User Satisfaction Research in Information Systems: Historical Roots and Approaches

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Abstract:

User satisfaction with information systems (IS) is considered an important indicator of information systems success and has been the subject of numerous research studies since the field's inception. In this paper, we review the user satisfaction research in the IS field. We discuss the roots of user satisfaction research as it pertains to satisfaction studies in marketing research and how these studies have been used to inform the IS context. We also discuss how the study of user satisfaction and use of the construct in IS research has evolved and matured over time. Finally, we discuss antecedents and outcomes of user satisfaction identified in IS research and provide suggestions for future research.

Keywords: User Satisfaction, Consumer Satisfaction, Information Systems, User Satisfaction Antecedents, User Satisfaction Outcomes, User Satisfaction Theories.

1   Introduction

Determining whether an IS implementation is successful has been a critical theme since the inception of the IS field. Scholars have proposed several indicators of IS success, such as system use, user satisfaction, IS performance, and IS effectiveness. Of these, user satisfaction has emerged as the most widely used single measure and indicator of IS success (DeLone & McLean, 1992, 2003; Petter, DeLone, & McLean, 2013) and as central to IS behavioral research.

Favored over other concepts such as system use as an indicator of IS effectiveness and success, user satisfaction is easily one of the most indispensable concepts in IS research (DeLone & McLean, 1992), which DeLone and McLean (1992) suggest is likely the case for three reasons: user satisfaction 1) has a high degree of face validity, 2) boasts a relative abundance of tools equipped to measure it, and 3) is a stronger indicator of IS success than many other measures, which are often conceptually weak or difficult to obtain. Despite concerns about the conceptual consistency and strength of the construct (Melone, 1990), as the field has matured, so too has the user satisfaction construct become more theoretically grounded, more consistently defined, and characterized with more reliable measures. These developments have helped to consolidate and advance our knowledge of user satisfaction and use of the construct. As an indicator of success, researchers now generally agree that user satisfaction (in comparison to other measures) is a more accessible and easily measured concept. It is both flexible enough to be applied at a general level and adaptable to specific contexts.

User satisfaction as a key theme in IS research emerged around five decades ago (i.e., 1960s) with studies that emphasized the importance of understanding and meeting user needs. Even though the studies did not always directly mention the concept of user satisfaction (as we know it today), early studies of IS implementation signaled an important gap between what users need (or expect) and what is delivered (i.e., performance) as impacting IS success (Ackoff, 1967). Some of this early work showed little agreement as to what satisfaction is and how one should measure it. For example, taking a process view of satisfaction, Mason and Mitroff (1973) attributed the discrepancy (gap) problem between needs/expectations and perceived performance in part to not accounting for psychological types and personality. Although the views of what forms satisfaction differ somewhat today, these early studies were not far "off the mark" in suggesting that some form of cognitive evaluation played a key role in determining IS success, with later work drawing on emergent thinking in attitude research to shed light on the cognitive processes that underpin satisfaction formation (Fishbein, 1963; Lucas, 1974). Other studies took a more direct approach to measuring and conceptualizing satisfaction and focused on the satisfaction judgment (or outcome) itself. For example, Powers and Dickson (1973) asked managers to indicate how well their needs were being satisfied. Lucas (1978) asked users to rate their level of satisfaction with a new sales IS and, in his 1981 study, asked executives to rate their level of satisfaction with an IS for supporting decision making.

With five decades of IS research on user satisfaction behind us, we revisit this important concept to understand its origins and how the concept and accompanying research have developed and matured over time. Being generally used to synthesize the scholarly literature on a specific topic, historical reviews or survey studies serve this purpose well. They are particularly important for advancing knowledge in the field of inquiry, for thoroughly describing the history behind and development of a topic of interest over time, and for highlighting potential directions for future research (Schwarz, Mehta, Johnson, & Chin, 2007). In this paper, we discuss the roots of user satisfaction in IS research as it relates to satisfaction in marketing research and review the literature on user satisfaction.

We limit our focus to IS-related studies that directly incorporate user satisfaction (or some other form of satisfaction with IS) into their research. We specifically focus on the history and origins of user satisfaction research in IS. We build on previous review papers that have focused on or incorporated user satisfaction in their review (Au, Ngai, & Cheng, 2002; DeLone & McLean, 1992, 2003; Melone, 1990; Sabherwal, Jeyaraj, & Chowa, 2006; Zviran & Erlich, 2003) and we provide a more comprehensive picture of the development, contributions, and state of user satisfaction research in IS. We also identify well-researched areas of user satisfaction and point out areas in need of more scholarly work.

Specifically, this paper proceeds as follows. In Sections 2 to 4, we review different definitions of user satisfaction and approaches used in IS to study user satisfaction. We review the foundations of different theories that scholars have used in reference disciplines such as marketing research to define the core concept of consumer satisfaction and provide examples of how these have been applied to and informed developments in user satisfaction research. In Sections 5 and 6, we introduce the antecedents and

outcomes of user satisfaction that scholars have investigated and provide a reference table listing key user satisfaction studies. Throughout the paper, we also go back to reference disciplines to identify areas of convergence, gaps, and avenues for further work. Finally, in Section 7, we summarize the user satisfaction research and suggest avenues for future research.

2   What is Satisfaction?

The term "satisfaction" (noun) derives from "satisfy" (verb), which is rooted in the Latin terms *satisfacere* ("to content"), and *satis* ("enough") and *facere* ("make"). The related term *satisfactionem* signals senses of "contentment, appeasement" and the "action of gratifying". It is described as a "fulfilment of one's wishes, expectations, or needs, or the pleasure derived from this" (Oxford Dictionary), so signaling that satisfaction means a "filling or fulfilment…up to a threshold of undesirable effects" (Oliver, 2010, p. 6). In other words, one may view satisfaction as "the consumer's fulfillment response" (p. 8) that is, a judgment that a product/service features or the product or service itself is providing a pleasurable level of fulfillment (Oliver, 2010). On the other hand, drawing on developments in the behavioral sciences, differing interpretations of satisfaction have emerged in marketing research, which consider a range of favorable and unfavorable responses. Hence, over time, researchers have moved away from the literal meanings of satisfaction to focusing on consumer experiences (Oliver, 2010).

2.1   Satisfaction and Attitude

Marketing research has focused on the satisfaction of consumers' needs and desires. As such, marketing research scholars have defined and conceptualized satisfaction based on developments in psychology and other behavioral sciences regarding concepts such as needs/motives, attitude, and intention/satisfaction. Attitude, in particular, is a key construct that underpins the satisfaction concept. It is by far one of the oldest and most studied constructs in social psychology and has been defined in many ways. Summarizing the literature and state of attitude research, Allport (1935) sought a definition that could cover the "many kinds of attitudinal determinations" identified in the literature. As such, he defines attitude as "a mental and neural state of readiness, organized through experience, exerting a directive or dynamic influence upon an individual's' response to all objects and situations with which it is related" (p. 810). While this definition emphasizes attitude towards objects, people, or institutions, later conceptualizations focused on attitude towards behavior. Thus, researchers defined attitude (affect) as "a person's general feeling of favorableness or unfavorableness towards [a] concept" (Ajzen & Fishbein, 1980, p. 54). In these studies, a person's judgment about whether performing a behavior is good or bad reflects attitude.

Being largely concerned about the factors and processes that constitutes attitude-behavior theory, marketing researchers drew heavily on the expectancy-value theories (EVT) (e.g., Fishbein, 1963) that dominated the thinking about the attitude-behavior link. These theories modeled attitude towards an object as a function of one's salient beliefs that the object had certain attributes and their evaluation of these attributes (Ajzen & Fishbein, 1980). Therefore, expectancy-value theories provided a framework for developing a theory of consumer behavior that formalized the belief that satisfaction with a product was a function of one's beliefs that the product fulfils certain functions (i.e., has certain "evaluative" attributes) and satisfies needs. Early studies (using expectancy-value theories) used ratings of attribute satisfaction and importance to derive an overall measure of satisfaction with (or attitude towards) the product.

These developments clearly recognized that attitude and satisfaction, though related, are distinct concepts with their own sets of antecedents, outcomes, and ways of relating to each other (Tse & Wilton, 1988). Oliver (1980) in his studies of consumer satisfaction distinguished the two concepts by describing satisfaction as a finite experience-based affect and attitude as a relatively stable affect that is based on prior experiences (e.g. previous satisfaction) or information without experience (e.g. service provider's reputation). Hunt (1977) also distinguishes the concepts and argues that attitude is an emotion and satisfaction is an evaluation of that emotion (e.g., whether an experience was as pleasurable as expected).

2.2   Satisfaction Definitions

As a subjective concept (such as the notion of attitude in its early days of theory development), several definitions and characterizations of satisfaction emerged in marketing research, which largely fall into two categories. The first category emphasizes a process-oriented approach that concerns how satisfaction is

formed in people. This approach defines key mechanisms by which the antecedents interact to form satisfaction. Hence, the major focus is on the evaluative (appraisal) process that underpins satisfaction formation. Emphasizing the cognitive processes involved in satisfaction, studies in this stream highlight the perceptual, evaluative, and psychological processes that contribute to satisfaction formation. For example, Tse and Wilton (1988 p. 204) defined consumer satisfaction as "consumers' response to the evaluation of the perceived discrepancy between prior expectations (or some other norm of performance) and the actual performance of the product as perceived after consumption".

The second approach—the *outcome-oriented approach*—describes satisfaction in terms of the result of the evaluative process; that is, the satisfaction (or summary judgment) that derives from a consumption or use experience. Hence, the second approach views satisfaction primarily as an outcome of a consumption process and focuses more on its effect on other constructs of interest and less on explaining the processes involved in satisfaction formation (Yi, 1989). Therefore, studies in this stream define satisfaction in terms of an emotional summary judgment (Yi, 1989) or summary-state of an evaluative process (Oliver, 2010). For example, Westbrook and Reilly (1983, p. 256), focusing on outcome, described consumer satisfaction as "an emotional response to the experiences provided by, associated with particular products or services purchased, retail outlets, or even molar patterns of behavior such as shopping and buyer behavior, as well as the overall marketplace". Despite the differences, a common theme reflecting their theoretical grounding in expectancy-value theory runs through the definitions, with both categories acknowledging the evaluative aspect as central to the satisfaction concept. Hence, most definitions will center on "experience" and the evaluation of performance as key to satisfaction.

Since its beginnings, studies of user satisfaction in IS have looked toward marketing research as a key reference field (Anderson, 1973; Oliver, 1976; Olshavsky & Miller, 1972; Olson & Dover, 1976) and followed its developments to shed light on the concept of user satisfaction. Similar to consumer satisfaction in marketing research, many definitions of user satisfaction have also emerged in the IS literature (Briggs, Reinig, & de Vreede, 2012; Melone, 1990). Although scholars do not agree on how one could group these definitions (Briggs et al., 2012; Melone, 1990), one stream representing the early formal definitions of user satisfaction tended to emphasize literal meanings of the term "satisfaction" using key terms such as "needs" and "fulfilment of needs or requirements". Following this trend, Swanson (1974) offered one of the earliest conceptualizations of satisfaction by measuring "appreciation" as a surrogate for satisfaction and defining it as a "manifold of beliefs about the relative value of the MIS as a means of inquiry" (p. 179). Another key conceptualization that emerged is user information satisfaction, which Ives, Olson, and Baroudi (1983) defined as "the extent to which users believe the information systems available to them meets their information requirements" (p. 785). Focusing on the idea of "meeting requirements", several IS researchers also adopted this definition (Simon, Grover, Teng, & Whitcomb, 1996; Treacy, 1985).

Following developments in marketing, several IS studies conceptualized and acknowledged the strong links to and roots of the user satisfaction construct in research on attitudes (Baroudi, Olson, & Ives, 1986; Brown, Venkatesh, & Goyal, 2014; Doll & Torkzadeh, 1988; Robey, 1979; Schewe, 1976; Thong & Yap, 1996; Wixom & Todd, 2005). Hence, another stream focusing on "affect" began to emerge that viewed satisfaction as a type of attitude. Similar to those in marketing research, definitions in this stream have also emphasized an outcome or a process-oriented view of satisfaction. Emphasizing outcome, scholars have defined user satisfaction as "the affective attitude towards a specific computer application by someone who interacts with the application directly" (Doll & Torkzadeh, 1988, p. 261), as a users' affect with (feelings about) prior (system) use (Bhattacherjee, 2001b), as "the level of emotional response to needs fulfillment through IT services" (Sun, Fang, Lim, & Straub, 2012, p. 1198), as "an affective state representing an emotional reaction to the entire Web site search experience, [which emphasizes] the buyer's cognitive state resulting from the consumption experience" (McKinney, Kanghyun, & Zahedi, 2002, p. 298), as "the overall affective evaluation an end-user has regarding his or her experience related with the information system (Chin & Lee, 2000, p. 554), and as "a valenced affective arousal with respect to some object that has reference to some state or outcome desired by an individual" (Briggs et al., 2012, p. 275). Therefore, outcome-oriented definitions in IS research are diverse and display little agreement on what satisfaction is.

Focusing on affect, other definitions emphasize the objects of the "satisfaction judgment". As such, scholars have also defined user satisfaction as "a multidimensional attitude towards various aspects of the MIS such as output quality, man-machine interface, EDP staff and services, and various user constructs

such as feelings of participation and understanding" (Raymond, 1985). For Bailey and Pearson (1983, p. 538), satisfaction comprises "a weighted sum of user's positive or negative reaction to a set of 39 factors".

Process-oriented definitions, on the other hand, posit user satisfaction as "the IS end-user's overall affective and cognitive evaluation of the pleasurable level of consumption-related fulfilment experienced with the IS" (Au et al., 2002, p. 453). In addition to examining antecedents and outcomes specific to information systems, studies in this group focused more on how user satisfaction is formed; that is, the evaluative process that leads to the satisfaction outcome (Bhattacherjee, 2001a, 2001b; Brown, Venkatesh, & Goyal, 2012; Brown et al., 2014; Lankton & McKnight, 2012). These studies are distinguishable since they incorporate measures of satisfaction formation processes into the research model.

Finally, many studies have used the term "satisfaction" (or a similar term) but have not defined it. For example, Baroudi and Orlikowski (1988) defined satisfaction as the measurement of how satisfied a user is with their information system but did not explain what the term "satisfied" means. Likewise Rai, Lang, and Welker (2002) defined user satisfaction as "the degree of user satisfaction with the system" (p. 57) and measured it using a single item ("How would you rate your satisfaction with SIS?") but, again, did not explain the term satisfaction.

Noting the wide range of definitions and suggesting that lack of agreement had led to many different conceptual definitions and operationalizations, Melone (1990) likened the issues with the user satisfaction construct to those related to early research on job satisfaction (Locke, 1976). This diversity also prompted questions as to whether IS researchers were using the same construct in their work (Treacy, 1985) and concerns about the extent to which the user satisfaction construct had been theorized in the IS literature (Melone, 1990). At the same time, Melone recognized that the various definitions shared the notion of the user's "providing some form of evaluative response" (p. 80). Critiquing the user satisfaction literature also as lacking a sound theoretical base for understanding the constructs and processes involved in acceptance of IT, Melone suggested that researchers focus on the slightly broader construct of user attitudes and argues that a focus on attitude would retain the essential elements of the user satisfaction construct while availing researchers of theoretical frameworks they could use to embed and better understand user satisfaction, its processes, its antecedents, and its outcomes.

Although many IS behavioral researchers have turned to attitude-based theories such as the technology acceptance model and the theory of reasoned action to better understand user intentions and behaviors and the affective and cognitive evaluations that precede them, attitude and satisfaction are not the same (Oliver 2010; Tse & Wilton, 1988), and the concerns regarding user satisfaction still remain today. Where satisfaction is the focus, a wide variety of definitions coupled with the diversity of measures remain in use (e.g., Bailey & Pearson, 1983; Bhattacherjee, 2001a; Brown et al., 2014). As such, the concerns of 25-30 years ago continue to persist as to whether researchers are using the same construct in their work (Treacy, 1985) when they use the term satisfaction. The key issue here is that, while IS research on user satisfaction may produce many ideas about user satisfaction, the proliferation of new knowledge will impede the field's maturity if there is no coherent and clearly discernible body of knowledge being developed (and agreed on) to help solve problems, address inconsistencies, and provide strong platforms for testing new ideas and accumulating further knowledge in a genuine and useful manner.

In Section 3, we use the two primary approaches to study satisfaction (i.e., outcome oriented and process oriented) and their underlying theories and conceptualizations of satisfaction to organize and classify user satisfaction studies.

3   User Satisfaction: The Outcome-oriented Approach

Most studies on user satisfaction follow an outcome-oriented approach focusing on measures of the satisfaction judgments and the factors that contribute to user satisfaction or are impacted by the satisfaction judgments. Drawing on illustrative studies and prior work, in this section, we review how IS research using an outcome-oriented approach has unfolded over the years. We focus on measures and how researchers have operationalized user satisfaction in the IS literature. We discuss antecedents and outcomes in Sections 5 and 6.

We can trace one of the earliest uses of the outcome-oriented approach to understanding satisfaction to Bettman (1974). He introduced the concept of attribute satisfaction to consumer satisfaction research and grounded it in Fishbein's (1972) multiple-attribute attitude model that determines an individual's overall

attitude towards an object based on the individual's summary evaluation of the object's attributes. (Bettman, 1974) suggested that the decision to purchase certain products comes first from one's believing that the product possesses certain attributes and second from one's judging the product's attributes to be satisfactory. He modeled satisfaction with an attribute as a binary variable. Based on this model, people would judge an attribute as either satisfactory or unsatisfactory, with their overall satisfaction towards a product being determined by their satisfaction with different attributes. To illustrate the role of attribute satisfaction in forming overall satisfaction, one can imagine a dining experience during which both positive and negative affective reactions may arise due to the complexity of this type of service. Individuals might be satisfied with some aspects of the experience and dissatisfied with other aspects. For example, they might be pleased with the food quality but not with the speed of delivery. Thus, their overall satisfaction judgment would be a summary feeling related to their satisfaction with different aspects of the restaurant experience (Oliver, 1993).

IS products and services are likewise complex "objects". For example, one may find that, while a user is satisfied with a report's format or content, they may be less satisfied (or dissatisfied) with the ease or speed with which they can obtain the report from the system. Similarly, they may be satisfied with the competence shown by IT support staff in dealing with a problem but not with the level of responsiveness with which they attended to the help request. Hence, their overall satisfaction judgment would derive from a summary feeling about their experience with the overall IT product (i.e., information output, technical system itself, and support services). For example, in the case of an IS implementation project in which several activities and phases run in parallel or in sequence over time, one could also evaluate user satisfaction in terms of what results occur at the end of a series of processing activities (whether over a short or long period of consumption), as an accumulation of interim and final judgments of satisfaction with each activity or event that contributes to the IS outcome, or as a summary assessment of the IS project or its outcome as a whole (Oliver, 2010).

Most user satisfaction studies conducted from an outcome-oriented perspective have focused on summary judgments of an IS as a whole. A handful also consider summary judgments at an attribute or sub-dimensional level, such as information satisfaction and system satisfaction (Krishnan & Ramaswamy, 1999; McKinney et al., 2002; Wixom & Todd, 2005; Xu, Benbasat, & Cenfeteli, 2013). Even fewer have examined user satisfaction as a summation of attribute-level judgments (Bailey & Pearson, 1983).

3.1   Measures of User Satisfaction

Powers and Dickson (1973) were one of the first to measure user satisfaction in information systems). They measured managers' satisfaction with a management information system as an overall judgment and concluded that user satisfaction is a major determinant of successful implementation of an IS project. Next, Noland and Seward (1974) provided users with certain reports and asked them to rate their satisfaction with the report on a five-point Likert scale. Similar to Powers and Dickson (1973), they did not consider specific attributes of the report but asked users to report on their satisfaction as a whole using a single question. Likewise, Ginzberg (1981), Rushinek and Rushinek (1986), and Alavi and Henderson (1981) evaluated user satisfaction using a single-item, the latter of whom concluded that user satisfaction with decision support systems was directly affected when additional aids were offered during the decision making process.

When it comes to attribute satisfaction, early IS studies focused on users' perceptions of attribute performance and quality and related those to their satisfaction with the IS. Lucas (1974) was among the first to develop a list of IS attributes and measure users' perceptions about these attributes. For example, Lucas perceived a high positive rating of the suitability of reports as an indication of the users' satisfaction with this attribute. Later, Debons, Ramage, and Orien (1978) developed a questionnaire to measure user productivity perceptions of 10 different attributes of IS, including timeliness, reliability, assistance, accuracy, access, adequacy, and cost. Similarly, Neumann and Segev (1980) designed a survey to measure user satisfaction with IS, which considered four attributes: accuracy, recency, content, and frequency. Up to this point, surveys aimed at measuring user satisfaction tended to use a five-point Likert scale and a single item to assess user perception of each attribute or overall satisfaction.

Mirroring developments in marketing research, in particular the idea that satisfaction in a given situation is "the sum of one's feelings or attitudes toward a variety of factors affecting that situation" (p. 531), Bailey and Pearson (1983) developed the first instrument that used multiple questions for each construct and sematic deferential scales with opposing adjectives to measure user satisfaction. Focusing on user information satisfaction, they used 39 factors to assess satisfaction. They developed attitudinal scales for

each of the 39 factors and asked users to rate their feelings about each attribute from positive to negative. They also developed corresponding scales to capture the "importance" of the attribute, which they used for validation. Ives et al. (1983) adopted Bailey and Pearson's (1983) user information satisfaction (UIS) survey instrument and reported an improved but shorter version of the instrument. They deleted items in each scale that had low factor loadings and eliminated factors that failed to show satisfactory psychometric qualities to improve the instrument's overall reliability. Similar to Bailey and Pearson (1983), the short-form UIS retained the core concept of using attitudinal scales to assess satisfaction but replaced the validation scales with a four-item measure of overall UIS. In a follow-up study, Baroudi and Orlikowski (1988) confirmed the validity and reliability of the UIS's short-form measure. Following Ives et al. (1983), Doll and Torkzadeh (1988) developed and validated a survey instrument to measure end user computing satisfaction (EUCS). Their measure of satisfaction focused on five key features of an information system: content, accuracy, format, ease of use, and timeliness. Although these early studies did not necessarily discuss the theoretical underpinnings of the user satisfaction construct in attitudinal research and expectancy-value theory, their influence is implied in the definitions and conceptualizations of the construct.

The UIS and EUCS instruments, though widely used, have not been without criticisms (Etezadi-Amoli & Farhoomand, 1991; Etezadi-Amoli & Farhoomand, 1996; Galleta & Lederer, 1989; Thong & Yap, 1996). For example, Galletta and Lederer (1989) criticized the summing of detailed, independent items to obtain a global measure of user satisfaction and raised concerns about the reliability of the detailed scales in the UIS. Their findings suggested that the detailed UIS measures were unreliable, while the global measures of satisfaction performed more reliably, which suggests both that the attitude was stable and that the global measures are an alternative way of measuring user satisfaction. Therefore, they suggested that the detailed UIS scales be revisited or that researchers consider using global measures of user satisfaction. Etezadi-Amoli and Farhoomand (1996) also pointed to issues with the UIS scales developed by Ives et al. (1983), Baroudi and Orlikowski (1986), and Bailey and Pearson (1983) as these scales relate to distinguishing clearly the cognitive aspects of a system (i.e., beliefs about characteristics of a system) from the affective aspects (i.e. attitudes towards a system or towards using a system). Etezadi-Amoli and Farhoomand (1991) also critiqued the end user computing satisfaction measures (Doll & Torkzadeh, 1988) and suggested (among other things) that it would be better to evaluate the extent of satisfaction with each rather than the frequency with which users were satisfied with particular attributes.

Following these developments and criticisms, one can observe two trajectories in user satisfaction measurement in the 1990s-early 2000s: some opted to fine-tune the more detailed UIS and EUCS instrument, and others turned to global measures of user satisfaction. For example, following their critique of existing EUCS measures, Etezadi-Amoli and Farhoomand (1996) proposed an alternative measure of EUCS focusing on satisfaction with documentation, ease of use, functionality of system, output quality, support, and security, and their impact on user performance. Still others referred to the original instruments such as the UIS but assessed the scales as formative (e.g., Sun et al., 2012) to address some of the criticisms regarding the measures and how the overall scores are derived (Galletta & Lederer, 1989). But for the most part, IS researchers have turned to global measures of user satisfaction (Bhattacherjee, 2001b; Khalifa & liu, 2002; McKinney et al., 2002; Wixom & Todd, 2005) adapted from marketing research (e.g. Spreng, Mackenzie, & Olshavsky, 1996). Ives et al., (1983) were one of the first to use a multi-item global measure of satisfaction to help validate the detailed measures that were posited in the short-form UIS scales. Subsequently, Galletta and Lederer (1989) also suggested using a global measure of user satisfaction as an alternative way to address the reliability issues linked to the detailed measures in the UIS. Later studies such as Bhattacherjee (2001b), Khalifa and Liu (2002), and McKinney et al. (2002) also used multi-item global measures adapted from marketing research (Spreng et al., 1996). However, little research has focused on fine-tuning the attribute-level satisfaction measures (Galletta & Lederer, 1989). As such, we suggest future research considers more detailed measures of satisfaction that can help advance current knowledge and provide meaningful insights that practitioners can act on to improve user satisfaction.

At a component-level, scholars developed multi-item scales to assess summary judgments of satisfaction associated with key components of an IS, such as the information product, the technical system, and support services (McKinney et al., 2002; Wixom & Todd, 2005). Galletta and Lederer (1989) were one of the first to introduce overall measures for the information product and systems support and services in a global measure of user satisfaction. McKinney et al., (2002) also used multi-item scales for their overall measures of information and system satisfaction and separated them from global measures of user satisfaction (i.e., satisfaction with the system as a whole). Likewise, Wixom and Todd (2005) introduced a

set of general measures of information satisfaction and system satisfaction to the user satisfaction literature. These latter developments provided a level of analysis that enabled a more detailed understanding of user satisfaction but is not as fine-grained as those focused on detailed attributes of an IS (e.g., content, format, ease of use). Further, in integrating user satisfaction and technology acceptance concepts into one model, Wixom and Todd (2005) distinguished cognitive aspects (i.e., beliefs about the technical system (system quality) and the information product (information quality)) from affective aspects (i.e., user satisfaction with the system itself and with the information outputs). They also recognized the likely influence of cognitive aspects of service quality on user satisfaction but omitted service quality from the model on the basis that, in the context of their study, service quality was more relevant to an evaluation of satisfaction with overall IT services than with individual applications. This development was especially important because, up to this point, many IS studies (e.g., Bailey & Pearson, 1983; Doll & Torkzadeh, 1988; Ives et al., 1983) had largely blurred the distinction between the cognitive aspects (i.e., beliefs about an object) that impact the satisfaction judgment and the affective aspects that reflect the satisfaction judgment (i.e., satisfaction with an object or affective attitude towards the object) (Ajzen & Fishbein, 1980). Extending Wixom and Todd's (2005) work, Xu et al. (2013) added service quality and service satisfaction to their model of component level satisfaction. The results showed that individuals' beliefs concerning both information and system quality affected service quality and that information quality, system quality, and service quality affected their associated satisfaction constructs (i.e., information, system, and service satisfaction).

Researchers have also contextualized and tailored the satisfaction construct to particular settings. Although these studies have described their constructs and measures as pertaining to satisfaction, they often focus on cognitive aspects of the system rather than affective aspects and, thus, blur the satisfaction concept. For example, Muylle, Moenaert, and Despontin (2004)'s 11-dimensional model of website user satisfaction measures users' cognitive evaluations of each attribute (e.g., entry guidance, hyperlink connotation, website structure and speed, language customization, and information comprehensiveness, accuracy and relevance, etc.) rather than affective judgments of each. Thus, the only measure of satisfaction pertaining to attitude in Muylle, et al. (2004) was overall measure of website user satisfaction.

In a similar vein, Palvia (1996) posited a model to evaluate user satisfaction with 12 elements of small business IT. They included common EUCS dimensions such as information content, accuracy, format, ease of use, timeliness, documentation, security, and integrity and domain factors such as software adequacy, software maintenance, vendor support, training and education, and an aggregate construct to capture overall evaluation of the system. Although Palvia refers to the instrument as a satisfaction measure (except for a single item measuring information accuracy), the attribute scales do not otherwise mention satisfaction, which blurs the distinction between one's evaluation of the objective attributes of a system and one's attitude toward the attributes. By contrast, in their study of consumer satisfaction with financial services, Krishnan and Ramaswamy (1999) clearly distinguished attribute-level satisfaction as an affective judgment. They posited a measure of overall satisfaction with corresponding measures of satisfaction for four factors related to product, services, and technology: branch service satisfaction, automated telephone service satisfaction, product line satisfaction, and financial reports satisfaction.

Most researchers have viewed satisfaction and attitude as distinct and have typically used different scales to represent the constructs (Bhattacherjee, 2001b; Bhattacherjee & Premkumar, 2004; Sabherwal et al., 2006), but some have operationalized satisfaction using measures that are similar to attitude scales (Ajzen & Fishbein, 1980; Brown et al., 2012; Brown et al., 2014), which means that user satisfaction at the operational level is indistinguishable from common measures of attitude in IS research. The difficulty this presents, as with any other measures of user satisfaction that are significantly different from each other, is as Treacy (1985) suggests: compared with other studies, it is questionable as to whether the researchers are using the same construct in their work. Lack of consistency can also potentially impede the accumulation of a general body of knowledge on the subject but, where valid, can point to new avenues for extending knowledge.

In general, despite the many definitions and approaches used to measure user satisfaction, IS studies have largely converged on overall measures of user satisfaction (e.g., Bhattacherjee, 2001a, 2001b; Chin & Lee, 2000). An examination of these measures shows that they have been less problematic in operationalizing the user satisfaction construct with clearer distinctions between the cognitive aspects that impact satisfaction (e.g., qualities of an IS) and the affective aspects that reflect attitude and satisfaction judgments. With most studies drawing on measures from marketing research and common sources such as the work of Oliver (1981) and Spreng et al. (1996), a more unified foundation of user satisfaction

research is emerging, which, over time, one can expect to result in a genuine accumulation of knowledge in IS research.

4 Process-oriented Approach in Study of User Satisfaction

The process-oriented approach to studying satisfaction focuses on the processes involved in satisfaction formation in individuals. Though not as dominant as those focused on outcome, one can find studies of user satisfaction in IS aligned with the process-oriented approach from the 1970s (Ajzen & Fishbein, 1980; R. E. Anderson, 1973; Fishbein, 1963; Edwin A. Locke, 1969; Oliver, 1976; Olshavsky & Miller, 1972; Olson & Dover, 1976). These studies draw on developments in marketing research and social psychology to better understand how user satisfaction is formed, and, in particular, the impact of disconfirmed expectations on satisfaction with IS performance (or outcomes).

In this section, we review prominent IS research that has used process-oriented satisfaction theories to explain IS user satisfaction. We begin with key process-oriented satisfaction theories posited in the marketing field and provide examples from IS research that has adopted the respective theory. We identify and discuss two general paradigms among the theories used to explain the cognitive processes involved in satisfaction formation: expectation disconfirmation and desires congruency. We focus here on the models used to explain user satisfaction formation; we discuss the aspects related to antecedents and outcomes in Sections 5 and 6.

4.1 Expectation-disconfirmation Paradigm

According to many studies that have used the expectation-disconfirmation model to explain consumer satisfaction (e.g., Oliver, 1977, 1979; Olson & Dover, 1979; Swan & Trawick, 1981; Weaver & Brickman, 1974), consumers compare product/service performance with their expectations to judge satisfaction with the product/service. If performance exceeds their prior expectation (positive discrepancy), then individuals would be more satisfied with the product/service. However, if performance is below their prior expectation (negative discrepancy), they would be less satisfied or even dissatisfied with the product/service. In short, the expectation-disconfirmation paradigm sees satisfaction as a function of expectation and disconfirmation (i.e. disconfirmation refers to the difference between performance and expectations). Hence, expectation-disconfirmation models of satisfaction use expectations as a basis to judge performance (or one's experience).

Further, the adaptation level theory supports the expectation-disconfirmation model. This theory suggests that individuals interpret stimuli in light of an adapted standard (Helson, 1964). The standard (or benchmark) against which one judges performance is a function of the individual's perception, the context, and the nature of the stimulus. Once one forms this standard, it will guide succeeding evaluations. Thus, positive and negative deviations from the standard depend solely on the individual's adapted levels and are different from one person to another. Hence, in an IS context, expectations about the performance of an IS (or its components or attributes) will act as the adapted standard against which one compares actual performance.

Scholars consider the expectation-disconfirmation model a paradigm since it has been used in conjunction with many theories. One can find traces of expectation-disconfirmation in most IS studies using theories that explain satisfaction as a function of a cognitive comparison between predictive expectations of some form and some kind of performance (Bhattacherjee, 2001a, 2001b; Bhattacherjee & Premkumar, 2004; Brown et al., 2012, 2014; Ginzberg, 1981; Lankton & McKnight, 2012; Szajna & Scamell, 1993). Early works in user satisfaction suggested that expectations may play an important role in determining IS failure and success. For example, Ginzberg (1975) noted that project members had needs and expectations that, if unmet, would lead to dissatisfaction and implementation failure. Recognizing the centrality of the individual in project success, their work emphasized the importance of setting up a satisfactory psychological contract (i.e., user expectations). Otherwise, if users held high expectations about an IS project that were not met, they became dissatisfied. Ginzberg (1981) suggested a similar relationship might hold for IS implementation such that "users who held unrealistic expectations about a system prior to its implementation would be less satisfied with the system than will users whose expectations were realistic" (p. 463). Ginzberg then examined the links between pre-implementation expectations and attitudinal measures of project success and found the two were related.

Later work explicitly tested the relationships that expectation-disconfirmation implies. For example, using a field survey of online brokerage users, Bhattacherjee (2001a) investigated key drivers of users' intentions

to maintain and continue their involvement with these online systems. He showed that confirmation of expectations affected both users' satisfaction with the service and their perceived usefulness, with user satisfaction with the initial service encounter also functioning as a key determinant of users' intentions to continue to use the service. Bhattacherjee (2001b) expanded the initial model to include satisfaction processes and found that users' satisfaction with online banking systems was influenced by their confirmation of expectations from prior IS use and perceived usefulness. Erevelles, Srinivasan, and Rangel (2003) also measured customer satisfaction with internet service providers (ISPs) using expectation disconfirmation. They found that, despite generally low expectations, customers were not satisfied with their ISPs. Using attribution theory (Kelley, 1973), Erevelles et al. suggested that customers believe their dissatisfaction is an outcome of ISPs' ignoring their needs. In the end, they identified both affective and cognitive causes as involved in customer's switching behavior. Based on the Bitner (1990) model of satisfaction with service encounters, Susarla, Barua, and Whinston (2003) also examined satisfaction with application service providers. They modeled perceived provider performance and disconfirmation constructs as direct antecedents of satisfaction. They found that the effect of perceived provider performance on satisfaction was significant and positive and that the effect of disconfirmation was significant and negative.

In Sections 4.2 to 4.6, we discuss key theories that scholars have used in conjunction with expectation disconfirmation, namely, contrast theory, assimilation-contrast theory, cognitive dissonance theory, generalized negativity theory, and comparison level theory. In Section 4.7, we discuss equity theory, which compares the perceptive ratio of outcomes to inputs invested by individuals with that of other individuals.

4.2   Contrast Theory

Contrast theory situates consumer satisfaction as a function of product performance and assumes that, when product expectations are disconfirmed with actual performance, the contrast between expectations and performance will cause consumers to exaggerate the difference between the received product and the expected product (Cardozo, 1965). According to this theory, consumers will evaluate a product's performance as higher than actual performance if their initial expectations were lower than the objective performance. Conversely, they will evaluate product performance as lower than actual performance if their expectations were higher than the objective performance. In other words, perception of product performance and, therefore, consumer satisfaction is improved through positive disconfirmation (i.e., when performance exceeds expectation) and reduced through negative disconfirmation (i.e., when performance falls below expectations).

Satisfaction research grounded in a process-perspective is largely based on comparison with an expectation or some form of comparison standard. The marketing literature includes a range of comparison standards (Oliver, 2010) such as *will* (i.e., predicted) expectations, *should* (i.e., normative, deserved) expectations*, desired and ideal* expectations, and *best* expectations (which are more prevalent in economic models and represented as rational expectations and expected utility). Spreng et al. (1996) has also identified different definitions of expectations in the marketing literature. For example, some authors have described expectations primarily in terms of the probability of occurrence of some event (e.g., Westbrook, 1987; Westbrook & Reilly, 1983), while others add an evaluation of the level of goodness or badness of events to the probability of occurrence (e.g., Churchill & Surprenant, 1982). To clarify predictive expectations, which is the most common standard investigated in the marketing literature, Oliver (1981) noted that such expectations will have two aspects: 1) the likelihood of occurrence (e.g., the probability of having a clerk waiting on consumers in a bank), and 2) the evaluation of the occurrence (i.e., how desirable, good or bad, the clerk is likely to do his job). However, the second part (i.e., the evaluation of a product or service) is rooted in personal preferences, which arise from desires and needs that differ across individuals. Further distinctions are that expectations tend to be future oriented and malleable while desires are oriented towards the present and relatively stable (Spreng et al., 1996).

In IS research, most process-oriented studies of user satisfaction have been based on predictive expectation paradigms that stem from contrast theory (Bhattacherjee, 2001a, 2001b; Brown et al., 2014; Fan & Suh, 2014; Lankton & McKnight, 2012; Liao et al., 2007; McKinney et al., 2002; Susarla et al., 2003; Venkatesh & Goyal, 2010). For example, Susarla et al. (2003) measured client satisfaction with application service providers (ASPs) by capturing their expectations about functional capabilities and technical performance guarantees of a specific ASP and their perceived performance. McKinney et al.

(2002) also used predictive expectations to assess user satisfaction with a given website. Bhattacherjee (2001a, 2001b) used a construct called "confirmation" to capture the gap between user expectations and perceived performance. As such, the IS literature has shown little divergence because most studies have drawn on and are consistent with earlier works in this paradigm (e.g., Bhattacherjee, 2001a). Chin and Lee (2000) presented a theoretical model that also used predictive expectations as a comparison standard. However, they argued that an end user's overall feelings of satisfaction can arise from considering multiple standards—in this case, from both direct and multiplicative combinations of expectation-based satisfaction and desire-based satisfaction. As such, Chin and Lee (2000) accounted for two comparison standards in determining discrepancy perceptions and ultimately one's satisfaction with an object (note: we discuss "desire-based expectations" as a comparison standard in Sections 4.8 and 4.9).

4.3   Assimilation-contrast Theory

Assimilation-contrast theory states that there are zones of acceptance and rejection in one's perceptions. That is, if the difference between expectation and performance is small enough to fall into the acceptance zone, people will tend to assimilate performance perceptions toward their prior expectations and, thus, perceive the gap between performance and expectation as smaller than what they would otherwise have perceived. However, if the disparity between expectation and performance is large enough to fall outside the acceptance zone, a contrast effect will occur and the consumer will magnify the difference between performance and prior expectations (Anderson, 1973). Based on this theory, scholars have suggested that promotional messages should overstate product performance and quality slightly so that the disconfirmation falls in the acceptance zone and causes an assimilation effect, which returns higher product ratings.

One can find evidence of the assimilation-contrast theory in IS research in Kettinger and Lee's (2005) work on IS service quality. Using assimilation-contrast theory as the underlying theoretical framework, Brown et al. (2012) also examined users' expectations and experiences and their effects on system use. They suggested that negative disconfirmation has more negative consequences for system use than positive disconfirmation has positive consequences. Brown et al. (2014) further investigated the effect of expectation-disconfirmation on user satisfaction with an IS and reported a similar finding on how negative disconfirmation can cause more damage to user satisfaction compared to the good that an equal amount of positive disconfirmation can bring to user satisfaction.

4.4   Cognitive Dissonance Theory

According to cognitive dissonance theory (Festinger, 1957), when people are presented with a fact that is different from their initial beliefs, they may adjust either the new fact, the old belief, or both to make them more consonant to cope with the mental discomfort that being presented with the new fact creates. Based on cognitive dissonance theory, when a product or service expectation does not match product performance or service quality, individuals may try to reduce the psychological tension that is created by the disparity between expectation and performance or quality (Yi, 1989) by adjusting their expectation, their evaluation of performance or quality, or both.

One can find applications of cognitive dissonance theory in the study of IS user satisfaction in Brown et al. (2014), Szajna and Scamell (1993), Lankton and McKnight (2012), Lankton et al. (2014), and Liao et al. (2009). Szajna and Scamell (1993) examined the effects of manipulated expectations on IS performance perception. Using cognitive dissonance theory (Festinger, 1962), they predicted and confirmed that unrealistic expectations, whether too high or too low, will result in less favorable user evaluations of the system. Lankton and McKnight (2012) and Lankton et al. (2014) also used cognitive dissonance theory in the context of an assimilation model. They argued that, since IT products are more complex than the "simple products" used in consumer satisfaction studies, it would be more difficult for users to evaluate the IT produfct performance and form a positive or negative disconfirmation judgment. As such, they suggested it is more important to correctly set the expectations for IT products (Lankton & McKnight, 2012).

4.5   Generalized Negativity Theory

Generalized negativity theory states that any disconfirmation of expectation, whether positive or negative, is perceived as less pleasant than a confirmation of expectations (Carlsmith & Aronson, 1963). This theory states that disconfirmation of expectation results in a hedonic negative state in individuals. As such,

consumers tend to evaluate a product or service less favorably when they have certain expectations and those expectations are not confirmed by product performance compared to when they have no specific expectations. The theory hypothesizes both positive and negative deviations from expectations to lower product evaluation. In other words, product evaluation is inversely related to the magnitude (without direction) of the disconfirmation. Oliver (1976) used this theory and found that only when ego involvement, commitment, and interest were high was the theory supported. In short, hedonic reactions as hypothesized by generalized negativity theory appeared to hold true only under certain conditions that can result in strong expectations.

Few IS studies infer or use generalized negativity theory. Although Ginzberg (1981) did not explicitly use generalized negativity theory, his results are consistent with its predictions. He showed that users who hold realistic expectations regarding an IS performance before its implementation tend to be more satisfied with the implemented system's performance than those with unrealistic expectations. Likewise, Venkatesh and Goyal (2010) found that disconfirmation of expectations, whether positive or negative, resulted in a less satisfactory user experience. Similar to Ginzberg (1981), they did not explicitly use generalized negativity theory, but their results supported its principles. Brown et al. (2014) conducted the only study we found that explicitly tested the usefulness of generalized negativity theory in representing the impacts of expectations and experience on satisfaction (attitude), intention, and use. However their findings did not support the model. Altogether, while potentially useful, it appears that generalized negativity theory's ability to explain the user satisfaction may have limited applications and hold true only in contexts where a "strict standard" is expected and any deviation from expectations about the IS or its services whether high or low is undesirable. We need further research to assess this theory's usefulness in the context of user satisfaction.

4.6   Comparison-level Theory

According to Thibaut and Kelley (1959), one can determine consumer satisfaction with a purchase based on the discrepancy between the actual outcome and a comparison standard. Outcomes that exceed a comparison level produce a positive discrepancy and will be satisfying, while outcomes that fall below the comparison level standard will result in a negative discrepancy and, in turn, dissatisfaction. Comparison level standards are different from predictive expectations in that researchers are concerned with the sources that contribute to forming the standard. Researchers have suggested that 1) similar product experience, 2) situationally produced expectation (e.g., advertisement, promotional offer, etc.), and 3) other consumers' experiences with the product determine the comparison level for a product or service (LaTour & Peat, 1979).

Few IS studies have used comparison levels theory to understand user satisfaction. One of the more recent studies, presented by Hsieh, Rai, Petter, and Zhang (2012), is premised on considering the "next-best alternative" as the comparison-level standard. In this study of smartphone application development, the authors suggested that freelance developer estimates of market demand in an incumbent smartphone application marketplace would impact developer commitment to that platform. Although they did not directly assess satisfaction, other studies have identified satisfaction as a precursor to commitment behavior, (Bhattacherjee, 2001a, 2001b; Morgeson, 2011), which suggests that this theoretical perspective may provide a useful way of understanding user satisfaction.

To conduct research using comparison level theory, respondents need to have prior experience with similar systems. However, to the extent that IS research has been focused on technology acceptance and user satisfaction with "new" technologies, it may be that lack of relevant prior experience in the focal context has been a contributing factor in the dearth of IS research that uses comparison level theory. With IT being almost ubiquitous in today's societies and organizations, few individuals will approach a technology not having some prior experience that impacts their expectations about the technology. As attention turns more towards post-adoption use (Jasperson, Carter, & Zmud, 2005), it may be timely for researchers to consider comparison level theory as a way to understand how user satisfaction is influenced in the post-adoption stage.

4.7   Equity Theory

Equity theory indicates that people compare the ratio of outcomes to the inputs and effort they have invested with those of others that they know (e.g.. Adams, 1963; Walster, Walster, & Bersheid, 1978). The comparison is based on the degree of equity, which individuals perceive between what they have received and what other people have received relative to respective inputs. Many scholars have applied equity

theory in marketing studies (e.g.,Hess & Hightower, 2002; Oliver & DeSarbo, 1988; Oliver & Swan, 1989; Patterson, Johnson, & Spreng, 1997; Swan, 1982; etc). For example, Fisk and Young (1985) used equity theory to examine consumer satisfaction with airline services. They manipulated price and waiting time for an airline to create disconfirmation of equity among subjects. They found that inequity resulted in dissatisfaction and reduced the intention to repurchase the service. However, the results were only valid for inexperienced subjects. Those with prior experience with air travel seemed less sensitive to the manipulations.

In IS research, few have used equity theory in their studies of user satisfaction. A notable exception is Joshi (1990), who used equity theory to examine the effects of equity on user information satisfaction. He operationalized equity as procedural fairness and added equity to the traditional model of user information satisfaction. The findings indicate that including equity improved the predictive power of the model and that equity was the most related construct to user information satisfaction. Joshi (1992) also investigated the role of equity along with role ambiguity and role conflict. He found that equity positively affected user satisfaction and role ambiguity and conflict negatively influenced user satisfaction. These results suggest that, where perceptions of equity matter, equity theory may be a promising pathway for understanding user satisfaction formation.

4.8   Desires Congruency Paradigm

The desires congruency paradigm differs from the expectation-disconfirmation paradigm in that it uses a different comparison standard, other than predictive expectations, to explain satisfaction formation. Even though different researchers have used different terminology for their proposed standards, those using desires congruency refer to what "should be" the performance or quality of a product, while those advocating predictive expectation refer to what "will be" the product performance or quality (Yi, 1989). Prominent theories that are used in conjunction with the desires congruency paradigm are norms as comparison level theory (Woodruff, Cadotte, & Jenkins, 1983) and value percept disparity (Westbrook & Reilly, 1983).

Unlike expectations that are predictive and usually stimulated in consumers by manufacturers and service providers, desire stems from consumers' needs and wants. Desires refer to what consumers would like to happen rather that what they think will happen (e.g., Nevo & Chan, 2007; Parasuraman, Zeithaml, & Berry, 1988). Spreng et al. (1996) suggest that due to its nature, one can conceptualize desire at various levels of abstractions; hence, the literature features different definitions of desire. At the most abstract level, one can define desire as basic and fundamental needs, whereas, at higher levels of abstraction, one can define desire as a means to attain end-state needs. To illustrate, a consumer may have an abstract value: the desire to keep his family safe and his desire may manifest itself in buying products that provide the benefit of protecting himself and his family from harm. The desired benefit may then be specified in terms of the benefits that are provided by certain product attributes, such as infant safe attributes of products. Therefore, desire can comprise an abstract end state such as the desire to provide safety for one's family, intermediate benefits such as the means to keep one's family away from harm, or concrete means of achieving those benefits such as buying a product that adheres to specific standards to make it safe for infants and toddlers.

A handful of IS researchers have extended their studies of user satisfaction to include desires disconfirmation. Typically, they have evaluated desires alongside predictive expectations (Chin, Junglas, Schwarz, & Sundie, 2014; Chin & Lee, 2000, Khalifa & Liu, 2002, 2003; Nevo & Chan, 2007) Some have also suggested that disconfirmation modeling be extended to include other standards, such as an ideal (should) comparative standard (Chin & Lee, 2000), though, to date, we did not find any published works along these lines in the IS literature.

To define desires, Khalifa and Liu (2003) used Gutman's (1982) means-end theory. According to means-end theory, individuals form desires based on inner emotional needs or wants rather than realistic predictions of actual performance. They argued that the speed of innovation and novelty inherent in the IT industry hinders formation of concrete expectations and, thus, that desires would be more salient determinants of satisfaction because their formation is less dependent on past experience and knowledge. Following Spreng et al. (1996), Spreng and Page (2003), and Chin and Lee (2000), Chin et al. (2014) defined desires as "what an individual wants to occur" (p. 9). Hence, desires reflect how an individual wishes the system or service would perform in contrast to expectations, which are anticipatory or forecasting in nature. Similarly, Nevo and Chan (2007) defined desire by contrasting it with expectation; that is, as representing what people would like to happen as opposed to what will happen. Chin et al.

(2014) likewise suggested that "what an individual expects from a system or service may be to some degree independent of what he or she actually desires" (p. 11). Investigating an organizational knowledge management system, Nevo and Chan (2007) found that desire was formed based on what a knowledge management system was and how it benefitted the organization. Users mostly desired a knowledge management system that could fully address the business needs, which led to the purchasing and implementing of the system. On the other hand, predictive expectations derived mostly from past experience with similar systems or through promises made by the vendor.

4.9   Norms as Comparison Standard and Value-percept Disparity Theory

Woodruff et al. (1983) used experience-based norms as a comparison standard in a study of consumer satisfaction with a focal brand. Unlike the expectation-confirmation model, they included participants' experience with other brands rather than only the focal brand. The authors reasoned that a consumer's view of the focal brand and what it "should be" is a collection of experiences one has had with the same brand, similar brands, or even a whole class of competing and substitute products. Sirgy (1984) also argued that different cognitive congruities may affect consumer satisfaction such as the congruity between 1) new product performance (after usage) and expected product performance (before usage); 2) new product performance and old (similar) product performance, 3) expected product performance (after purchase) and ideal product performance, and 4) expected product performance (after purchase) and deserved product performance. He found that all proposed cognitive congruities both alone and additively would affect satisfaction. These findings suggest that what consumers believe a product performance "should be" has a great effect on their satisfaction with the product.

Scholars have used value-percept disparity (also referred to as standard-percept disparity) as an alternative to the expectation-confirmation model. Value-percept disparity can also be categorized as a norm-based theory. This theory was introduced by Westbrook and Reilly (1983) to address a gap in expectation-confirmation model's not providing sufficient differentiation between cognitive and evaluative notions. It argues that, because what one expects from a product might be different from what one desires or values in a product, expectations (as prediction) may not be an appropriate comparison standard for assessing satisfaction. For example, one might expect that a software application will have errors in it even after testing, but software failures are neither desirable nor valued whether they are expected or not. Thus, one can expect values to affect consumer satisfaction more when they are different from expectations about a product or service. According to this theory, the disparity between one's desires, needs, or wants (i.e., values in short) and product perceptions is the major determinant of consumer satisfaction. The greater the disparity, the greater the dissatisfaction would be and vice versa. Westbrook and Reilly (1983) compared the value-percept disparity model with the expectation-confirmation model and found that neither was sufficient on their own to explain consumer satisfaction.

Although studies focused on predictive expectations dominate the IS literature, several have examined desires as a comparative standard. Suh, Kim, and Lee (1994) examined the notion of desires instead of expectations in an IS study. They found that IS success was positively correlated with the disconfirmation of actual system performance and desired performance. Chin and Lee (2000) proposed an integrated conceptual model that differentiates the effects of disconfirmed expectations from those of disconfirmed desires on end user satisfaction. However, to date, we found no studies that have empirically tested Chin and Lee's (2000) proposed model. Chin et al. (2014) also examined the notion of a desires comparison standard; their work focused on assessing the relative psychometric performance of discrepancy measures.

Khalifa and Liu (2003), pointing to the rapid advances in IT, argued that conventional consumer satisfaction models in marketing are not good enough to address all aspects of user satisfaction with information systems. They developed and empirically tested a user satisfaction model for explaining and predicting satisfaction with Internet-based services at adoption and post-adoption stages. They defined expectation disconfirmation, perceived performance, and desire disconfirmation as determinants of satisfaction and found that, despite the role of desire disconfirmation in forming satisfaction at the adoption stage, its effects were insignificant at the post-adoption stage. They also reported a non-significant relationship between user service satisfaction at adoption and user satisfaction at post-adoption.

Nevo and Chan (2007) studied user satisfaction with knowledge management systems using a qualitative approach. They discussed both expectations and desires and how they are created among users. Nevo and Chan concluded that expectations and desires affect user satisfaction in different ways. They

observed that the effects of expectations and desires on satisfaction varied with time, with expectations playing a more important role in shaping performance perceptions at the beginning of usage. Thus, disconfirmation of expectations may be a stronger determinant of user satisfaction when individuals start using a system. On the other hand, desires affected satisfaction in the long run, which suggests that, after the initial period of user experience with a system, disconfirmation of desires would become the stronger determinant of user satisfaction with system. The temporal distinguishing of the impacts of predictive expectations and desires has important implications for user satisfaction research, particularly in post-adoption, but has not been followed through as far as we can tell in the literature.

In general, findings in IS research regarding the role of desires and desires-based disconfirmation in the formation of user dissatisfaction have returned mixed results at best, which suggests limited understanding of the role of this construct in framing user satisfaction with IS. As such, researchers could conduct future research to help identify whether and under what circumstances desire influences and perhaps even dominates the user satisfaction judgment, particularly in the post-adoption context.

We also need further research to look at other standards such as "normative" and "ideal" (should) as comparison standards for determining user satisfaction. Scholars consider experienced-based normative standards in particular as superior to expectations because the former draw on past experiences with similar products or services or may derive from expectations set by the service provider (Khalifa & Liu, 2003; Woodruff, et al. 1983) (e.g., through service-level agreements that lay out the level of service that users "should expect" to receive). Understanding experienced-based satisfaction may also be more relevant in post-adoption than for new technologies (Khalifa & Liu, 2004). Indeed, research into Internet-based service adoption has shown that, as experience increased, users developed more realistic expectations about the service and, thus, relied more on these expectations (when compared with desires) for assessing their satisfaction (Khalifa & Liu, 2003). The same study also showed that, as user experience with the IT service increased, the initial judgment of satisfaction changed significantly such that there was no relationship between initial satisfaction and subsequent user satisfaction judgments. Finally, experienced-based normative standards are likely to differ for different people and differ in the way they evolve over time even when persons have experience with and are evaluating the same IS product or service (Woodruff et al., 1983). This reiterates further the need for organizations to set out what is realistic and "normal" for an IS service or product.

5   Antecedents of User Satisfaction

Similar to marketing research and its concern with satisfying consumer needs and requirements, recognizing the factors that influence user satisfaction is important for scholars and practitioners who want to understand how to influence user satisfaction. In this section, we overview factors that scholars have examined as satisfaction antecedents in marketing and discuss in detail those antecedents that IS researchers have studied in relation to user satisfaction. We identify areas of emphasis and those that researchers have understudied.

With the IS field's constantly evolving nature, one can identify many different attributes of IS that have been the focus of user satisfaction studies. In this paper, we provide a list of these attributes along with an illustrative list of research papers in which they appeared (See Table 1). Readers should note that the attributes' definitions may vary from one study to another. We encourage readers to refer to the cited reference for the definition used for each antecedent where the paper's authors provide it.

In this section, we examine meta-analytic and review studies of IS user satisfaction and individual studies that illustrate key antecedents of user satisfaction. In this review, we also recognize the blurring of cognitive and affective aspects such that some studies may have conceptualized certain factors as antecedents of satisfaction while others have examined them as components of the user satisfaction construct as has been the case with aspects of information, system, and service quality (e.g., Bailey & Pearson, 1983; Doll & Torkzadeh, 1988; Ives et al., 1983). In this section, we focus on those studies that explicitly identified and separated antecedents from the satisfaction construct.

In marketing research, scholars have investigated many factors as determinants of satisfaction, which include but are not limited to perceived performance (e.g., Churchill & Surprenant, 1982; Khalifa & Liu, 2003; Spreng & Olshavsky, 1992; Szymanski & Henard, 2001), expectations and disconfirmation (Fornell, Johnson, Anderson, Cha, & Bryant, 1996; McKinney et al., 2002; Oliver, 1980; Spreng & Mackoy, 1996; Spreng & Olshavsky, 1993), desires and desires' disconfirmation (e.g., Khalifa & Liu, 2003; Spreng et al., 1996; Spreng & Mackoy, 1996; Spreng & Olshavsky, 1992), experience (e.g., Brown, Venkatesh,

Kuruzovich, & Massey, 2007; Hom, Griffeth, Palich, & Bracker, 1999; Irving & Meyer, 1994), affect (e.g., Mano & Oliver, 1993; Oliver & Rust, 1997; Szymanski & Henard, 2001; Westbrook & Oliver, 1991), equity and fairness (e.g., Fisk & Young, 1985; Joshi, 1990; Oliver & Swan, 1989; Patterson et al., 1997), service quality (e.g., Ekinci & Sirakaya, 2004; Lee, Lee, & Yoo, 2000; Spreng & Mackoy, 1996; Woodside, Frey, & Daly, 1989), perceived value (Fornell et al., 1996; Westlund, Cassel, Eklöf, & Hackl, 2001), and attitude (Yi, 1989). We encourage interested readers to refer to the cited sources for detailed explanations of each factor.

In the IS field, scholars have confirmed many of the findings from marketing research in relation to user satisfaction. For process-oriented studies, research has focused on and identified expectations and expectations-disconfirmation and desired expectations and desire disconfirmation as significant determinants of user satisfaction (Bhattacherjee, 2001a; Chin & Lee, 2000; Khalifa & Liu, 2000; Nevo & Chan, 2007; Suh et al., 1994). From an outcome-perspective, scholars have also identified other factors such as perceived performance (Khalifa & Liu, 2000), attitude, experience, affect, value (Mahmood, Burn, Gemoets, & Jacquez, 2000), equity (Joshi, 1990, 1992), service quality (Delone & McLean, 2003; Kettinger & Lee, 1994; Xu et al., 2013), and information and system quality (Delone & McLean, 1992; Gelderman, 1998; Wixom & Todd, 2005) as antecedent to user satisfaction.

User involvement was one of the earliest antecedents to gain significant attention in the IS literature (Lucas, 1978; Ives et al., 1983; Baroudi et al., 1986). Scholars have long recognized it as a key determinant of IS success (Power & Dickson, 1977), and it is the most studied of the determinants of user satisfaction (Petter et al., 2013). For example, using Bailey and Pearson's (1983) UIS measures, Baroudi et al. (1988) examined the supposition that user involvement leads to user satisfaction. They tested alternative models and concluded that user involvement during development enhanced user satisfaction with the system.

Apart from user involvement, many of the early studies of user satisfaction did not distinguish cognitive elements such as qualities of the IS and consequences of use from the affect aspects that relate to satisfaction (Gable, Sedera, & Chan, 2008; Galletta & Lederer, 1989; Rai et al., 2002; Wixom & Todd, 2005). Thus, scholars embedded many of these elements in measures of user satisfaction, particularly those oriented towards evaluating detailed aspects of an IS, which blurred the construct. For example, Bailey and Pearson (1983) included several IS attributes among their 39 items measuring user satisfaction, such as information accuracy, timeliness, reliability, completeness, response time, system integration and system flexibility, and EDP staff competence. Doll and Torkzadeh's (1988) EUCS instrument likewise contained items related to information quality (e.g., format, accuracy) and system quality (i.e., ease of use), and Swanson's (1974) measure of MIS appreciation included attributes of information quality and system quality, such as system reliability and response time, information conciseness, clarity, and readability.

Shewe (1976) focused on consequences of use with a 10-item attitudinal scale, which included operating cost, quality of the information, information usefulness, job productivity, and decision making effectiveness. Shewe asked users to indicate their level of satisfaction with each consequence. However, Shewe anchored the scales as strongly agree/strongly disagree, which made the distinction between consequences of use and the satisfaction construct unclear. Indeed, Sedera and Tan (2005) in a content analysis of 16 satisfaction instruments (yielding 192 satisfaction-related items) found that aspects of information quality and system quality were the most often used as dimensions of user satisfaction, with 169 items (88%) mapping to measures of system quality and information quality and 20 items (10%) mapping to individual impact (14) and organizational impact (6) (see also Gable et al., 2008).

Early research on user satisfaction also did not necessarily and explicitly differentiate the aspects of an IS that impacted user satisfaction from each other (i.e., information, system, and service). Instead, research identified a general set of antecedents for user satisfaction as impactful. One can further classify many of these antecedents as aspects of the information, system, or service components of an IS, with the general thesis being that one's perception of these antecedents would determine one's satisfaction with the antecedents themselves or with each component or with the system as a whole. For example, Rushinek and Rushinek (1986) listed 17 factors impacting overall satisfaction; these factors varied widely and included system- and service-related factors and others (e.g., system response time, system expandability, system cost, promptness of equipment delivery, energy efficiency of the system, compatibility of peripherals/programs, number of users, percentage/number of mainframes/PCs, etc.). Debons et al. (1978) also identified 10 factors related to user satisfaction; namely, timeliness, reliability, assistance, accuracy, access, accommodation, communication, adequacy, environment, and cost. Some

studies, however, did not clearly or consistently define many of the antecedents, which may result in some confusion as to how one should interpret and use the results in future work that seeks to distinguish these elements. For example, depending on the construct definitions, terms such as timeliness, reliability, and access may relate to attributes of the system or to attributes of the information product. On the other hand, terms such as accuracy and adequacy are more often (and arguably more clearly) linked to attributes of information (e.g., Bailey & Pearson, 1983; Doll & Torkzadeh, 1988; Ives et al., 1983; Morgeson, Mithas, Keiningham, & Aksoy, 2011; Neumann & Segev, 1980).

DeLone and McLean (1992) were one of the earliest studies to comprehensively review the literature on IS success. In their study, they focused on empirical papers published between 1981 and 1987 in seven leading IS journals. They included user satisfaction as a key indicator of IS success. The findings showed system quality and information quality directly influence user satisfaction and system use, while system use and user satisfaction depend on each other. Their model did not specify how system use and user satisfaction are causally related but showed only that system use and user satisfaction influence each other and are influenced by information and system quality. Ten years later in a follow-up study to include new work on IS success, DeLone and McLean added (2003) service quality as an antecedent of user satisfaction and intention to use. They also explicated the "use construct" and distinguished between two of its aspects: "intention to use" and "actual use". They also hypothesized actual use and net benefits (e.g., improved decision making, improved productivity, increased sales, cost reductions, improved profits) as antecedents to user satisfaction.

Distinguishing the qualities of an IS, DeLone and McLean (1992, 2003) and Petter, Delone, and McLean (2008) identified system quality as comprising attributes that pertain to the quality of the information processing system itself, such as ease of use, system flexibility, system reliability, integration, convenience of access, and response time. Information quality attributes focused on the quality of the information system outputs mainly in the form of reports and results of queries (DeLone & McLean 1992, 2003) and included relevance, accuracy, completeness, consistency, understandability, conciseness, currency, timeliness, and clarity of the information product itself. Finally, service quality attributes aligned with the quality of services of the IS function (DeLone & McLean, 2003, Petter et al., 2013, Pitt, Watson, & Kavan, 1995) and included responsiveness, accuracy, reliability, technical competence, and empathy of the IS staff.

Many scholars have tested the relationships presented in DeLone and McLean's (1992) original model. For example, Wixom and Todd (2005), focusing on user satisfaction at a component level, suggested system quality as antecedent to user satisfaction with the system itself and information quality as antecedent to user satisfaction with the information output of the system. Building on the Wixom and Todd (2005) and DeLone and McLean (2003) models, Xu et al. (2013) suggested service quality as an antecedent to user satisfaction with e-services. Seddon and Kiew (1996), on the other hand, examined the links between overall user satisfaction and system quality and information quality as presented in the DeLone and McLean (1992) model. However, they replaced system use with perceived usefulness as an antecedent while noting that use as a behavior is appropriate for a process model but not for a causal model. Their findings showed that usefulness, alongside information quality and systems quality, explained most of the variance in user satisfaction. DeLone and McLean (2003) disagreed with replacing use and suggested instead that the problem may lie with overly simplistic definitions of a complex construct (for further discussion, see DeLone & McLean, 2003). Drawing on concepts related to the technology acceptance model and the attitude-belief linkages of the theory of reasoned action (Ajzen & Fishbein, 1980), Rai et al. (2002) also assessed the DeLone and McLean model using ease of use as a surrogate for system quality. Their goodness-of-fit results found support for the relationship between user satisfaction and information quality and ease of use (they did not include system use). They also confirmed the links in Seddon and Kiew's (1996) model.

In addition to attributes of information quality, system quality, and service quality as antecedents of user satisfaction, other beliefs also impact user satisfaction. These include self-efficacy, outcome expectancy, management support, ease of use, computer experience, leadership style of IT managers, user computer literacy, attitude, and system use. For example, Henry and Stone (1994) stated that self-efficacy and outcome expectancy positively affect users' perception of satisfaction. Management support, ease of use, and computer experience also affect satisfaction through outcome expectancy and self-efficacy. Igbaria and Nachman (1990) believed that the leadership style of IT managers has a direct impact on user satisfaction. They further stated that hardware and software accessibility and availability and user computer literacy, attitude, and system utilization affect user satisfaction. Mahmood et al. (2000), in a

meta-analysis of end user satisfaction and its antecedents, identified nine commonly studied antecedents of user satisfaction: perceived usefulness, ease of use, user expectations, user experience, user skills, user involvement in the development, organizational support, perceived attitude of top management toward the project, and user attitude toward IS. Their results suggest that all nine variables are significantly related to user satisfaction.

Researchers have infrequently studied use and net benefits (i.e., individual impacts) as antecedents of user satisfaction. However, we found some evidence to suggest support for use as an antecedent of satisfaction at the individual level wherein a greater, more positive experience with the use of a system would lead to greater satisfaction (DeLone & McLean, 2003). At the same time, Sabherwal et al. (2006), in a meta-analytic study, found no support for a relationship of use as an antecedent of satisfaction. In the case of net benefits, Davis (1989) used an adapted measure of perceived usefulness as an indicator of individual impact; that is, net benefit of IS use (DeLone & McLean, 1992; Petter et al., 2008; Rai et al., 2002). Results have shown net benefits (as perceived usefulness) to impact user satisfaction (Rai et al., 2002). At the organizational level, however, Petter et al. (2008) declared the data insufficient to draw a conclusion regarding the impacts of use and net benefits on user satisfaction.

Petter et al. (2013) focused on factors influencing dimensions of IS success (e.g., use, user satisfaction, net benefits etc). They examined work published between 1992 and 2007 and suggested five categories of determinants: task, user, social, IS project, and organizational characteristics. Focusing on user satisfaction, they found support for task-related factors such as task compatibility and task difficulty; user characteristics such as enjoyment, trust, attitudes towards technology; user expectations, project factors such as user involvement, relationship with developers, developer skill; and organizational factors such as management support. Of the factors studied, the most consistent determinants of user satisfaction across the studies were task compatibility, task difficulty, attitudes towards technology, and user involvement. Their analysis also highlighted several variables that have been understudied and others that have returned mixed results. For example, Petter et al. (2013) found mixed results for social factors and for the impact of management support on user satisfaction. We found few studies that examined the impact of task, organizational, and project characteristics on user satisfaction, such as task significance, task interdependence and task variability, developer skills and project management skills, and IS governance and IT investment. User-related factors such as self-efficacy, attitudes towards change, trust, and technology experience have also had little attention in relation to user satisfaction.

Research on user satisfaction with information systems is not limited to user "employee" perspectives. Indeed, we found many studies in relation to e-commerce and online interactions that examined satisfaction from the customer "user" perspective. These studies have largely focused on vendor perceptions, product/service attributes, and technology/website characteristics as antecedents of user satisfaction. For example, Szymanski and Hise (2000) investigated the factors affecting consumer satisfaction with online retailers. In the first phase of the study, they conducted interviews with focus groups to identify determinants of "e-satisfaction". They identified four factors that directly influence e-satisfaction: online convenience, merchandising (product offerings and product information), site design, and financial security of online transactions. Further tests returned statistically significant correlations between satisfaction and each factor. The authors identified shopping convenience and site design as the leading factors and financial security, product information, and product offerings as less influential factors. Schaupp and Bélanger (2005) examined three categories of factors impacting e-satisfaction; that is, technology-, product-, and shopping-related factors. The findings showed that privacy (technology factor), merchandising (product factor), and convenience (shopping factor) impacted satisfaction. Morgeson (2011) also studied customer (end user) satisfaction with government and private business websites. He offered an end user satisfaction and loyalty model based on Fornell et al. (1996) to measure user satisfaction. The model suggested organization, personalization, navigation, and reliability as determinants of satisfaction with websites. The results further indicated that satisfaction with private sector websites is predominantly determined by the personalization, while satisfaction with public sector websites is determined, more or less equally, by the different determinants.

In summary, prior research has uncovered several factors that influence user satisfaction. While scholars have shown some factors to be consistent determinants of user satisfaction (e.g. user involvement, information quality, system quality), it is not uncommon for there to be variability across studies and across contexts, such that one can observe some inconsistencies among the determinants (Sabherwal et al. 2006). Some determinants are more relevant (and perhaps even unique) to certain contexts than others, such as privacy and merchandising in the case of e-satisfaction (Schapp & Belanger, 2005). Also,

few studies in the IS literature have examined the impact of prior experiences with or use of an IS and one's perceptions of net benefits on satisfaction (Petter et al., 2008). For evaluative purposes, we need more work so that practitioners and future research can gain better insights into the elements that are likely to yield the greatest influence on user satisfaction and ultimately, assure, the success of the IS.

Additionally, little has been done in IS research to determine how satisfaction with one element of an IS or interim judgments of aspects of the users' consumption experiences influences the level of satisfaction with other elements and with the object or experience as a whole (Oliver, 2010). Indeed, Oliver (2010) has argued that a good definition of satisfaction would require that it generalize satisfaction with individual elements of product or service delivery, with final outcome satisfaction, and with satisfaction with satisfaction (p 7), which acknowledge the processes used to determine one's final level of satisfaction.

6   Outcomes of User Satisfaction

Studying the consequences of user satisfaction enables one to better understand the importance that this construct holds in regard to organizations and individual users. Outcomes of user satisfaction or understanding what user satisfaction leads to or causes justifies the efforts in studying it. Researchers have examined the user satisfaction construct itself as a dependent variable and, consequently, as the object of many studies. Many have also considered it as a proxy measure for IS success and effectiveness in organizations (DeLone & McLean, 1992, 2003). However, its consequences have received relatively little attention in the literature.

The marketing literature has addressed consequences of satisfaction from the perspective of the individual and that of the organization. Individual effects have focused on consumers and how they react as a result of satisfaction or dissatisfaction. The most studied individual-level consequence has been behavioral intentions (e.g., Dabholkar, Shepherd, & Thorpe, 2000; Oliver, 1980; Oliver & Swan, 1989), which includes behavioral intentions that relate to complaining behavior (e.g., Nyer, 1999; Oliver, 1987; Szymanski & Henard, 2001), word of mouth (e.g., Curren & Folkes, 1987; Morgeson, 2011; Yi, 1989), repurchase intention, retention, and loyalty (e.g., Anderson & Sullivan, 1993; Newman & Werbel, 1973; Westlund et al., 2001). At the organizational level, the types of outcomes that researchers have discuss include market share (Fornell, 1992) and shareholder value (E. W. Anderson, Fornell, & Mazvancheryl, 2004). Oliver (2010) has argued that such outcomes are indirectly influenced by satisfaction through its impact on loyalty rather than directly.

Studies of outcomes of user satisfaction in the IS literature were far fewer and more limited in scope than those examining antecedents of user satisfaction. Except for concepts related to the "successful implementation of IS" as an outcome (Powers & Dickson, 1973), most of the stated direct outcomes of user satisfaction in the IS literature have been at the individual level. At the organizational level, studies of the link between user satisfaction and system use and impacts (net benefits) have also been few with most not declaring a causal direction between the variables. For example, Gelderman (1998) investigated the relationship between satisfaction of managers with their IS and the performance of their units. Using the EUCS measures, his results indicated a significant relationship between satisfaction and unit (organizational) performance but not a causal direction. Law and Ngai (2007) also investigated the correlation between user satisfaction with an ERP and organizational performance but likewise did not suggest a causal direction. Petter et al (2008), identifying a limited number of studies with mixed results, determined that the data on organizational outcomes was insufficient to draw conclusions about linkages to use and impacts.

The most studied consequence of user satisfaction has been system usage at the individual level. System usage (or system use intentions) as a concept has many manifestations in the IS literature; for example, as continuance intentions/ continued use, extended use, intention to use, and frequency of use/duration of use. In general, studies of the link between user satisfaction and use/use intentions have found moderate support for the relationship (DeLone & McLean, 1992; Petter et al., 2008). Borrowing from the marketing literature on loyalty (Anderson, 1973), Bhattacherjee (2001a, 2001b) posited continuance intentions as an outcome of satisfaction. In the case of a consumer relationship management system, users' level of satisfaction with their IS use was positively related to their intentions with satisfied users intending to continue their use of the system. Focusing on technology acceptance, early studies of system use such as Igbaria and Tan (1997) measured use as the number of computerized applications used by employees and number of business tasks the system was used for and found use to be related to user satisfaction. However, not all studies have found a positive link. For example, Sabherwal et al. (2006), in their meta-

analyses, did not find support for the impact of user satisfaction on use. Hsieh and Wang (2007) in their study of post-adoption use, found that, in the presence of perceived usefulness and ease of use, user satisfaction had no impact on extended use.

Researchers have also considered individual impact—"the effect of information on the behavior of the recipient"—as a key outcome of user satisfaction (DeLone & McLean, 1992). However, individual impact (or net benefits for individuals) has been difficult to define. For the most part, scholars have considered it to be closely related to individual performance; thus, an IS that helps to increase individual performance has had a positive impact. One can also interpret a positive impact in light of a better understanding of the decision context and improved decision making productivity (DeLone & McLean, 1992). Studies of individual impact as a consequence of user satisfaction have generally used various measures of work such as adapted measures of perceived usefulness or improved decision making quality performance (Davis, 1989; DeLone & McLean, 1992; Iivari, 2005; Petter et al., 2008; Rai et al., 2002). Several studies have suggested strong support for individual impact as an outcome of satisfaction (Petter et al., 2008). For example, some studies have shown user satisfaction to have a strong impact on work performance (Iivari, 2005, Rai et al., 2002). Igbaria and Tan (2007), operationalizing individual impact in terms of decision making quality, performance, productivity, and effectiveness of the job, also reported a significant direct effect for user satisfaction on individual impact and a small indirect effect via system use.

Far less frequently studied is the impact of satisfaction on cognitive aspects of a system such as perceived usefulness and ease of use as embodied in the technology acceptance model (Davis, 1989). Wixom and Todd (2005) reported that system satisfaction affects users' perception of ease of use and information satisfaction influences their perception of usefulness. This finding makes sense from the perspective that user satisfaction with a product (or consumption experience) as a whole may include interim judgments of satisfaction with single events (Oliver, 2010) or, in this case, with components or aspects of an IS that then give rise to revised cognitive beliefs about the IS (such as beliefs about ease of use and usefulness) and levels of satisfaction across stages of the IS use experience. For example, Lankton and Wilson (2007), in their study of multichannel service providers (e.g., healthcare services), investigated the effects of information-seeking needs and prior user satisfaction with online services on initial expectations, which they conceptualized in terms of expectations of usefulness, ease of use, and enjoyment. They concluded that prior service satisfaction and information-seeking need are significant predictors of user expectations.

Finally, Morgeson (2011) examined word-of-mouth recommendation and re-use intention (also referred to as retention) as outcomes of satisfaction in a study of user satisfaction with websites. They defined word-of-mouth intention as users' intention to speak positively about their experience with the website and recommend it to others and re-use intention as users' intentions to return to the website (Morgeson, 2011); the latter is similar to continuance intentions (Bhattacherjee, 2001a, 2001b). The results showed a strong relationship between user satisfaction and retention; satisfaction also directly and indirectly (through re-use intention) influenced word-of-mouth recommendation.

Table 2. Antecedents and Outcomes of User Satisfaction in IS Research[1]

Study	Antecedents	Outcomes
Powers & Dickson (1973)	N/A	Successful implementation of IS
Nolan & Seward (1974)	N/A	N/A
Debons et al. (1978)[3]	Timeliness, reliability, assistance, accuracy, access, communication, adequacy, environment, cost	N/A
Neumann & Segev (1980)[3]	Accuracy, recency, content, frequency	N/A
Alavi & Henderson (1981)	Supplemental decision aids	
Bailey & Pearson (1983)[3]	39 antecedents[2]	N/A
Ives et al. (1983)[3]	EDP staff and services, information product, vendor support, knowledge or involvement	N/A
Doll & Torkzadeh (1988)[3]	Content, accuracy, format, ease of use, timeliness	N/A
Igbaria & Nachman (1990)	Leadership style of IT managers, hardware and software accessibility and availability, user computer literacy, attitude, system utilization	N/A

Table 2. Antecedents and Outcomes of User Satisfaction in IS Research[1]

Joshi (1990)	Equity, information quality, users knowledge and involvement level, EDP staff and services	N/A
Joshi (1992)	Equity, role conflict, role ambiguity, information quality, users knowledge and involvement level, EDP staff and services	N/A
DeLone & McLean (1992)	Information quality, system quality	Individual impact
Szajna & Scamell (1993)	Unrealistic expectations	N/A
Henry & Stone (1994)	Computer self-efficacy and outcome expectancy	N/A
Suh et al. (1994)	Desired expectations	N/A
Etezadi-Amoli & Farhoomand (1996)	Documentation, ease of use, functionality of system, quality of output, support, and security	N/A
Palvia (1996)	Software adequacy, software maintenance, information content, information accuracy, information format, ease of use, timeliness, security and integrity, productivity, documentation, vendor support, training and education	N/A
Gelderman (1998)	Content, accuracy, format, ease of use, timeliness	N/A
Chin & Lee (2000)	Expectations disconfirmation, desires discrepancy	N/A
Mahmood et al. (2000)	Perceived usefulness, ease of use, user expectations, user experience, user skills, user involvement in the development, organizational support, perceived attitude of top management toward the project, user attitude toward IS	N/A
Szymanski & Hise (2000)	Online convenience, merchandising, site design, transaction security	N/A
Bhattacherjee (2001a)	Confirmation of expectation	Continuance intention
Bhattacherjee (2001b)	Expectation, confirmation of expectation	Continuance intention
McKinney et al. (2002)	Disconfirmation of expectations, information quality satisfaction, system quality satisfaction	N/A
Erevelles et al. (2003)	Expectation disconfirmation	N/A
Khalifa & Liu (2003)	Perceived performance, expectation disconfirmation, desire disconfirmation	N/A
Susarla et al. (2003)	Perceived provider performance, functional capability of ASP, disconfirmation of expectation	N/A
Wixom & Todd (2005)	Information quality, system quality	Usefulness, ease of use
Lankton & Wilson (2007)	Expectations	N/A
Nevo & Chan (2007)	Expectations disconfirmation, desires disconfirmation	N/A
Seddon & Kiew (1996)	Information quality, system quality, importance of the system	N/A
Morgeson (2011)	Organization, personalization, navigation, reliability	Retention, word of mouth
Lankton & McKnight (2012)	Expectations, disconfirmation, performance	Continuance intention
Brown et al. (2014)	Perceived usefulness (in conjunction with different theories of satisfaction)	N/A

[1] Papers are listed in chronological order.
[2] We refer interested readers to the paper in question for the complete list of used scales.
[3] These studies did not distinguish cognitive aspects (i.e., beliefs about characteristics of a system) from affective aspects (i.e., attitudes towards a system or towards using a system, such as satisfaction); however, later studies recognize many of these cognitive elements as antecedent to user satisfaction.

7 Conclusion and Suggestions for Future Research

In this paper, we show that IS research has generally used either an outcome-oriented or a process-oriented approach to examine user satisfaction. Outcome-oriented approaches focus on measuring satisfaction through its antecedents and are based on attribute satisfaction theoretical frameworks. Pprocess-oriented approaches focus on the process involved in satisfaction formation and explaining this process using a range of theories rooted in the psychology and marketing literature. In general, most theories associated with the process-oriented approach consider a cognitive gap between an individual's expectations, desires, needs, or wants and a cognitive standard or what the person perceives as a result of consumption. Even though process-oriented studies give a better understanding of satisfaction formation, they may not be the best approach in the study of user satisfaction. In part, one can argue that understanding how satisfaction is formed in individuals does not directly contribute to the IS field's core (Benbasat & Zmud, 2003). Further, employing process-oriented theories in studies that measure user satisfaction with an IS usually results in longer and more complicated data-collection processes due to the need to collect data for expectations and experience often over two points in time (Jiang, Klein, & Saunders, 2012). On the other hand, a focus on user satisfaction as an outcome and its determinants and consequences is important because it has potential to yield actionable insights. These insights can help organizations better achieve their goals in assuring the success of an IS project both in terms of user satisfaction and use and in terms of its impacts on the organization through the consequences of user satisfaction and use.

Our findings show that scholars have employed a large number of antecedents of user satisfaction across different studies. While some antecedents (e.g., information quality and system quality or their subsets) have appeared in quite a few studies, others (e.g., leadership style and documentation) have appeared in only a handful of studies. Despite having similar names, we also observed that the definition and operationalization of antecedents can vary significantly from one study to another. In some cases, also, it is not clear whether a term references one aspect of the IS or another. For example, the term "reliability" has different meanings for information quality versus system quality. This ambiguity in the research presents an opportunity for future research to clarify and document key antecedents related to user satisfaction along with their respective definitions, operationalizations, study contexts, and respondent profiles (e.g., managers vs. regular users) to provide more consistent reference sets of antecedents that others can use to inform future user satisfaction research and practice.

We also recommend that researchers examine user satisfaction scales that focus on detailed measures (e.g., Bailey & Pearson, 1983; Ives et al., 2003). In many cases, past studies have embedded cognitive aspects (i.e., beliefs about characteristics the system) in their user satisfaction instruments. This lack of separation in part muddied the early definitions and representations of user satisfaction (Etezadi-Amoli & Farhoomand, 1996; Galletta & Lederer, 1989; MeLone, 1990; Treacy, 1985). Later works, however, refocused and refined the user satisfaction construct to more clearly separate aspects of IS (e.g., Wixom & Todd, 2005; Xu et al. 2013). Despite the limitations, we recognize that these earlier works can provide invaluable insights into key elements that users consider when evaluating an IS and its components. As such, we highly recommend that future research consider these earlier studies when examining user satisfaction (and related concepts) at a detailed level.

Future research should further focus on the three major aspects of IS (i.e., information, system, and service quality) that DeLone and McLean (2003) suggest and the antecedents of each aspect. As we mention earlier, many scholarly works reference antecedents of user satisfaction that one could categorize under one of these major aspects. From an evaluative perspective, the results could provide useful insights for practice to be better able to manage user perceptions of IS quality and, in turn, influence user satisfaction. We also need research to develop more comprehensive models of user satisfaction that includes information quality, system quality, and service quality and their respective antecedents. We also recommend future research include satisfaction outcomes. These measures may take various forms such as global measures of satisfaction (e.g. "All things considered, I am satisfied/dissatisfied with the "'system'") (Chin et al., 2014), be conceptualized at a component level (e.g., information satisfaction, service satisfaction) (Wixom & Todd, 2005; Xu et al. 2013), or be derived from second-order constructs based on measures of attribute satisfaction. The results would provide a level of detailed insight into what comprises a users' affective evaluation of a system, which practitioners and researchers may find useful for determining meaningful actions. Including overall measures of satisfaction alongside more detailed measures would provide an even more comprehensive view of user satisfaction with an IS. For example, knowing that responsiveness of IS help services or level of completeness of the

information output are the key factors influencing a user satisfaction judgment can help managers pinpoint particular aspects of an IS information product or service to focus on for effective improvements.

User satisfaction's impact on post-adoption use is yet another under-researched area. For example, researchers have identified satisfaction as a key determinant of habitual use (Limayem, Hirt, & Cheung, 2007) and, hence, as stabilizing the use behavior. But, in the case of adapted use, interim judgments that lead to dissatisfaction with various aspects of an IS may disrupt the current use of a system (e.g., habitual use) and, thus, lead to changes in use. In this case, dissatisfaction and satisfaction may respectively play a key role in enabling changes in use and the subsequent stabilizing of such use at a new level of equilibrium (Tennant, 2014). Repeated evaluations of user satisfaction over time with major components of an IS, its antecedents, and its outcomes may also be useful for understanding the extent to which actions taken influence the antecedent variables and the stability of the satisfaction judgment (Mittal, Katrichis, & Kumar, 2001). Such studies may further shed light on how satisfaction impacts post-adoption use such as continued use, discontinued use, technology reinvention/adaptation, and performance (e.g., Bhattacherjee, 2001a, 2001b; Parthasarathy & Bhattacherjee, 1998; Tennant, 2014).

In this paper, we also show that we know little about how user satisfaction impacts outcomes at an organizational level. In marketing studies, factors such a customer loyalty often mediate these relationships; however, in IS research, those that attempt to explore the link assume a direct relationship between satisfaction at the individual level and outcome at an organizational level. Drawing on the approaches used in marketing research, we suggest that scholars pay attention to identifying factors that may bridge the gap between organizational-level and individual-level outcomes of user satisfaction.

In this study, we did not systematically document the different methodologies used in gathering and analyzing data pertaining to user satisfaction research. However, the most popular method for data gathering we observed was the survey questionnaire followed by lab experiments (e.g., Doll & Torkzadeh, 1988; Ives et al., 1983; Szajna & Scamell, 1993; Wixom & Todd, 2005). The most observed statistical methods used in analyzing data included variance analysis, factor analysis, structural equation modeling, mathematical modeling, and surface response analysis (Brown et al., 2014; Doll & Torkzadeh, 1988; Ives et al., 1983; Joshi, 1990; McKinney et al., 2002; Szajna & Scamell, 1993). We need further research to investigate the data-gathering and analysis methods used in user satisfaction research and to suggest the most appropriate and fruitful methodologies for different contexts.

From a methodological perspective, it may also be insightful to undertake longitudinal studies or event studies of the IS consumption cycle to provide better insights into how one may define user satisfaction and the impact of interim judgments of satisfaction on the final satisfaction outcome. Certainly, as far as we are aware, no other studies besides Wixom and Todd (2003) and Xu et al. (2013) have examined the impacts of interim judgments of user satisfaction on outcomes, and, indeed, none have looked at the impact of these component judgments on user satisfaction as a whole or its long-term impact over the life cycle of an information system.

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