. In other side, manufacturing industries exhibit increasing productivity because IT effectively used for labor substitution in manufacturing industries.

Bryjolfsson (1993) proposed four explanations for the paradox as described below [2]:

Mismeasurement of outputs and inputs. The measurement problems are particularly acute for IT use in the service sector and among white collar worker, where manufacturing sector and blue collar measures are better. In manufacturing sector, for example, clothing manufacturer, they can convert values into unit cost, for example color and sizes of T-shirt. They can measure, whether investment is returned positively or not by measuring sold particular size and color T-shirt in such periodic timeline. In other side, in service sector, most intangible improvement cannot be measured into numbers. For example, 24 hours of ATM and its benefit to bank customers.

Lags due to learning and adjustment. New technologies are coming very fast, in other side, people need time to learn and experience before becoming proficient.

Redistribution and dissipation of profits. The third possible explanation is that IT may be beneficial to individual firms, but unproductive from the standpoint of the industry as a whole or the economy as a whole: IT rearranges the shares of the pie without making it any bigger.

Mismanagement of information and technology. The fourth possibility is that, on the whole, IT really is not productive at the firm level. The investments are made nevertheless because the decision-makers aren't acting in the interests of the firm. Instead, they are increasing their slack, building inefficient systems, or simply using outdated criteria for decision-making.

2.2. IT Success

The value of information technology (IT) to modern organizations is almost undeniable. However, the determination of that value has been elusive in research and practice [3]. Past firm-level studies of IT payoff can be viewed as addressing three general questions - *what* is measured, *how* is it measured, and *where* is it measured? (Banker et al. 1993, Berger et al. 1988, Mahmood and Szewczak 1999). In *what* is measured, past studies propose that IT performance is associated with variables that transcend traditional measures and include measures of productivity, in addition to profitability (Mahmood and Mann 2000). Study characteristics, such as duration of data collection and the process of IT investment, describe *how* the data are gathered. On the question of *where* measurements for IT payoff should occur, prior studies indicate that payoff has been harder to measure in some industries than others [4].

The importance of defining the IS dependent variable cannot be overemphasized. The evaluation of IS practice, policies, and procedures requires an IS success measure against which various strategies can be tested. Without a well-defined dependent variable, much of IS research is purely speculative. Some of these measures have been merely identified, but never used empirically [5]. DeLone and McLean (1992) proposed model of IS success as we can see in figure 1.

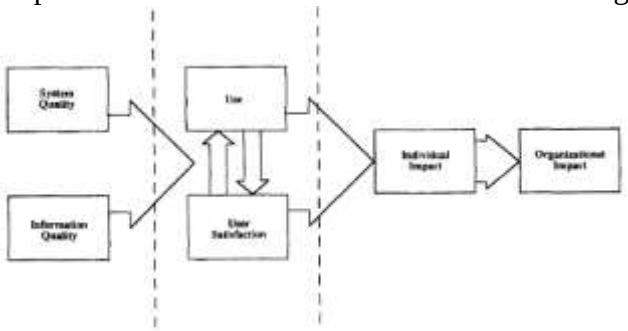

Figure 1. DeLone and McLean's model of IS success

As an examination of the literature on IS success makes clear, there is not one success measure but many. However, on more careful examination, these many measures fall into six major categories – **system quality, information quality, use, user satisfaction, individual impact, and organizational impact**. Moreover, these categories or components are interrelated and interdependent, forming an IS success model. By studying the interactions along these components of the model, as well as the components themselves, a clearer picture emerges as to what constitutes information systems success.

Seddon (1997) and Arun Rai et al. (2002) were evaluated DeLone and McLean's work in many ways [6][7]. A noteworthy difference between the DeLone and McLean structural model and the Seddon structural model is that the DeLone and McLean structural model includes a path between IS Use and Perceived Usefulness, whereas the Seddon model does not. So, the authors proposed to amend Seddon's model (figure 2). Statistical comparison for both models can be seen in table 2.

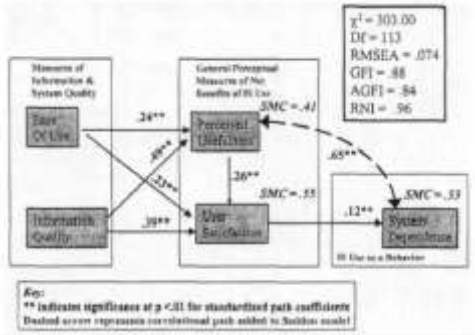

Figure 2. Seddon's model

Table 2. DeLone and McLean's vs Seddon's model.

Statistics	Model		
	DeLone and McLean	**Seddon**	**Amended Seddon**
X^2	303.89	392.87	303.00
Degrees of freedom	113	114	113
RMSEA	0.079	0.095	0.074
GFI	0.87	0.85	0.88
AGFI	0.83	0.80	0.84
RNI	0.95	0.93	0.96
SMC Perceived Usefulness	0.60	0.41	0.41
SMC for User Satisfaction (%)	51	55	55
SMC System Dependence (%)	30	27	53
Average SMC explained (%)	47	41	49.67

And after 10 years, DeLone and McLean updated there is success model [8] as seen in figure 3.

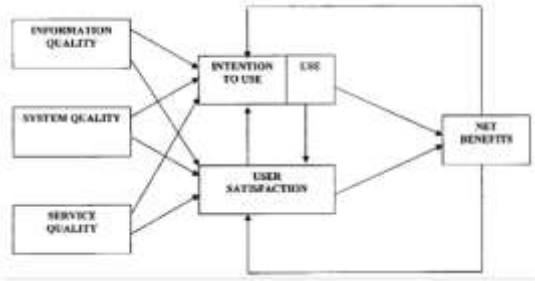

Figure 3. Updated DeLone and McLean IS success model

2.3. IT Value

DeLone and McLean updated model stated that there are some factors that drive users to use the IS systems and services. In other words, there must be something valuable that attract users to accept and use IS. Davis (1986) suggested that users' motivation can be explained by three factors: *Perceived Ease of Use, Perceived Usefulness,* and *Attitude toward using* the system [9]. He hypothesized that the attitude of a user toward a system was a major determinant of whether the user will actually use or reject the system. The attitude of the user, in turn, was considered to be influenced by two major beliefs: perceived usefulness and perceived ease of use, with perceived ease of use having a direct influence on perceived usefulness. Finally, both these beliefs were hypothesized to be directly influenced by the system design characteristics, represented by X1, X2 and X3 (see figure 4).

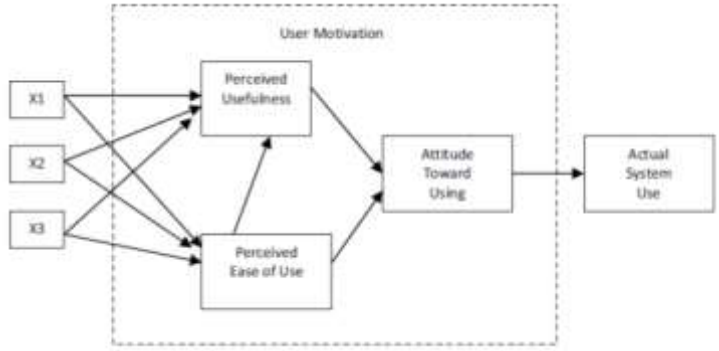

Figure 4. Original TAM proposed by Fred Davis (1986)

Below are the definitions of perceived usefulness and perceived ease of use. **Perceived usefulness:** The degree to which an individual believes that using a particular system would enhance his or her job performance. **Perceived ease of use:** The degree to which an individual believes that using a particular system would be free of physical and mental effort.

Technology Acceptance Model (TAM) was revised and tested many times including by Adams, Nelson and Todd (1992), Hendrickson, Massey and Cronan (1993), Subramanian (1994), Davis and Venkatesh (1996), Davis, Bagozzi and Warshaw (1989), Mathieson (1991), and Venkatesh and Davis (2000). One of the main criticisms for studies on the TAM model is that self-reported use data are used to measure system use instead of real actual use data. As some researchers pointed out, self-reported use data is a subjective measure, and is thus unreliable in measuring actual use of a system (Legris, Ingham and Collerette, 2003, Yousafzai Foxall, and Pallister 2007).

Another factor that made IT valuable is its **quality**. DeLone and McLean stated that factors which attract users were *information quality*, *system quality*, and *service quality*. The IS department is changed, not just a provider of products, it is also a service provider. Indeed, this may be its major function. The notion that IS departments are service providers is not well-established in the IS literature. In the IS success measurement, the service function was not included. Current IS success measures, product and system quality, focus on the tangible end of the spectrum. Pitt et al. (1995) argue that service quality, the other end of the spectrum, needs to be considered as an additional measure of IS success [10]. Their paper discusses the appropriateness of SERVQUAL to assess IS service quality. The instrument was originally developed by marketing academics to assess service quality in general (see figure 5).

Service quality has 5 dimensions, which described as follow: ***Tangibles*****:** Physical facilities, equipment, and appearance of personnel. ***Reliability*****:** Ability to perform the promised service dependably and accurately. ***Responsiveness*****:** Willingness to help customers and provide prompt service. ***Assurance*****:** Knowledge and courtesy of employees and their ability to inspire trust and confidence. ***Empathy*****:** Caring,

individualized attention the service provider gives its customers. Kettinger et al. (1997) raised the debate about SERVQUAL and proposed SERVPERF as measurement tool for a total service quality score [11]. But Cronholm et al. (2014) suggested to use SERVQUAL based on their overall conclusion is that SERVQUAL has been a good base for adjusting determinants to fit the IT Service Management (ITSM) field [12].

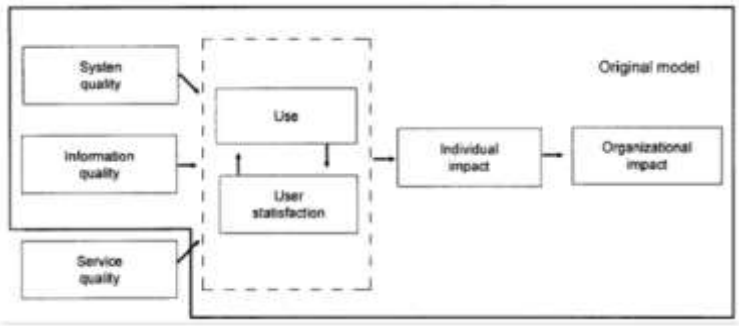

Figure 5. Proposed model by Pitt et al.

2.4. IT Evaluations

IT is not just influence on person, but also on organization as group of persons. As stated by DeLone and Mclean, that IT impacts on individual will leads on impact to organization. In this circumstances, **effective** is the key. So, how to measure the effectiveness in IT? Cameron (1986) proposed five major factors were selected as predictors of organizational effectiveness: (1) the external environment-including turbulence, complexity, richness or munificence, and supportiveness (2) institutional structure-including centralization, professionalization, standardization, administrative ratio diversity, and saga (3) institutional strategy-including major area of strategic orientation, pro activity of strategies, and internal versus external focus (4) institutional demographics-including size, location, unionism, percent of tenured faculty, type of school (e.g., liberal arts, major doctoral, comprehensive), institutional control (e.g., public, private) and so on (5) institutional finances-including internal expenditure patterns, revenues from sources such as federal and state governments and foundations, endowments, and acquisition of revenues compared to competing schools [13]. Grover et al. (1996) sharpened this idea by developed framework as we can see in figure 6 [14].

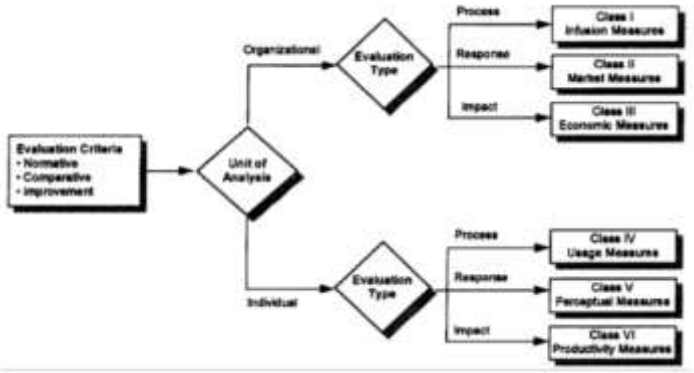

Figure 6. Proposed framework of the construct space of IS effectiveness

In the organizational effectiveness literature, three types of evaluation have been proposed: (1) **process**, (2) **response**, and (3) **impact**. *Process* evaluation assumes that when resources are limited, organizational members work to ensure their efficient use. The second is *response w*hich assesses the reaction of the individual or the organization (or its external entities) to the IS service or product. The final evaluative type is *impact*, *w*hich is the most comprehensive and the most difficult to assess. It is associated with the direct effects of IS implementation on individual or organizational performance.

Almost all researchers agree that user satisfaction was an important factor in the IT evaluation and IT success field. User satisfaction may be defined as the extent to which users believe the information system available to them meets their information requirements (Ives et al., 1983). In the IS literature, the user satisfaction construct has been referred to as "felt need", "system acceptance", "perceived usefulness", "feelings about the information system", "MIS appreciation", "perceptions", and "beliefs" (Ives et al., 1983; Swanson, 1982). The concept of user satisfaction is based on Cyert and March's (1963) suggestion that if an information system meets the requirements of the users, the users' satisfaction with the information system will increase [15].

Another researcher came with LAP approach. Sushil has developed a flexible systems methodology or a methodological construct, which has been used by a number of management researchers in real life organizational cases. This methodology envisages a SAP-LAP framework. The SAP (Situation - Actor - Process) analysis first maps these three components, namely, "situation", "actor" and "process" out of the existing organizational state to define the dynamic interplay of reality. The SAP analysis leads to the second phase of the analysis called LAP synthesis, which has three components, namely, "learning issues", "actions" and "performance" [16]. Batra figures out what was done by Sushil into a framework (figure 7).

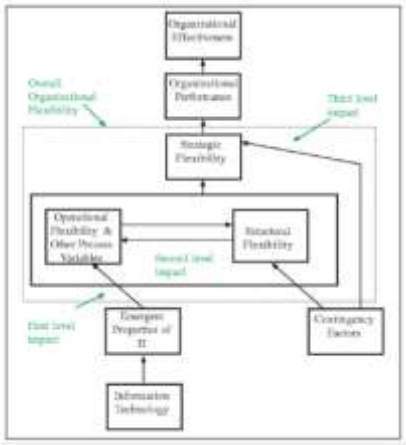

Figure 7. Proposed framework of the IS Organizational Effectiveness Measurement

While IT or IS continually developed and implemented, then another question came up, is IT or IS has sustainable benefits? Mata et al. (1995) tried to figure out their proposed model based on Resource-Based Model [17] (see figure 8).

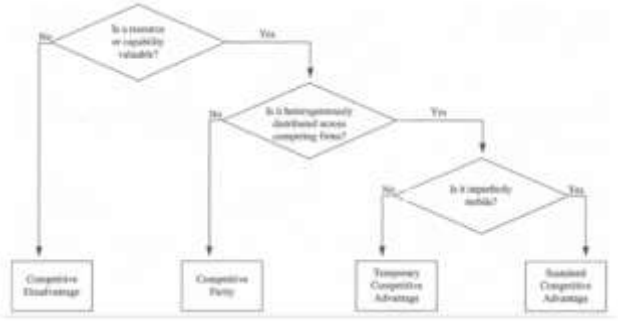

Figure 8. Resource-Based Model of Competitive Advantage

This model is organized with reference to a set of three questions about a firm's resources and capabilities. 1) Does a particular resource or capability add value to a firm, i.e., does its exploitation reduce a firm's cost below and/or increase its revenues above what would have been the case if these resources or capabilities were not exploited? 2) Is a particular resource or capability heterogeneously distributed across competing firms? 3) Is a resource or capability imperfectly mobile? There five attributes of IT that have been suggested as possible sources of sustained competitive advantage: customer switching costs, access to capital, proprietary technology, technical IT skills, and managerial IT skills.

Then, what is the role of human in the sustainable advantages of IT? Powell et al. (1997) tried to answer this question. The finding of his work shows that ITs alone have not produced sustainable performance advantages in the retail industry, but that some firms have gained advantages by using ITs to leverage intangible, complementary human and business resources such as flexible culture, strategic planning - IT integration, and supplier relationships. The results support the resource-based approach, and help to explain why some firms outperform others using the same ITs, and why successful IT users often fail to sustain IT-based competitive advantages [18]. In contrast, Cao (2010) argued that a holistic approach to understanding IT business value is more appropriate. A holistic approach assumes that IT and organizational process, structure, culture and power and politics are interrelated and interacting and the whole is more than the sum of its parts [19].

Information system (IS) success and its determinants have been considered critical to the field of information systems (Bailey and Pearson 1983, DeLone and McLean 1992, Seddon 1997, Rai et al. 2002). However, empirical results in this area are inconsistent, and a synthesis across the numerous empirical studies is needed (Rai et al. 2002). Sabherwal et al. (2006) tried to provide further insights into the success of an IS that is adopted or used by individuals within the organization, and the determinants of IS success, by empirically integrating prior research in this area [20]. Their proposed framework can be seen in figure 9.

Their finding indicates that the quality of the specific system and four constructs related to ISs in general-user training, user attitude, top-management support, and facilitating conditions-are critical to IS success. If IS developers and managers focus on these aspects, user participation in the development of the specific system, user satisfaction, perceived usefulness, and system use, would improve as well.

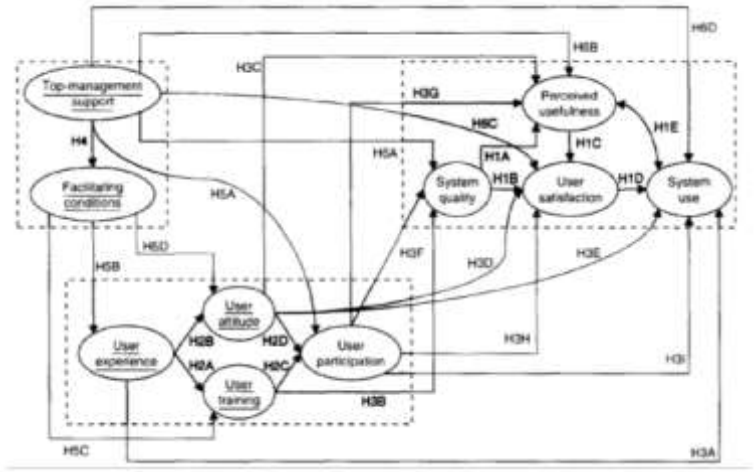

Figure 9. Proposed framework by Sabherwal et al.

2.5. IT Adoption

E-commerce today means many things to different people. There exists a wide variety of e-commerce definitions and conceptualizations covering a plethora of issues, applications, and business models [21]. Zwass (1996), defines e-commerce as "*the sharing of business information, maintaining business relationships and conducting business transactions by means of telecommunications networks*". Zwass suggests that the best way to conceptualize and analyze e-commerce is to consider it as a hierarchical structure composed of three metalevels: *infrastructure, services* and *products and structure.*

Molla et al. (2001) adopted DeLone and McLean model and proposed new framework to be used in e-commerce (figure 10). The *System* and *Information Quality* components in the D&M model are replaced by *E-commerce System* and *Content Quality* respectively. *User Satisfaction* is replaced with *Customer E-commerce Satisfaction.* But c*ustomer e-commerce satisfaction* is proposed here as a dependent variable to e-commerce success. Two additional factors - *trust* and *service* are needed to capture the transactional and customer support components of e-commerce systems and understand the relationship between use and customer e-commerce satisfaction. The authors prefer to maintain *Use* as in the original work.

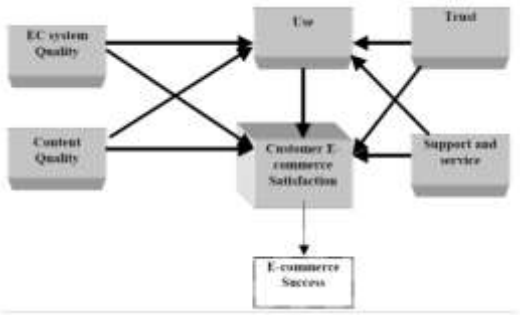

Figure 10. E-Commerce Success Model

Zhu et al. (2004) confirmed and sharpened the work of Molla by proposed e-business value model based on Technical – Organizational – Environmental (TOE) framework (figure 11).

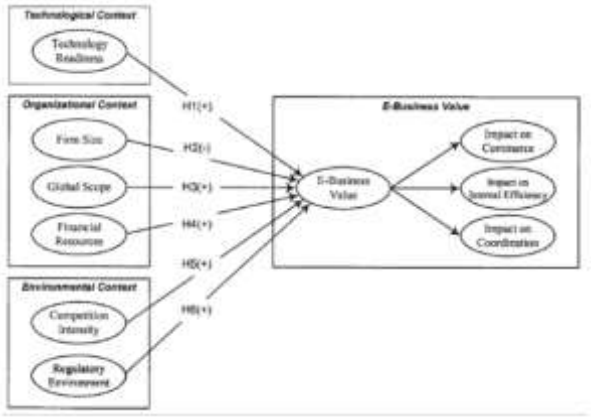

Figure 11. Research Model for E-Business Value Based on the TOE Framework

The TOE framework identifies three aspects of a firm's context that influence the process by which it adopts and implements a technological innovation: technological context, organizational context, and environmental context. *Technological context* describes both the internal and external technologies relevant to the firm. These include existing technologies inside the firm, as well as the pool of available technologies in the market. *Organizational context* is defined in terms of several descriptive measures: firm size and scope; the centralization, formalization, and complexity of its managerial structure; the quality of its human resources; and the amount of slack resources available internally. *Environmental context* is the arena in which a firm conducts its business—its industry, competitors, access to resources supplied by others, and dealings with government [22].

DeLone & McLean (2004) propose several e-commerce systems success measures identified in the management information systems (MIS) and marketing literature, the nomological structure of the updated D&M model is not fully consistent with the quality–value–satisfaction–loyalty chain in the marketing and consumer behavior literature (e.g. Zeithaml, 1988; Patterson & Spreng, 1997; Cronin *et al*., 2000; Parasuraman & Grewal, 2000; Hellier *et al*., 2003; Durvasula *et al*., 2004). Thus, continued research is also required to reconcile the updated D&M model with

the marketing research literature. The updated D&M model has not yet been empirically validated in the e-commerce environment.

Wang (2008) tried to validate the DeLone and McLean model, adjusted and implemented it in the e-commerce. His proposed model can be seen in figure 12.

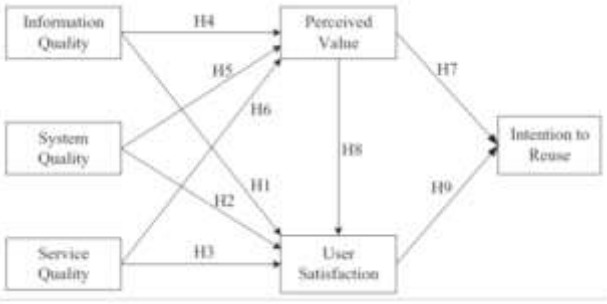

Figure 12. Proposed e-commerce success model by Wang (2008)

Based on the findings, this study revises the TAM by replacing Perceived Usefulness with Perceived Value to make it more consistent with the proposed e-commerce systems success model (see figure 13).

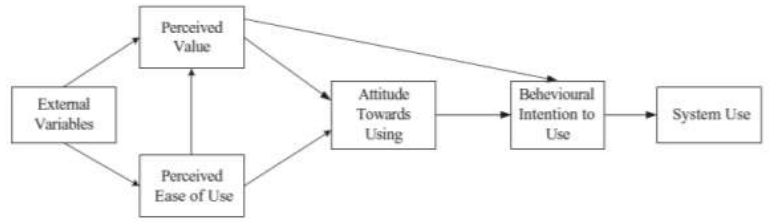

Figure 13. The revised Technology Acceptance Model

Perceived Value is introduced to the respecified e-commerce systems success model as an intervening success measure, which mediates the effects of Information Quality, System Quality, and Service Quality on User Satisfaction and Intention to Reuse. Perceived Value is defined as a belief (cognitive) measure of net realized benefits, while User Satisfaction is an attitude (affective) one [23].

2.6. IT Management

The fundamental issues of measuring and evaluating IT applications and IS activities remains unresolved. Information economics seeks to account for a wider scope of IS benefits, by including less tangible items such as improved customer service or a higher degree of competitiveness. It also prescribes that the benefits and risks be separated into two domains, a business domain and a technological domain, and that each domain be evaluated separately [24].

Robert Kaplan of Harvard University and David Norton, an American management consultant, have proposed the Balanced Scorecard (BSC) as a means to evaluate corporate performance from four different perspectives: the financial perspective, the internal business process perspective, the customer perspective, and the learning and growth perspective. Their BSC is designed to complement ‘‘financial

measures of past performance with measures of the drivers of future performance''. The name of their concept reflects an intent to keep score of a set of items that maintain a balance ''between short- and long-term objectives, between financial and non-financial measures, between lagging and leading indicators, and between internal and external performance perspectives''.

Based on the BSC framework, Martinsons et al. (1999) proposed new model to measure and manage IT projects (figure 14).

Figure 14. BSC-based IT evaluation model

Martinsons defined step-by-step in building a balanced IT/IS scorecard:

1. Create an awareness for the concept of the balanced IS scorecard among top management and IS management;
2. Collect and analyze data on the following items:
   a. Corporate strategy, business strategy, and IS strategy;
   b. Specific objectives and goals related to the corporate, business and IS strategy;
   c. Traditional metrics already in use for IS performance measurement; and
   d. Potential metrics related to the four balanced IS scorecard perspectives;
3. Clearly define the company-specific objectives and goals of the IS department or functional area from each of the four perspectives;
4. Develop a preliminary balanced IS scorecard based on the defined objectives and goals of the enterprise and the approach outlined in this paper;
5. Receive comments and feedback on the balanced IS scorecard from management, and revise it accordingly;
6. Achieve a consensus on the balanced IS scorecard that will be used by the organization;
7. Communicate both the scorecard and its underlying rationale to all stakeholders.

The following steps may be appropriate in order to implement effectively the balanced IS scorecard as a strategic management system:

1. Clarify and translate the vision and strategy into specific action programs;
2. Link strategic objectives to team and individual goals;
3. Link strategic objectives to resource allocation;
4. Review performance data on a periodic basis, and adjust the strategy as appropriate.

The authors have recently observed the implementation of balanced IS scorecards in three large companies in Hong Kong. The evidence from these cases suggests that several common errors must be avoided when implementing this concept. Three of these errors are discussed below:

1. Failure to include specific long-term objectives;
2. Failure to relate key measures to performance drivers by means of cause-and-effect relationships; and
3. Failure to communicate the contents of, and rationale for the balanced IS scorecard.

IS can be evaluated in terms of 1) The efficiency of the activities associated with IS development and operations; and 2) Its contribution to the effectiveness of those that use IS to improve personal productivity and strive to help attain corporate goals. The balanced IS scorecard integrates these two dimensions. While there exist metrics and instruments to assess specific IS sub-functions and specific IS sub-areas, such as data center performance, productivity and data quality, typically these measures cannot be aggregated in any meaningful way. This limits their usefulness as the bases for identifying the sources of overall performance improvements or degradations.

Chang et al. (2005) tried to develop such an instrument—a "scorecard"— for evaluating overall Information System Functional Performance (ISFP) [25]. They based their model on the theoretical Input-Output Performance Model (figure 14).

Systems performance: Assesses the quality aspects of systems such as reliability, response time, ease of use, and so on, and the various impacts that systems have on the user's work. "Systems" encompass all IS applications that the user regularly uses.
Information effectiveness: Assesses the quality of information in terms of the design, operation, use, and value provided by information as well as the effects of the information on the user's job. The information can be generated from any of the systems that the user makes use of.
*Service performance: Asse*sses the user's experience with services provided by the IS function in terms of quality and flexibility. The services provided by the IS function include activities ranging from systems development to help desk to consulting.

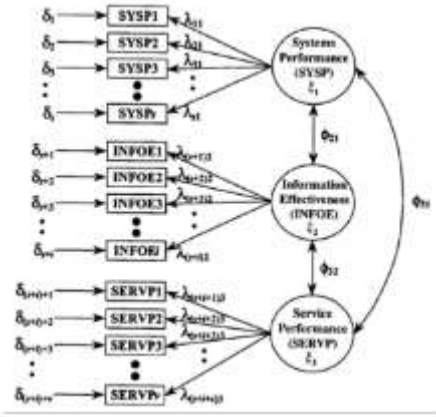

Figure 15. Three-Dimensional Model of Information System Functional Scorecard

Overall, the goal of developing a measure to assess the performance of the IS function was successfully achieved in this study. The resulting instrument is not only comprehensive enough to cover all aspects of ISFP but also sensitive enough to pinpoint specific areas that need attention. The ISFS instrument should be a useful tool for organizations to use in continuously monitoring the performance of their IS function and for researchers to use in studies that require ISFP as a dependent or independent construct, as well as in studies that seek to complement the ISFS through other analyses.

IS maintenance costs comprise a major portion (70%) of the total IS implementation costs. Companies choose to invest their resources and manpower in their core capability to provide products or services. The demand for IT outsourcing and the Software-as-a-service (Saas) model, which integrates network, hardware, and software, is increasing as IT sophistication itself increases. Despite rapid growth in the Saas market, no research has been conducted on Saas measurement based on BSCs. Software-as-a-service (Saas) can be defined as applications and computer-based services delivered and managed from a remote center to multiple customers via the Internet or a VPN. Saas shares common themes with On-Demand Service [26]. The Saas provider acts as a mediator, mediating services between independent software vendors (ISVs). Saas customers do not possess, manage or maintain the applications, but only use them as final products by accessing services with IT support. While Saas is advantageous in that it reduces the repair costs of application-based construction and maintenance, the risk of data leakage becomes a major disadvantage because application servers are constructed by outside companies.

Because it is impossible to assess an organization in a competitive environment based merely on financial performance, it is necessary to measure Saas performance by using the balanced scorecard (BSC) approach, which balances leading and lagging indicators, as well as by using financial and non-financial measures. To provide a balanced approach to the measurement of organizational performance,

including sub-areas, such as knowledge management (KM), business processes, and financial performance, BSC measures four categories: learning and growth, internal business processes, customer performance, and financial performance (figure 15).

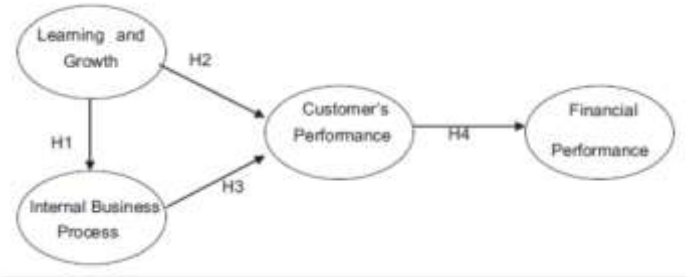

Figure 16. BSC-approach-based for System as a Service model by Lee et al. (2013)

This study uses BSCs as a lens for suggesting four measures. The intention was to determine the leading and lagging indicators. This determination improves the understanding of leading and lagging indicators of BSC categories based on the balance between financial and non-financial analysis.

3. Critics and Discussion

Based on the reviewed literatures, I point out several things that should be considered.

1. User satisfaction can be used to figure out whether an IS system is useful or not. But user satisfaction only can be measured by voluntary use only. This is the main weakness when we try to evaluate IS systems that offered to be used by public.
2. I propose an "addiction level" to be considered as a factor to evaluate IS system success. The more addicted users to use the system, the higher suited of the system towards particular user needs.
3. User is the center of IS systems. IS systems were developed to simplify and automate sequences of human tasks. Evaluating IS systems from the technical side is easy and there are so many parameters provided, such as up-time, bandwidth availability, tasks processed per second, and so on. But evaluating IS system from the user side is much difficult and broad. There are only perceive usefulness and perceive ease of use that commonly used, but I believe we have to broaden our point of view into psychological switching barrier (barrier that prevent user to switch and try another offered system), needs-suitability level (degree of particular system to suitable toward particular user need), perceived attractiveness (degree of how users attracted their intention of the offered system), and so on.
4. Trust is an important factor in the e-commerce field. But I believe we can extend the scope of trust, not just in term of security of the electronic transactions, but also in term of secure feeling when prospective user started to be attracted to use the offered system and continue to use the existing system.

5. I believe we have to consider about "circle-habit" to be an important factor that affect the intentional of use the offered IS system. For example, when a kid sees his father uses online ticketing system for years, his father's trust of the ticketing systems will be inherited or transferred to the young kid. So, when he starts to be able to use IS systems, he has an "adhered-trust" on ticketing system.
6. There only few studies that view the IT evaluation field from the environmental side. I believe, we have to pay more attention in the environmental point of view because environment affects human's feeling and behavior. For example, cold north area tends to make people who live there slow to angry, while hot desert area tends to drive people who live there quickly to angry.
7. There is so limited studies focus on the time and cultural changes of society toward IT evaluation field, since IT related studies commonly conducted in cross-sectional time period, not longitudinal method. I believe, we have to pay more consideration about people and cultural changes, because when people and society change, the way how users use IT or IS systems also changes. These changes can bury particular technology into history, for example telegraph and pager systems.

4. Implication

This literature study reviews a lot of methods that be used in the IT evaluation field. But in the discussion, there are several issues pointed out to be more considered. These will bring implications both for researchers and practitioners. For researchers, the items pointed out in the discussion would drive them to expand their thinking and research area in order to gain higher precision in research and explore novel methods to cover the issues. For practitioners, this review could enrich their knowledge of IT implementations and evaluations, and drive them to think beyond the IT implementation's processes and faced obstacles.

5. Conclusion

IT evaluation has been investigated and many approaches have been proposed, but there is still opportunities to explore from many perspectives and aspects. We can investigate from the technical point of view, user point of view, time and culture point of view, and also environment point of view. People changes every time, and also their needs. IT and IS should be changed as well in order to provide its main purpose, which is simplify and automate human tasks. Future studies should address those changes of human life.

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