ABSTRACT

Information Systems (IS) effectiveness has been studied over the past three decades, with user satisfaction utilized as a key measure. However, very little attention has been given to the role of user-perceived cognitive value of IS in measuring the effectiveness of such systems. Therefore, this article defines and articulates user-perceived value of IS as an important construct for IS research, not from the financial or ‘net benefit’ perspective to the organization, rather from the cognitive perspective. Following literature review, a new taxonomy of IS effectiveness, Value-Satisfaction Taxonomy of IS Effectiveness (VSTISE), is presented. The VSTISE posits four quadrants to indicate level of user-perceived IS effectiveness: improvement, effective, misleading, and ineffective. A case study using the proposed VSTISE is discussed. Results based on the 192 responses identify several problematic system characteristics that warrant additional investigation for their limited IS effectiveness. Finally, recommendations for research and practice are provided.

Keywords: end-user computing satisfaction; IS effectiveness; taxonomy of IS effectiveness; user-perceived value; user satisfaction; value theory

INTRODUCTION

Nearly three decades scholars have suggested that effectiveness of Information Systems (IS) is “an important phenomenon for researchers and practitioners” (Scott, 1995, p. 43). Simultaneously, numerous scholars have noted the challenges for IS research in measuring IS effectiveness (Arnold, 1995; DeLone & McLean, 1992; Doll & Torkzadeh, 1988; Grover, Seung, & Segars, 1996; Ives, Olson, & Baroudi, 1983; Kim, 1989; Stone, 1990; Yuthas & Eining, 1995). Grover et al. suggested that IS effectiveness depends on the unit of analysis, i.e., individual or organizational perspective. Although the organizational perspective is valid and critical, the focus of this article is on the individual (i.e., the user) perspective. There has
been extensive investigation in the past three decades to assess IS effectiveness using user satisfaction as a surrogate measure (Bailey & Pearson, 1983; Baroudi & Orlikowski, 1988; Doll & Torkzadeh, 1988; 1991; 1994; Galletta & Lederer, 1989; Gelderman, 1998; Ives et al., 1983; Kettinger & Lee, 1994; Lee, Kim, & Lee, 1995; Torkzadeh & Doll, 1991). However, some IS scholars have voiced a concern about measures of user satisfaction with IS that do not take into account the “silent beliefs” of IS users (Etezadi-Amoli & Farhoomand, 1991, p. 1). Additionally, marketing scholars such as Chiou (2004) as well as Yang and Peterson (2004) also indicated the limitations of user satisfaction as a sole measure of effectiveness of customer loyalty. Chiou (2004) indicated that “more than half of the satisfied customers will defect eventually” (p. 686). According to Yang and Peterson (2004), “high value is one primary motivation for customer patronage” (p. 803). Moreover, IS scholars have noted that IS effectiveness is a multidimensional construct, and yet have used only user satisfaction as a surrogate predictor of that construct. Additionally, the significance of user-perceived value as a cognitive construct affecting human attitudes (and in turn affecting the construct of satisfaction) has been recognized by numerous scholars in a broad variety of fields (Rafaeli & Raban, 2003). Nevertheless, very little attention has been given in IS research to antecedent constructs such as the user’s personal beliefs or perceived value. In this article, we attempt to fill this void by defining, articulating, and suggesting a specific measure, the user-perceived value construct. Moreover, we attempt to contribute to IS literature by providing the theoretical foundations to stimulate future research to use the perceived value construct in other models. We propose a new taxonomy of IS effectiveness that can be used as a benchmarking tool by practitioners and IS decision makers, especially in the service sector.

The majority of the work conducted in IS literature about the value construct has dealt with the economical or financial perspective of value (i.e., net benefit, return on investment, etc.; see (DeLone & McLean, 1992; 2003; Gefen & Ragowsky, 2005; Ragowsky, 1995; Ragowsky, Somers, & Adams, 2005; Ragowsky, Stern, & Adams, 2000)) as a dependent variable in IS models. The approach we advocate is to incorporate the user-perceived cognitive value construct as another variable in the measure of IS effectiveness. We define user-perceived value as a belief about the level of importance that users hold for IS characteristics. Figure 1 illustrates the conceptual model we propose. Interestingly enough, it was originally recognized in the IS literature that user-perceived value is relevant in understanding user satisfaction and user-perceived IS effectiveness with respect to a system’s characteristics (Bailey & Pearson, 1983). However, much of the subsequent work on evaluating levels of user satisfaction concentrated primarily on attitudes towards IS (Doll & Torkzadeh, 1988; 1991; Ives et al., 1983; Torkzadeh & Doll, 1991). In part, this is because some scholars found that measuring user-perceived value (i.e., user-perceived importance level of system characteristics) provides very little additional information to the overall understanding of user satisfaction (Ives et al., 1983). However, some disagreement exists in the literature about such an approach, as measurement of user-perceived value can lead to a deeper understanding of the user-perceived IS effectiveness (Etezadi-Amoli & Farhoomand, 1991). Therefore, our primary objective in this article is to bring the attention of IS researchers to a new construct in the measurement of IS effectiveness. We present user-perceived value along with the previously used user satisfaction construct as measures to construct a new taxonomy of IS effectiveness from the user’s cognitive perspective.

The organization of this article is as follows. Section II provides the theoretical background that serves as the foundation for this work. The section includes a review of the literature from the IS field on user satisfaction. The discussion provides a review of the IS measures developed and validated over the past three decades to measure user satisfaction with IS. Due to the nature of the review, we will attempt to pres-
ent instrument development and maturation of constructs based on chronological order. This is followed by a similar review related to the construct of IS effectiveness. Additionally, a review of value theory from cognitive psychology and other fields is provided with an emphasis on the user as the unit of analysis. In section III, we propose a new taxonomy for IS effectiveness based on the combined measures of user satisfaction and user-perceived value of IS. A case study where the proposed new taxonomy was used is outlined in section IV. Finally, in section V, we offer discussion to articulate the implications of the user-perceived value construct for future IS research, and we offer IS decision makers and practitioners recommendations on using our new taxonomy as a benchmarking tool for IS effectiveness.

THEORETICAL BACKGROUND

User Satisfaction with IS

User satisfaction with IS has been dominating IS research for almost three decades as a central measure for IS effectiveness (DeLone & McLean, 1992; Ives et al., 1983; Kim, 1989).

Extensive research in developing measures for user satisfaction with IS has evolved over time and researchers have debated definitions and validity of associated instruments (see e.g., Bailey & Pearson, 1983; Doll & Torkzadeh, 1988; Ives et al.). Early IS research in generating user satisfaction measures included Jenkins and Ricketts (1979) who examined user satisfaction with IS output reports. Bailey and Pearson were among the first IS scholars to successfully validate a widely accepted instrument to evaluate user satisfaction with IS. They provided a foundation for two major streams of research in a quest to develop sound measures of user satisfaction: user information satisfaction (Ives et al., 1983) and end-user computing satisfaction (Doll & Torkzadeh, 1988). Bailey and Pearson defined the overall measure of user satisfaction as the sum of the user’s weighted reactions to a set of characteristics describing the IS. Bailey and Pearson's estimation of the overall user satisfaction with IS was a weighted average of the answers to a set of adjectives, while the level of importance of each characteristic was used as the weight in the estimation. Although the definition and validation of the associated instrument to measure user satisfaction was a clear contribution to the IS field, their survey

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with over 200 items was time consuming for users to complete. Ives et al. coined the term user information satisfaction (UIS) as “the extent to which users believe that the information system available to them meets their information requirements” (p. 785). They set out to improve internal consistency, reliability, and ease of administration of Bailey and Pearson’s instrument. To accomplish this, they eliminated characteristics with the lowest correlations to the overall user satisfaction measure. They also eliminated the measures of importance. The latter was done for expediency, in part based on their observation that importance-weighted satisfaction and unweighted satisfaction scores were highly correlated in their study’s data, making the importance items unnecessary.

Several scholars sought to reaffirm the reliability and validity of the UIS instrument of Ives et al. (1983), including Baroudi and Orlikowski (1988), who used the instrument in their survey of 358 IS users. Their results reaffirmed construct and convergent validity as well as reliability of the UIS instrument. Following Ives et al., Baroudi and Orlikowski’s study also did not include any measure of the user-perceived importance (i.e., perceived value) for each characteristic. Galletta and Lederer (1989) questioned the usefulness and reliability of the 13-item instrument of Ives et al. at both the theoretical and measurement levels. They observed that when creating the UIS Ives et al. had removed potential items of interest like “confidence in systems” and “timeliness of information” as well as other items. They questioned estimating overall user satisfaction with IS by adding up heterogeneous items from broadly different IS characteristics (e.g., product and support) and with differences in scale, because even though the UIS analysis had resulted in validated reliability tests, the basic assumptions of those tests were not met (Galletta & Lederer, 1989). Kettinger and Lee (1994) noted that much of the previous work focused mostly on large centralized transaction systems, and because of changes in the nature of IS during the 1980s and 1990s, the IS as a service function had been overlooked. Galletta and Lederer used the results of Baroudi and Orlikowski and the prior research in service quality (SERVQUAL) by Parasuraman, Zeithaml, and Berry (1988) to revise the UIS. They surveyed 342 IS users at a major university by combining the UIS instrument and SERVQUAL. Their results indicate that IS service reliability and IS service empathy contribute to enhancing the prediction of user satisfaction with IS.

In response to the growth of end-user computing (Ahituv, Munro, & Wand, 1981; Benson, 1982), Doll and Torkzadeh (1988) created an instrument to measure the satisfaction of those users who deal directly with information systems or specific computer applications. They defined end-user computing satisfaction (EUCS) as “the affective attitude towards a specific computer application by someone who interacts with the application directly” (Doll & Torkzadeh, 1988, p. 261). They also argued that the existing user information satisfaction instruments (e.g., Bailey & Pearson, 1983; Ives et al., 1983) were evaluating general attitudes of managers towards IS rather than those of users of IS (i.e., computer end-users) specifically. They proposed to develop an instrument focusing on characteristics specific to computer applications affecting end-user satisfaction. A final revised instrument for EUCS with 12 items which comprised these five factors was produced. A test-retest study to validate the instrument, in which it was administered over three time intervals, was performed in a later study (Doll & Torkzadeh, 1991). Based on the second set of results, Torkzadeh and Doll (1991) concluded that the 12-item EUCS instrument is “internally consistent and stable” and that it does not “elicit a substantial reactivity effect” (p. 36), i.e., it does not cause inflation or deflation of results by respondents.

Etezadi-Amoli and Farhoomand (1991) voiced a number of concerns with Doll and Torkzadeh’s (1988) EUCS instrument both from theoretical and methodological perspectives. One concern was the lack of a “scale evaluating the degree of importance of each item to the respondent” (p. 1), which prevents the EUCS instrument from measuring the “silent beliefs”
of respondents’ satisfaction with the IS. A second set of concerns has to do with the statistical techniques followed in the elimination of items and the analysis which led to the five factors underlying EUCS. In their study, Etezadi-Amoli and Farhoomand conducted confirmatory factor analysis using Doll and Torkzadeh’s data. They found the fit to be “inadequate” and concluded that Doll and Torkzadeh’s EUCS instrument “cannot be used unequivocally because of the . . . methodological and conceptual problems” (Etezadi-Amoli & Farhoomand, 1991, p. 3).

Doll, Xia, and Torkzadeh (1994) responded to Etezadi-Amoli and Farhoomand’s (1991) criticism by conducting a confirmatory factor analysis in order to compare four proposed models to predict overall EUCS. The comparison of the different path analytic models predicting EUCS included three which incorporated the five factors found in their previous work, as well as a null model without the factors (Doll et al., 1994). New data was collected from 409 computer end users validating their original EUCS instrument. Hendrickson, Glorfeld, and Cronan (1994) conducted a study to further validate the test-retest findings of Doll and Torkzadeh (1991) over a 2-year time frame. The results were comparable to those reported by Doll and Torkzadeh, leading to the conclusion that the “reliability assessment over two years indicate[s] that the EUCS instrument is stable and reliable” (Hendrickson et al., 1994, p. 659). Lee et al. (1995) conducted a study to empirically test the relationship between end-user ability, EUCS, end-user IS acceptance, system utilization, and job satisfaction. They used the EUCS instrument to assess end-user satisfaction with IS. Data collection included a sample size of 236 end-users in the central US. Their results show strong reliability for EUCS, which provides additional validity for the instrument as a solid measure of the end-user computing satisfaction construct.

Palvia (1996) noted that both UIS and EUCS were developed for large organizations and he suggested adding other measures (such as productivity, hardware/software adequacy, system security/integrity, and so on) to the 12-item EUCS instrument to make it more appropriate for small businesses. He concluded that small businesses have significantly different factors associated with IS satisfaction than do end-users in large businesses (Palvia, 1996). McHanry and Cronan (1998) conducted a study to validate the EUCS instrument for simulation and decision support systems (DSS). Their results were comparable with those reported by Doll and Torkzadeh (1988). Additionally, they concluded that the EUCS instrument is valid and reliable also in measuring simulation systems and DSS settings. Seddon and Yip (1992) suggested that EUCS lacks newer aspects of IS satisfaction, such as technical support as well as user knowledge and involvement with system development. They observed that UIS and EUCS have some differences on the items to be measured and their relative importance. Studying user satisfaction with accounting information system, Seddon and Yip compared three types of IS user satisfaction instruments: UIS, EUCS, and a composite UIS/EUCS instrument. Their results show that Doll and Torkzadeh’s EUCS provides the best predictor of overall user satisfaction.

In summary, extensive effort has been given to determining which characteristics of an IS are relevant for determination of satisfaction with IS, and the composition of the list of characteristics used has been affected both by definition of satisfaction and by the changing nature of IS over the past three decades. Scholars have made strides in reducing the list of characteristics to a manageable set for more expedient survey administration, which has, however, led to criticism on theoretical grounds on the exclusion of important measures. Finally, while the importance of a specific IS characteristic (i.e., user’s perceived value) was originally a part of IS satisfaction surveys, because of early empirical observations it has largely been removed from most IS satisfaction instruments. It is our primary goal to build on the rich IS satisfaction work conducted over the past three decades by providing solid theoretical argumentation for the use of user-perceived value as an augmenting construct for our new
taxonomy of IS effectiveness. As such, in the following section we will review literature associated with IS effectiveness.

**IS Effectiveness**

IS effectiveness has been defined in many ways including quality of system, quality of information provided by the system, impact on individuals and/or the organization, as well as user satisfaction (Arnold, 1995; Grover et al., 1996; Kim, 1989; Seddon & Yip, 1992; Shannon & Weaver, 1949; Yuthas & Eining, 1995). After nearly three decades, IS scholars are still seeking a standard framework and instrument to evaluate IS effectiveness, and disagreement persists among researchers with respect to the composition of these constructs, frameworks, and measurement mechanisms (Kim, 1989; McHaney, Hightower, & Pearson, 2002; Seddon & Yip, 1992; Yuthas & Eining, 1995).

However, it was noted that a single measure of IS effectiveness may not be applicable for all situations or systems (Seddon & Yip, 1992). In this section we provide a brief review of the literature in the area of IS effectiveness for the purposes of further demonstrating the centrality of user satisfaction in the endeavor to propose a new taxonomy of IS effectiveness.

Scott (1995) noted that “information system effectiveness is an important phenomenon for both researchers and practitioners” (p. 43). Moreover, she noted that user satisfaction with IS has been repeatedly used in literature as a measure of IS effectiveness. However, after conducting an analysis of data collected over 6 years from CEOs and IS managers Scott concluded that “we do not yet have an adequate measuring instrument for information system effectiveness” (Scott, 1995, p. 44). Accordingly, in this study we attempt to address this problem by augmenting the widely used user satisfaction construct with user-perceived value of IS for a new taxonomy of IS effectiveness.

Grover et al. (1996) suggested that there are many different definitions for IS effectiveness to be found in the literature, which depend on the basis for evaluation, the unit of analysis (individual or organization), and the type of evaluation that can occur at the process (system/technological), the response (communication), or the impact (outcome) level. The basis for evaluation can either be comparative, normative, or improvement based; where the comparative evaluates IS effectiveness between a system and peer systems, the normative defines IS effectiveness by the attainment of ideal state, and the improvement addresses changes in system effectiveness over time. Grover et al. also observed that mirroring technology’s evolution there is a temporal effect on the definition of IS effectiveness; i.e., as the use of IS has changed so has the definition of IS effectiveness. In their seminal paper, Grover et al. classified over 100 papers from 14 top IS journals into one of six classes of definitions of IS effectiveness based on their classification. While financial and economical value of IS have been used as measures of IS effectiveness from the organizational unit of analysis (DeLone & McLean, 1992; 2003; Gefen & Ragowsky, 2005; Ragowsky, 1995; Ragowsky et al., 2005; Ragowsky et al., 2000), the main hypothesis we suggest deals with perceived value by the users (i.e., cognitive value). Moreover, Scott (1995) noted that future measures of IS effectiveness should not be related to financial performance, rather to individual users’ perceptions related to the IS. Thus, the individual unit of analysis, as suggested by Grover et al., will be the focus of our IS effectiveness discussion from this point on.

IS usage has been broadly studied with respect to IS effectiveness. The fundamental argument is that a highly effective IS will be more often and more widely used than a system that is less effective (Baroudi, Olson, & Ives, 1986; Fuerst & Cheney, 1982; Ginzberg, 1981; Srinivasan, 1985). The classical Technology Acceptance Model (TAM) proposed by Davis (Davis, 1986; 1989) has been widely used in predicting antecedents constructs that influence intention to use and actual usage of IS. The TAM model is based on the Theory of Reasoned Action (TRA) proposed by Ajzen and Fishbein (1980). Accordingly, the TAM model proposes...
that perceived usefulness and ease of use impact attitude towards IS, acceptance behaviors or intention to use IS, and ultimately actual usage of an IS (Davis, 1989; Davis, Bagozzi, & Warshaw, 1989; Venkatesh, Morris, Davis, & Davis, 2003). However, research results on system use as a measure of IS effectiveness has been somewhat mixed. While some have argued that effective IS have increased system use, Srinivasan, for example, demonstrated that frequency of system use is not significantly correlated with user-perceived IS effectiveness. Srinavasan concluded that IS usage is not necessarily associated with IS effectiveness.

DeLone and McLean (1992) in their classical work identified system usage and user satisfaction with IS as key constructs to impact IS success (i.e., organizational impact and individual impact constructs). They noted that IS implementation success is synonymous with IS effectiveness as they maintained that a successful system is also an effective one. DeLone and McLean reviewed 180 empirical studies on IS success and categorized this body of research based on the constructs proposed in their framework. Their review leads to the conclusion that IS success/effectiveness is a multidimensional and interdependent phenomenon. Even within their general classification scheme for IS success there is a great deal of heterogeneity in the definitions and instruments to measure such a complex construct. Such heterogeneity led DeLone and McLean to argue for simplification of models to measure IS effectiveness and to move towards the development of a comprehensive instrument. Pitt, Watson, and Kavan (1995) observed that due to the changing nature of IS during the early 1990s, characteristics related to the service quality of IS should be included in any general framework for IS effectiveness. IS in industry had changed from being application centric to service centric, and hence the service component of IS should also be added to a model of IS effectiveness. They proposed applying service quality (i.e., SERVQUAL (Parasuraman et al., 1988)) as another construct that impacts IS success/effectiveness. In their 10-year recap following their original work, DeLone and McLean (2003) summarized the progress in the area of IS success/effectiveness since their highly cited 1992 study. Based on over 100 empirical studies, they revised their original IS success model, incorporating IS service quality as another construct in the model as proposed by Pitt et al. DeLone and McLean (2003) also collapsed organizational impact and individual impact into a single category which they called ‘net benefits’ depending on the unit of analysis used by a given study that utilizes their model. However, they note that “as a result of this ‘use’ and ‘user satisfaction,’ certain ‘net benefits’ will occur. If the IS or service is to be continued, it is assumed that the ‘net benefits’ from the perspective of the owner or sponsor of the system are positive, thus influencing and reinforcing subsequent ‘use’ and ‘user satisfaction’” (DeLone & McLean, 2003, p. 23). Moreover, DeLone and McLean (2003) noted that “net benefit” measures should mainly be based on previously “developed and tested [measures] for IS investments” (p. 25). Thus, it appears that their measure of IS effectiveness is based on the financial benefit to the user or the owners of the system rather than a cognitive perceived benefit to the user. DeLone and McLean (2003) concluded that despite the complexity of the IS effectiveness construct, “an attempt should be made to reduce significantly the number of measures used to measure IS success [effectiveness] so that research results can be compared and findings validated” (p. 27). Consequently, in this study we attempt to address this exact issue by proposing a new approach to measure IS effectiveness based only on two constructs: user satisfaction with IS and user-perceived value of IS.

In summary, it appears that the IS effectiveness literature concludes that although both user satisfaction and IS usage have been used in various models that impact IS effectiveness, IS usage has been demonstrated to have mixed results as a predictor of IS effectiveness. However, user satisfaction with IS appears to have been widely employed as a key surrogate measure for IS effectiveness throughout the past three decades. Moreover, Zviran and Erlich (2003),
after a substantial review of the literature of user satisfaction with IS and IS effectiveness, concluded that the “user satisfaction factor is an important criterion and the one most prevalent for measuring the success of information systems” (p. 83). Additionally, numerous researchers have noted that IS effectiveness is a multidimensional construct, while the actual measures of IS effectiveness in literature appear to concentrate only around one measure, i.e., user satisfaction with IS. Moreover, it appears that a measure of IS effectiveness from the user’s perspective is still warranted, in particular based on user perceptions (Barki & Hartwick, 1994). Additionally, user satisfaction with IS is particularly important as a surrogate for effectiveness in contexts where the use of the IS is voluntary. However, satisfaction with IS as a sole measure of IS effectiveness may have some limitations. One such limitation may result from an aspect of human nature: some people do not want to admit a mistake, especially after heavy investment in time and resources. This human characteristic often drives an innate bias to argue for a system, especially in the early roll-out phase, on the part of those who championed or invested heavily in the system. Such users may indicate they are highly satisfied with the IS on a survey, even when it is not effective in their actual experience. In these cases, a normative comparison of the current state of a given system and ideal state of the system as perceived by the user would be very useful for the determination of IS effectiveness. Therefore, in this article we propose a new taxonomy of IS effectiveness following the work discussed here. Our approach, building on Grover et al.’s (1996) normative approach by introducing the user-perceived value construct along with the accepted key surrogate measure for IS effectiveness: user satisfaction with IS. Thus, a substantive review of value theory will follow this section to provide the theoretical background for using the user-perceived value construct in the proposed taxonomy.

**Perceived Value Construct**

The importance of research on value as a cognitive construct (i.e., human perceived value) affecting human attitudes has been recognized by numerous scholars in a broad variety of fields including psychology, sociology, anthropology, political science, and economics (Rafaeli & Raban, 2003). However, most work conducted so far in IS literature about the value construct has dealt with the economical value (i.e., net benefit, return on investment, etc.) rather than user-perceived cognitive value (Ragowsky et al., 2005). Nevertheless, some scholars outside the IS field including Allport, Vernon, and Lindzey (1951), Feather (1967; 1975), and Rokeach (1969; 1973; 1979) have argued that perceived value is fundamental and more stable in human cognition compared to attitudes (i.e., satisfaction), which can be altered based on one’s experience over time. Management and education researchers have also recognized that the study of perceived value is vital for providing insight into their domains (Brown, 1976), as well as criticizing the neglect of the application of perceived value in their studies (e.g., see Brown; Durgee, O’Connor, & Veryzer, 1996; Kahle & Kennedy, 1988). In IS literature, Doll and Torkzadeh (1991) divided research in IS effectiveness into two streams. The first (“downstream”) investigates the causal link beginning with attitude and moves towards the social and economic impact of IS on individuals and organizations, while the second (“upstream”) focuses on the linkage between those causal factors which affect beliefs (i.e., user-perceived value) and in turn affect attitude (i.e., user satisfaction). Doll and Torkzadeh (1991) observed that most IS research has concentrated on downstream analysis, while relatively little attention has been placed on those factors affecting attitudes towards IS. They noted that one reason that attitude research in the IS domain lacks clarity is that it “emphasizes the affective rather than the cognitive (e.g., beliefs) dimension of attitude” (Doll & Torkzadeh, 1991, p. 5). Moreover, they noted that an “individual’s attitude towards
any object is a function of his or her beliefs about the objects . . . and the evaluative aspect [i.e., perceived value] of those beliefs” (Doll & Torkzadeh, 1991, p. 7). In the subsections below, we provide a definition for perceived value (as distinguished from economic value) from psychology literature and a discussion on cognitive value theory.

**Definition of ‘Perceived Value’**

Literature beyond the IS field contained several definitions of perceived value (Barki & Hartwick, 1994; Brown, 1976; Chioiu, 2004; Feather, 1975; Keeney & Raiffa, 1993; Kluckhohn, 1951; Rokeach, 1973; Williams, 1979; Yang & Peterson, 2004). In IS literature, Keeney and Raiffa (1993) defined value as a principle of importance. Additionally, Barki and Hartwick (1994) developed a measure of user involvement in which one of the user involvement’s dimensions was importance. They defined it as “a psychological state reflecting the importance...of a new system to the user” (p. 62).

Based on the definitions found in literature presented above, it appears that there is a consensus on the definition of perceived value. Such definition indicates that perceived value is an enduring core belief individuals use to evaluate the importance of objects, ideas, or behaviors. Henceforth, we propose a more narrow definition in the context of IS research of users’ perceived value of IS as a combined set of enduring core beliefs that users incorporate to evaluate the importance of IS characteristics or attributes. For example, a user may believe that the quality of information of a given IS is very important, which indicates a very high perceived value of the system’s characteristic believed by that given user. On the other hand, if that same user believes that quality of service of a given IS is not important, such a belief indicates a very low perceived value of the system’s characteristic by that given user.

**VALUE-SATISFACTION TAXONOMY OF IS EFFECTIVENESS (VSTISE)**

IS researchers have incorporated user satisfaction in their understanding of IS effectiveness; however, the construct of perceived value has been given very little attention in such models. It appears that there is a great body of research conducted in fields other than IS, which suggests that perceived value is a highly relevant construct for any social science (Beatty, Kahle, Homer, & Misra, 1985; Durgee et al., 1996; Feather, 1967; 1975; Kahle & Kennedy, 1988; Prescott & Hopkins, 1984; Rokeach, 1969; 1973; 1979). In fact, Grover et al. (1996), in their review and categorization of over 100 articles on IS effectiveness, stated that noticeably missing are studies that deal with perceived value. Moreover, Barki and Hartwick (1994) noted that “systems deemed to be both important and personally relevant are likely to engender positive effective or evaluative feelings” (p. 62). Thus, the model we propose here will incorporate perceived value of IS as well as user satisfaction with IS and suggest a new taxonomy for user-perceived IS effectiveness. Our newly proposed taxonomy suggests that an IS will be considered effective when users perceive its characteristics as highly important (high perceived value) and are highly satisfied by those same characteristics (high satisfaction).

Galletta and Lederer (1989) suggested practitioners are interested in tools “to uncover user perception of strength and weaknesses [of systems’ characteristics]” (p. 421). Thus, in this study we propose a new Value-Satisfaction taxonomy of 2×2 matrix to indicate user-perceived IS effectiveness based on user satisfaction with IS and perceived value of IS, noted as Value-Satisfaction Taxonomy of IS Effectiveness (VSTISE). In order to construct the taxonomy, decision makers can develop a list of characteristics for the system under investigation based on users’ input and prior literature. A survey can be developed to measure users’ perceptions for the level of satisfaction and the user-perceived...
value for that given IS characteristic. Figure 2 provides an example of survey item scales that should be used to construct the survey of measuring user satisfaction and user-perceived value of each IS characteristic for the purpose of constructing our proposed taxonomy of IS effectiveness. Similar item scales can be used for the list of characteristics suggested by the decision makers and users. Subsequently, assessment of the user satisfaction and perceived value can be made empirically using survey methodology that will yield dual scores for each IS characteristics and dual scores for the overall system (i.e., overall user satisfaction and overall perceived value). The data collected is then used to construct the 2×2 matrix of Value-Satisfaction taxonomy by positioning the mean score of the user satisfaction on the horizontal axis and positioning the mean score of the user-perceived value on the vertical axis (see Figure 3). Thus, each IS characteristic and the overall system will be represented as a point in the VSTISE taxonomy. Consequently, such a taxonomy can provide insight for actions and improvement priorities of specific IS characteristics, thereby enabling decision makers to improve the overall effectiveness of an IS. The following discussion will elaborate on how such positioning of the IS characteristics in the taxonomy can enable decision makers to realize such effectiveness.

In Figure 3, the first quadrant, Q1, consists of low-satisfaction and high-value observations and is named ‘improvement.’ IS characteristics positioned in this quadrant of the taxonomy provide the top opportunities for improvement in IS effectiveness. Improvement in such IS characteristics could occur by providing more resources in order to increase user satisfaction with the characteristics of the IS that are already perceived as highly important (i.e., high perceived value). The second quadrant, Q2, having high-satisfaction and high-value observations, is named ‘effective.’ IS characteristics positioned in this quadrant of the taxonomy are considered to be effective as users are both highly satisfied with these IS characteristics and at the same time perceive them as highly important (i.e., high
perceived value). No action is necessary for characteristics that fall in this quadrant. These IS characteristics are considered effective and can be considered as key characteristics of the system under study. The third quadrant, Q3, of characteristics with scores that are high-satisfaction and low-value is named 'misleading.' IS characteristics positioned in this quadrant of the taxonomy suggest that the users are highly satisfied with characteristics that are simply not perceived as important (i.e., low perceived value). This may suggest that resources that are provided to such IS characteristics may be more appropriately used if transferred to other characteristics, e.g., those located in the ‘improvement’ quadrant (see Figure 4). The fourth quadrant, Q4, with low-satisfaction and low-value observations, is named ‘ineffective.’ IS characteristics positioned in this quadrant of the taxonomy are perceived to have low value (importance) for users, while users express low satisfaction with them. Thus, such IS characteristics are ineffective and generally warrant a closer investigation to explore possibilities for increasing their perceived value and/or satisfaction. For example, IS characteristics in the ‘ineffective’ quadrant may have anticipated increases with respect to user-perceived value in the future, in which case these IS characteristics may demand improvement in satisfaction.

THE CASE STUDY: APPLYING VSTISE

The proposed Value-Satisfaction Taxonomy of IS effectiveness (VSTISE) is dependent on the specific industry and system being applied. This section discusses the methodology used to develop the IS effectiveness taxonomy in the context of online learning systems (OLSs). This case study included a two-phase approach: Phase I was a qualitative assessment of the characteristics to which users attribute value when using the system, while Phase II included quantitative assessment of the characteristics found in literature and those newly uncovered in Phase I of the study. Exploratory analysis of the data was made in order to clean up any irregularities such as multivariate outliers and response sets. This was followed by a reliability test of the instrument using Cronbach’s α analysis of the instrument items.
Phase I of this study included qualitative research, following Keeney’s (1999) methodology, in the pursuit of system characteristics to which users attribute value when using the system. The purpose of this phase was to augment the characteristics found in prior literature. A qualitative questionnaire was developed following Keeney’s methodology, with open-ended questions. Appendix A includes the questionnaire used in this phase noted for a generic IS. Initially users were provided with the first section only (Section 1 of Appendix A) and were instructed to think about all the system’s characteristics to which they attribute value (i.e., “that are important to them”) when using the system. The second section of the qualitative questionnaire (Section 2 of Appendix A) includes open-ended questions to capture responses along four dimensions, noted in Appendix A for a generic IS. In the case study, due to the OLS context, the four system dimensions were following those proposed by Webster and Hackley (1997). The dimensions approach was employed in order to obtain more structured results focused on the four main dimensions. Four groups of OLS users participated in the focus group phase of this study, the first qualitative phase. Overall there were 75 responses out of 115 questionnaires, giving an overall response rate of over 65%. Responses from the users were grouped based on their similarities and categorized based on each of the four main dimensions proposed by Webster and Hackley. Similar terminologies were converted to a single characteristic and compared with the characteristics found in literature. Some of the terms did not correspond to existing system characteristics found in literature. As a result, six new characteristics were added to the list. Results of the qualitative process are presented in Appendix E and form the basis for the quantitative survey items used in Phase II of the study.

The second phase of this case study, Phase II, included a quantitative research using a survey instrument for the assessment of the characteristics found in literature and those newly uncovered in Phase I. A survey instrument was developed to assess the users’ perceived cognitive value and satisfaction from each characteristic in the system’s four dimensions and the overall system using the scale noted in Figure 5 above. Responses from 207 participants were submitted, representing over 32% of the

<table>
<thead>
<tr>
<th>VSTISE Quadrant</th>
<th>Description of IS Characteristics</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Improvement</strong> Q1</td>
<td>IS characteristics falling in this quadrant should be improved as users perceive them to have high value (highly important), however express low satisfaction from such attributes. Improvements can occur by providing additional resources to increase user satisfaction with such IS characteristics that are perceived to be of high value.</td>
</tr>
<tr>
<td><strong>Effective</strong> Q2</td>
<td>Users perceived high value for these IS characteristics as well as being highly satisfied, and hence performance on these IS characteristics can be considered effective.</td>
</tr>
<tr>
<td><strong>Misleading</strong> Q3</td>
<td>Resources that are invested in these IS characteristics are wasted as users express high satisfaction from IS characteristics that are simply not as important to users, hence misleading! Resources to support IS characteristics in this quadrant may be more appropriately used if transferred to other IS characteristics located, e.g., in the ‘improvement’ quadrant.</td>
</tr>
<tr>
<td><strong>Ineffective</strong> Q4</td>
<td>These IS characteristics are perceived to have low value (not important) and at the same time users are dissatisfied with them. Such IS characteristics are ineffective and generally warrant a closer investigation to explore possibilities for increasing their perceived value and/or user satisfaction.</td>
</tr>
</tbody>
</table>

Figure 4. Summary of the value-satisfaction taxonomy of IS effectiveness (VSTISE) quadrants
user sample. Subsequently, a pre-analysis data cleansing was conducted to ensure the reliability of the results following the guidance provided by Mertler and Vannatta (2001) for data cleansing based on various irregularities. Seven response-sets and eight multivariate outliers were observed in the data, resulting in a total of 192 usable cases.

Prior to the analyses of this data, an investigation was made of the correlation between the value (V) and satisfaction (S) constructs. This analysis included Pearson correlation, an indicator for linear association between two variables. Additionally, this analysis also included Eta (η) correlation, an indicator for non-linear association between two variables. Results of this analysis are provided in Table 1. These results suggest that there are no correlations (linear or non-linear) observed between value and satisfaction measures. These results are quite profound as they suggest that value and satisfaction are two distinct uncorrelated constructs. This adds to the overall validity of the current taxonomy as the approach for users’ perceived IS effectiveness is noted to be based on these two distinct components. Hence, it also adds to the validity of the Value-Satisfaction Taxonomy of IS effectiveness.

A preliminary data analysis was done using the Principal Component Analysis (PCA) to explore the initial validity and reliability of the instrument. Four factors were extracted with a total cumulative variance explained of nearly 61% with Cronbach’s α of over .83 for all four factors.

VSTISEs were developed in a similar manner to the SWOT proposed by marketing scholars (Andrews, 1987; Ansoff, 1965; Mintzberg, Ahlstrand, & Lampel, 1998; Porter, 1991). VSTISEs were based on aggregated user-perceived satisfaction with the system characteristics as well as aggregated user-perceived cognitive value of system characteristics. The taxonomy for each dimension was constructed by positioning all the system characteristics of that dimension in the taxonomy, where the mean characteristics satisfaction scores are positioned on the horizontal axis and the mean characteristics value scores are positioned on the vertical axis. The dimension taxonomy was developed for each of the four dimensions including the system characteristics as points in the taxonomy. Similarly, taxonomy for the overall system was constructed. The overall taxonomy also included the aggregated means of the four system dimensions as points in that taxonomy. One approach suggests that in the case of no user scores in the low-low quadrant, it is more appropriate to rescale the cut-off-point between the low and high quadrants on both axes to 75%.

<table>
<thead>
<tr>
<th>Var 1 (Y) * Var 2 (X)</th>
<th>Eta</th>
<th>Pearson</th>
<th>Relationship</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sa_Act * Va_Act</td>
<td>0.228</td>
<td>0.228</td>
<td>No observed relationship</td>
</tr>
<tr>
<td>Va_Act * Sa_Act</td>
<td>0.390</td>
<td>0.228</td>
<td>No observed relationship</td>
</tr>
<tr>
<td>Sb_Act * Vb_Act</td>
<td>0.345</td>
<td>0.339</td>
<td>No observed relationship</td>
</tr>
<tr>
<td>Vb_Act * Sb_Act</td>
<td>0.499</td>
<td>0.339</td>
<td>No observed relationship</td>
</tr>
<tr>
<td>Sc_Act * Vc_Act</td>
<td>0.239</td>
<td>0.224</td>
<td>No observed relationship</td>
</tr>
<tr>
<td>Vc_Act * Sc_Act</td>
<td>0.434</td>
<td>0.224</td>
<td>No observed relationship</td>
</tr>
<tr>
<td>Sd_Act * Vd_Act</td>
<td>0.438</td>
<td>0.407</td>
<td>No observed relationship</td>
</tr>
<tr>
<td>Vd_Act * Sd_Act</td>
<td>0.486</td>
<td>0.407</td>
<td>No observed relationship</td>
</tr>
<tr>
<td>So_Act * Vo_Act</td>
<td>0.359</td>
<td>0.308</td>
<td>No observed relationship</td>
</tr>
<tr>
<td>Vo_Act * So_Act</td>
<td>0.419</td>
<td>0.308</td>
<td>No observed relationship</td>
</tr>
</tbody>
</table>
of the maximum scale (EBI, 2002). In this study the measures scale ranges from 1 to 6, while no scores were noted below 3 in satisfaction and below 3 in value, resulting in the use of 4.5 as the cut-off point between low and high on both axes of the taxonomy.

Results of the VSTISE for dimension A (Figure 5) indicate that five system characteristics (A_1, A_2, A_3, A_4, and A_5) from the Technology, Network, and Technical Support dimension are in the high-value-low-satisfaction quadrant (Q1). This implies that support via phone, support via e-mail, quality of support, system up-time, and reduced system errors are of high importance to users but have low satisfaction, suggesting high priority for improvement in such system characteristics of dimension A (Technology, Network, and Technical Support). Results also indicate that seven system characteristics (A_6, A_7, A_9, A_10, A_11, A_12, and A_13) from the Technology, Network, and Technical Support dimension are in the high-value-high-satisfaction quadrant (Q2), implying that system security, access to content, access flexibility, submit files from anywhere, different system tools, access of all content from one area (portal), and remote access are high-effectiveness system characteristics that should be highlighted as part of the strengths of the system under study. One system characteristic (A_14) from dimension A was found in the low-value-low-satisfaction quadrant (Q3), implying that content audios might not be needed as they are not important nor are users satisfied from them. No system characteristics from dimension A were found to be in the low-value-high-satisfaction quadrant (Q4), implying that no wasted resources were found among any of the systems characteristics of dimension A (Technology, Network, and Technical Support).

Results of the dimension B VSTISE (Figure 6) indicate four system characteristics (B_3, B_4, B_5, and B_7) from the Information and Content dimension in the high-value-low-satisfaction quadrant (Q1). This implies that content, interesting subject matter, difficulty of subject

Figure 5. VSTISE for Dimension A (technology, network, and technical support) (N=192)
matter, and enjoyment from content are of high importance to students but have low satisfaction, suggesting these as first priority for improvement among the system characteristics of dimension B (Information and Content). Also, results of this taxonomy indicate that six system characteristics \(B_1, B_2, B_8, B_9, B_{10},\) and \(B_{11}\) from the Information and Content dimension are in the high-value-high-satisfaction quadrant (Q2), implying that such characteristics are high-effectiveness system characteristics that should be highlighted among the strengths of the system under study. No system characteristic from dimension B was found in the low-value-low-satisfaction quadrant (Q3) and no system characteristic from dimension B was found in the low-value-high-satisfaction quadrant (Q4), implying no system characteristics from this dimension may need to be discarded and that no wasted resources were found for any of the system characteristics of dimension B.

Results of dimension C (Figure 7) indicate that five OLS characteristics \(C_1, C_2, C_4, C_5,\) and \(C_7\) from the Developers and Managers dimension are in the high-value-low-satisfaction quadrant (Q1). This implies that the amount of developers/managers-user interactions, developers'/managers’ attitude, quality of developers/managers-user interactions, submission time window for files, and online workload are of high importance to users but have low satisfaction, suggesting these as first priority for improvement among the system characteristics of dimension C. Results of this taxonomy also indicate that one system characteristic \(C_5\) from dimension C is in the high-value-high-satisfaction quadrant (Q2), implying that freedom of usage (selective seeking and processing of information) should be highlighted as a strength of the system under study. No system characteristic from dimension C was found in the low-value-low-satisfaction quadrant (Q3) and no system characteristics from dimension C was found in the low-value-high-satisfaction quadrant (Q4), implying that no system characteristics from this dimension

Figure 6. VSTISE for Dimension B (information and content) \((N=192)\)
may need to be discarded and that no wasted resources were found among any of the system characteristics of dimension C.

Results of the VSTISE for dimension D (Figure 8) indicate that three system characteristics (D_1, D_9, and D_10) from the User dimension are in the high-value-low-satisfaction quadrant (Q1). Due to the very low satisfaction (2.85) of D_9, cost of courses, it was the only system characteristic not plotted in the taxonomy. This implies that extensive experiencing with the system, cost of using it, and cost of ISP and Internet access have high importance for users but have low satisfaction, suggesting these as first priority for improvement among the system characteristics of dimension D. Also, results of this taxonomy indicate that seven system characteristics (D_6, D_7, D_11, D_12, D_13, D_14, and D_15) from the User dimension are in the high-value-high-satisfaction quadrant (Q2), implying that users’ comfort with online technology, users’ perceived Internet and computer skills, reduced travel cost/time (to and from locations), ability to travel while using the system (for business or other), employer support, attendance to family responsibilities, and family support are high effectiveness system characteristics that should be highlighted as among the strengths of the system under study. Four systems characteristics (D_2, D_3, D_4, and D_5) from the User dimension were placed in the low-value-low-satisfaction quadrant (Q3), implying that these system characteristics do not seem to be effective as they are not important nor are users satisfied with them. These results suggest that the users of the system under study may not find co-users an effective part of the system. No system characteristic from the User dimension was found to be in the low-value-high-satisfaction quadrant (Q4), implying that no wasted resources were found among the system characteristics of dimension D.

Finally, results of the overall system VSTISE (Figure 9) indicate that system dimensions B (Information and Content) and C (Developers and Managers) are in the high-value-low-sat-

Figure 7. VSTISE for Dimension C (developers & managers) (N=192)
isfaction quadrant (Q1), implying that overall both dimensions are of high importance for users but give low satisfaction. This suggests that higher management in charge of the system under study may need to focus their first attention on the improvement of characteristics in these two system dimensions. That may include enhancing content with games and adding some interactive features to the content. Moreover, it may also suggest that seminars and workshops are needed to improve developers’ and managers’ performances (such as the amount of developers/managers-user interaction, developers’/managers’ attitude, quality of interaction, etc.). Results of this overall taxonomy also indicate that in general, system dimensions A (Technology, Network, and Technical Support) and D (User) are in the high-value-high-satisfaction quadrant (Q2), implying that both dimensions are effective and should be highlighted as among the strengths of the system under study. No system dimensions were found in the low-value-low-satisfaction quadrant (Q3) or the low-value-high-satisfaction quadrant (Q4).

DISCUSSION AND CONCLUSION

Discussion

In this paper we provided a review of IS satisfaction, IS effectiveness, and perceived value literature. We extracted the definitions of perceived value construct from heterogeneous literature including psychology, marketing, operations research, information systems, and management to propose a definition of perceived value of IS. We consider IS as effective when users perceive its IS characteristics as highly important (i.e., high perceived value) and are highly satisfied by those same characteristics. Based on our definition, we propose a new taxonomy for incorporating the perceived value
construct and the construct of user satisfaction with IS to the goal of obtaining a better understanding of user-perceived IS effectiveness. In this sense, we recommend that our definition of the perceived value construct and our new taxonomy, VSTISE, proposed here serve as a theoretical foundation for future empirical studies of IS effectiveness.

The rich and extensive IS satisfaction theory (UIS theory, EUCS theory, DeLone and McLean’s classical IS success model, and Davis’ classical TAM) provided the theoretical foundation for measures of user satisfaction with IS. We reviewed the extensive work done during the 1980s and early 1990s on IS user satisfaction and have provided and overview of several validated instruments in assessment of user satisfaction. However, some scholars suggest that IS research has omitted the measurements of the degree of importance (or user-perceived value), forgoing the opportunity for a deeper understanding of IS phenomena (Etezadi-Amoli & Farhoomand, 1991). Our review of definitions of value from psychology, marketing, IS, management science, and decision analysis suggests several synonymous terms for user-perceived value. Such synonyms might include importance, preference, and desirability. Our review of literature in the area of IS effectiveness suggests that there is little agreement on the definition of IS effectiveness, let alone how to measure it (Arnold, 1995; Grover et al., 1996; Kim, 1989; Seddon & Yip, 1992; Yuthas & Eining, 1995). Such inconsistencies have led to development of surrogate measures of IS effectiveness, rather than direct measures or taxonomies of IS effectiveness (Baroudi et al., 1986; Baroudi & Orlikowski, 1988; Ives et al., 1983). However, several scholars suggest that user satisfaction and system usage are not enough in the assessment of IS effectiveness (Arnold, 1995; Yuthas & Eining, 1995). Grover et al. present a clarifying framework of IS effectiveness. In this study, we follow such an approach by enabling decision makers and IS managers to develop the IS effectiveness taxonomy based

\[
\text{Figure 9. VSTISE – Overall (N=192)}
\]
on measurements of user satisfaction with the IS and user-perceived value of the IS as a benchmarking tool to assess such IS effectiveness. Constructing such VSTISEs will enable decision makers to visually see how all their IS characteristics fall into the four quadrants of the IS effectiveness taxonomy: improvement, effective, misleading, and ineffective. Moreover, the location that a given IS characteristic falls in the taxonomy can aid decision makers and IS managers in understanding additional actions needed in order to improve the effectiveness of the IS characteristic. For example, if quality of service measured in a given IS falls under the improvement quadrant (Q1) (i.e., low user satisfaction, high perceived value), decision makers should spend time understanding why users are unsatisfied with the quality of service provided. Clearly, users find the quality of service of that given IS to be highly important (i.e., high perceived value). Therefore, an attempt should be made to uncover ways to increase user satisfaction that may include, for example, better training for the IS service providers. On the other hand, if ease of use of a given IS falls under the misleading quadrant (Q3) (i.e., high user satisfaction, low perceived value), decision makers should understand that resources spent now on increasing or maintaining the system’s ease of use may be unnecessary and funds spent on this effort may be better used on other IS characteristics, such as the quality of service in the example above. Our conclusion is noted based on the notion that users express high satisfaction with the current state of ease of use and it’s not that important for them (i.e., low perceived value); thus, funds can be diverted from this IS characteristic (see Figure 7).

Implication for Research, Practice, and Future Research

The work proposed here is significant and beneficial both for researchers and practitioners. For researchers, the main theoretical contribution that this work provides is by integrating the construct of perceived value and the construct of user satisfaction in order to develop the taxonomy of IS effectiveness, VSTISE. However, additional work is needed to validate the taxonomy. Specifically, future research should attempt to empirically validate the proposed taxonomy in different IS services. Some examples for additional studies resulting from this work may include construction of VSTISE for electronic medical records (EMRs), e-government systems, flight reservation systems, customer relations management (CRM) systems, enterprise information systems or enterprise resource planning (ERP) systems, etc. Moreover, additional work is needed to fully understand the relationship of the user-perceived value construct and other key constructs in IS literature.

Practitioners (i.e., decision makers and IS managers) may use our proposed taxonomy in various types of systems as a benchmarking tool to assess the user-perceived IS effectiveness. Practitioners can use the VSTISE, following Grover et al.’s (1996) approach, to evaluate system effectiveness over time by seeing visually how the IS characteristics move in the taxonomy over time. Moreover, they can use the VSTISE to compare IS effectiveness among peer systems by comparing the results of the taxonomy measured by two or more IS. For example, a study could be done for the exploration of IS effectiveness of Web-based flight reservation systems. Such a study could follow the qualitative approaches proposed in the first phase of the case study to develop a list of characteristics and develop a survey to assess both user satisfaction and user-perceived value of the system. That data could then be used to develop the Value-Satisfaction grid of Web-based airline reservation systems. Such assessment can compare results of multiple systems as a comparative measure, or provide a longitudinal assessment and compare the same system or systems over time. Results of such VSTISEs can help managers and IS managers of such Web-based flight reservation systems to improve system characteristics with misleading effectiveness by channeling funding to these system characteristics and eliminate system characteristics that have high perceived value but low satisfaction.
Limitations

This study has several limitations. The first one is related to the definition of IS effectiveness. As discussed in the theoretical background section, the definition of IS effectiveness and ways to measure it has been a moving target for IS scholars for nearly three decades. In this work, we followed only one perspective proposed by Grover et al. (1996) to interpreting and measuring IS effectiveness, namely the individual user as the unit of analysis. However, Grover et al. (1996) indicated a second perspective of IS effectiveness, namely the organizational unit of analysis. Thus, additional research may be needed to investigate the use of VSTISE proposed here to indicate IS effectiveness from the organizational unit of analysis. The second study limitation is external validity. The results presented here are based exclusively on a single institution and one type of IS. Additional studies should attempt to validate the results in other institutions as well as other types of ISs. Finally, the nature of this study was an exploratory one attempting to develop the taxonomy, rather than test hypotheses. As such, additional validity and reliability measures are warranted. Straub (1989) suggested that sound measures of IS should be tested in multiple methodologies in order to provide evidence for construct validity. He defines construct validity as “measures [that] show stability across methodology” (Straub, 1989, p. 150). Although in this study, we have used both qualitative and quantitative approaches to develop and measure the constructs, additional validation is needed for the results presented here. Therefore, future studies may also use difference methodologies, e.g. confirmatory analysis, in order to provide further validity and reliability for the results.

Conclusion

The proposed taxonomy was highlighted for its validity with a case study of nearly 200 users. A two-phase study incorporating qualitative and quantitative methods was used to develop an instrument assessing users’ perceived value and user satisfaction in the context of OLS. Prior to the development of the VSTISEs, empirical data validated that the construct of perceived value is indeed a fully independent construct from the construct of user satisfaction. Although previous IS literature suggested that the two constructs are highly correlated (i.e., user satisfaction and user-perceived value), results of this empirical case study suggest that the two constructs show no observed correlations (linear or non-linear), which is consistent with the findings by non-IS studies (Chiou, 2004; Yang & Peterson, 2004). Using aggregated data, VSTISEs were developed following four major system dimensions: (A) Technology, Network, and Technical Support; (B) Information and Content; (C) Developers and Managers; as well as (D) User. Results indicated several system characteristics that may need additional attention, while they also indicated several system characteristics that are perceived by the users as effective.

ACKNOWLEDGMENT

The authors would like to thank the accepting editor-in-chief Professor John Wang, as well as the anonymous referees, for their careful review and valuable suggestions. Additionally, the authors would like to thank the users for participating in this study.

REFERENCE


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**APPENDIX A**

**Open Ended Questionnaire (Phase I)**

**Section 1:**
Please identify five things that are important for you when using the information system:

1. ___________________________
2. ___________________________
3. ___________________________
4. ___________________________
5. ___________________________

**Section 2:**
A. Technology, Network, and Technical Support
Now, please think about issues related to the Technology, Network and Technical Support and try to identify five more things that are important for you when using the information system:

1. ________________________
2. ________________________
3. ________________________
4. ________________________
5. ________________________

B. Information and Content

Now, please think about issues related to the Information and Content presented by the system and try to identify five more things that are important for you when using the information system:

1. ________________________
2. ________________________
3. ________________________
4. ________________________
5. ________________________

C. Developers & Managers

Now, please think about issues related to the Developers and Managers in charged of the system and try to identify five more things that are important for you when using the information system:

1. ________________________
2. ________________________
3. ________________________
4. ________________________
5. ________________________

D. User

Now, please think about issues related to the User and try to identify five more things that are important for you when using the information system:

1. ________________________
2. ________________________
3. ________________________
4. ________________________
5. ________________________
APPENDIX B

Resulted System Characteristics from Literature & Phase I in the Context of Online Learning Systems

<table>
<thead>
<tr>
<th>Online Learning Systems Characteristics</th>
</tr>
</thead>
<tbody>
<tr>
<td>A1 Quick answer from technical support via phone</td>
</tr>
<tr>
<td>A2 Quick answer from technical support after-hours via e-mail</td>
</tr>
<tr>
<td>A3 Quality of technical support</td>
</tr>
<tr>
<td>A4 System operation time (up-time)</td>
</tr>
<tr>
<td>A5 Reduced system errors</td>
</tr>
<tr>
<td>A6 System security (discourage hacking, secure access, etc.)</td>
</tr>
<tr>
<td>A7 Access to courses from anywhere in the world (via the Internet)</td>
</tr>
<tr>
<td>A9 Learning at anytime of the day (schedule flexibility)</td>
</tr>
<tr>
<td>A10 Submit assignments from anywhere (via the Internet)</td>
</tr>
<tr>
<td>A11 Different system tools (chat, bulletin-board or discussion forums, etc.)</td>
</tr>
<tr>
<td>A12 Access of all courses from one area (My WebCT)</td>
</tr>
<tr>
<td>A13 Taking quizzes remotely (off-campus)</td>
</tr>
<tr>
<td>A14 Review course audios</td>
</tr>
<tr>
<td>B1 Availability of course content</td>
</tr>
<tr>
<td>B2 Quality content of courses</td>
</tr>
<tr>
<td>B3 Amount of material in courses</td>
</tr>
<tr>
<td>B4 Interesting subject matter</td>
</tr>
<tr>
<td>B5 Difficulty of subject matter</td>
</tr>
<tr>
<td>B7 Enjoyment from the courses/lessons</td>
</tr>
<tr>
<td>B8 Ease-of-use (with course content, navigation, interface, etc.)</td>
</tr>
<tr>
<td>B9 Similar of interface across all online courses</td>
</tr>
<tr>
<td>B10 Gathering information quickly</td>
</tr>
<tr>
<td>B11 Organization of courses (content of courses, organization of assignments, etc. across all courses)</td>
</tr>
<tr>
<td>B12 Taking practice tests prior to graded test</td>
</tr>
<tr>
<td>C1 Amount of professor-to-student interaction</td>
</tr>
<tr>
<td>C2 Professor’s attitude (across all professors)</td>
</tr>
<tr>
<td>C4 Quality of professor-to-student interaction</td>
</tr>
<tr>
<td>C5 Freedom of learning (selective seeking and processing of information)</td>
</tr>
<tr>
<td>C6 Submission time window for assignments and quizzes</td>
</tr>
<tr>
<td>C7 Online workload of courses</td>
</tr>
<tr>
<td>D1 Learning a lot in these classes</td>
</tr>
<tr>
<td>D2 Amount of interaction with classmates</td>
</tr>
<tr>
<td>D3 Quality of interaction with classmates</td>
</tr>
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continued on following page
APPENDIX B. CONTINUED

<table>
<thead>
<tr>
<th>D4</th>
<th>Classmates’ attitude (across all courses)</th>
</tr>
</thead>
<tbody>
<tr>
<td>D5</td>
<td>Being part of a ‘class’ although it was online</td>
</tr>
<tr>
<td>D6</td>
<td>Your comfort with online learning and technology</td>
</tr>
<tr>
<td>D7</td>
<td>Your Internet and computer skills</td>
</tr>
<tr>
<td>D8</td>
<td>Self-discipline and time management</td>
</tr>
<tr>
<td>D9</td>
<td>Cost of courses</td>
</tr>
<tr>
<td>D10</td>
<td>Cost of ISP and Internet access</td>
</tr>
<tr>
<td>D11</td>
<td>Reduced travel cost/time (to and from campus)</td>
</tr>
<tr>
<td>D12</td>
<td>Ability to travel while taking online courses (for business or other)</td>
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<tr>
<td>D13</td>
<td>Employer support and your ability to work while learning</td>
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<tr>
<td>D14</td>
<td>Attendance to family responsibilities</td>
</tr>
<tr>
<td>D15</td>
<td>Family support</td>
</tr>
</tbody>
</table>

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