User Satisfaction with Information Systems:

A Comprehensive Model of Attribute Satisfaction

A Dissertation

Presented to

The Faculty of the C.T. Bauer College of Business

University of Houston

In Partial Fulfillment

of the Requirements for the Degree

Doctor of Philosophy

By

Reza Vaezi

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ABSTRACT

Satisfaction with information systems (IS), as an indicator of IS success, has been the subject of many studies since the inception of the field. Understanding the basis on which users form their perceptions of satisfaction has been a key area of focus. Of the many factors that have been studied, it is suggested that information quality, system quality and service quality are three major antecedents of user satisfaction with an IS. However, most studies have included only one or two of these determinants in their user satisfaction models. Prior studies have also been mostly concerned with information quality and system quality with later studies focusing on or including service quality. Further, most studies focus on the evaluative processes (i.e. assessments of quality) that inform user satisfaction. Only a few consider the outcome of these evaluations (e.g. information satisfaction, system satisfaction) and their role in determining overall user satisfaction, where overall satisfaction represents a summary judgment of one's satisfaction with the individual aspects (or attributes) that make up the IS being evaluated. This is particularly important as satisfaction with aspects (or attributes) of an object or experience is considered a more direct and hence a more accurate predictor of overall satisfaction. This study therefore investigates the effects of three aspects of user satisfaction (i.e. information satisfaction, system satisfaction, and service satisfaction) on overall satisfaction with an IS.

To investigate overall user satisfaction with an IS, this study proposes an attribute-level model of satisfaction. This model suggests that overall user satisfaction is a summary outcome of user satisfaction with three key aspects – the information output, the technical system and the supporting services – associated with a specific information system. It further specifies that user satisfaction with each of these aspects is derived from user satisfaction with individual attributes

linked to each aspect (e.g. the accuracy, format and completeness of the information outputs received). The attribute-level model provides us with greater analytical and diagnostic capabilities compared to process models, which focus on the evaluative processes underlying satisfaction formation. By shifting the focus of investigation from process to outcomes (i.e. attribute-level satisfaction) this study also provides both practitioners and academics with an instrument to identify the IS attributes that are most important to overall user satisfaction.

To that end, this dissertation develops and validates a survey instrument to measure user satisfaction with IS following the proposed model. It tests the model and instrument using undergraduate students enrolled in a core business class at the University of Houston as subjects. Students' overall satisfaction as well as their satisfaction with key aspects and respective attributes of the PeopleSoft system currently in use at University of Houston is measured through the proposed model and instrument. The results of the statistical analyses confirm the validity and reliability of the model and instrument and provide further insights for future research.

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CHAPTER 1: INTRODUCTION

Motivation

Satisfaction with Information Systems (IS) has long been the subject of much research in the field of Management Information systems (MIS). It has mostly been used as a surrogate measure for information systems success (Khalifa and Liu 2003). User satisfaction research gained salience with the work of Bailey and Pearson (1983) and continued through works of Ives et al. (1983), Doll and Torkzadeh (1988). In their seminal work, DeLone and McLean (1992) provided a comprehensive model of variables that have been used to assess IS success and their relationships with one another. They proposed that system quality and information quality are key antecedents of user satisfaction. This work was one of the earliest to elaborate a model of user satisfaction that identified key aspects of an IS, and proposed that user perceptions about these aspects (and related attributes) impact satisfaction. However, despite the insights provided by this work, only a few studies have examined user perceptions about system and information aspects of an IS as key determinants of user satisfaction (e.g. McKinney et al. 2002; Nelson et al. 2005; Wixom and Todd 2005).

With the increasing use of information systems in organizations, the role of IT departments and information systems has changed from focusing on product delivery (i.e. IS as a product), to providing a service to the organization as well. With this change the attention of IT departments and Information Systems has broadened – thus quality of IT support (i.e. service quality) has also been recognized as a key aspect of an IS. Kettinger and Lee (1994) and Pitt et

al. (1995) were among the first scholars to focus on IS service quality as a surrogate for IS success and as an antecedent to user satisfaction with IS. They both borrowed the notion of service quality from the marketing literature and adapted the SERVQUAL model developed by Parasuraman et al. (1988) to the IS context.

Service quality as an antecedent of Information Systems satisfaction was later incorporated by DeLone and McLean (2003) in their updated model of IS success. Altogether, they proposed that service quality along with system quality and information quality are three major determinants of user satisfaction with Information Systems. However, studies that investigate all three dimensions of Information Systems in relation to user satisfaction, as proposed by DeLone and McLean are rare if not completely nonexistent.

There are two main approaches to the study of satisfaction. One approach is concerned with the processes that are involved in satisfaction formation and tries to understand underlying mechanisms that lead to the formation of satisfaction/dissatisfaction. The other approach looks at satisfaction as a summary outcome of a consumption experience and is less concerned with the processes involved in its formation (Yi 1989). Research on satisfaction mostly follows a process-oriented approach toward understanding satisfaction (Anderson and Sullivan 1993; Churchill and Suprenant 1982; Oliver 1980; Spreng and Olshavsky 1992). These focus on understanding the evaluative processes (e.g. assessments of quality) that inform satisfaction judgments. Likewise the majority of research studies of user satisfaction have tried to explain why users are satisfied or dissatisfied with an Information System, using process-oriented theories and frameworks borrowed from this stream of marketing and psychology literature (e.g. Bhattacherjee 2001b; McKinney et al. 2002; Nelson et al. 2005; Wixom and Todd 2005).

Even though the process-oriented approach theoretically covers the entire usage experience and provides useful insights into the formation of overall satisfaction, it is not suitable for studying products or services that are composed of many different features since it cannot explain the relative importance of satisfaction with each feature to overall satisfaction (Oliver 1993a). In order to better explain the relative importance of satisfaction with a product or service that is characterized by multiple attributes, a multi-attribute approach that evaluates satisfaction with each attribute and its contribution to overall satisfaction with the product or service is recommended (Mittal et al. 1998; Oliver 1993a). Such an approach identifies key aspects (or attributes) of an object (i.e. product or service) and seeks to assess satisfaction with each aspect and, their contribution to overall satisfaction.

In addition, prior research shows that process approaches that rely, for example, on evaluations of quality, are not always consistent when it comes to explaining overall satisfaction (Mittal et al. 1998; Wirtz and Bateson 1995). For example, it is quite feasible that one might evaluate the aspects of a product or service to be of high quality and yet not be satisfied with the product or service – this observation suggests there are other considerations that impact overall satisfaction which have not been considered in the research model. For example, a high quality evaluation may still not be close to one's desires, expectations, or other anchors of judgment and thus can still lead to dissatisfaction. The task of delineating key evaluation anchors and how they relate to the quality assessment in the formation of satisfaction becomes extremely problematic and cumbersome. Assessing satisfaction with the salient aspects (or attributes) of a product or service is a much more direct approach to understanding how global assessments of satisfaction are formed and is therefore likely to be more accurate in predicting overall satisfaction (than the summary assessments of quality emphasized in process-based models). To

explain better the relative importance of user satisfaction with detailed features of an Information System to overall satisfaction this study uses a multi-attribute approach in understanding user satisfaction. This study is the first in its kind to adopt such an orientation in the IS field.

There are several reasons indicating why multi-attribute models are useful in studies of consumer satisfaction, in general, and user satisfaction in the case of Information Systems. First, it is proposed that consumers tend to form satisfaction evaluations at an attribute level rather than the overall level (Gardial et al. 1994). Thus, it is more appropriate to measure satisfaction at both the overall and the attribute levels. Second, an attribute-level approach to satisfaction provides researchers with a higher level of detail and therefore a more diagnostically useful mechanism for understanding satisfaction compared to global assessments of satisfaction that follow a process-oriented approach focused on internal processes involved in forming satisfaction (LaTour and Peat 1979). Third, attribute-level modeling is capable of capturing mixed feelings toward a product or service. For example, a system user might be satisfied with some aspects of an IS and dissatisfied with others. This approach enables researchers to understand the relative importance of satisfaction with each attribute of an Information System in respect to overall satisfaction and at the same time, identify and observe the individual and integrated effects of these mixed feelings of satisfaction on overall satisfaction (Oliver 1993a). Finally, attribute-level modeling provides more insights for managers. In practice, one tends to take action at the attribute-level of an IS rather than the global level. Thus, practitioners usually aim to increase overall satisfaction by increasing satisfaction with attributes that are important for consumers in a product or service (Mittal et al. 1998). Therefore, knowing which Information System attributes are contributing more to overall user satisfaction can help IS managers and system

developers to focus on and improve the Information System features and services that matter the most to users.

As discussed, to date there is no comprehensive and yet parsimonious model of IS satisfaction that evaluates satisfaction with the three key aspects of an IS identified in the literature (DeLone & McLean, 2003) – that is, the *information* outputs, features of the technical *system* and *services* that support the IS. Such a framework will help both academics and practitioners to have a better understanding of Information System attributes and their relative importance in affecting user satisfaction perceptions.

This research will therefore address the following research question:

1- How does satisfaction with *information outputs*, the technical *system* and *service* contribute to overall user satisfaction?

2- How does satisfaction with attributes of *information outputs* contribute to information satisfaction?

3- How does satisfaction with attributes of a (technical) *system* contribute to system satisfaction?

4- How does satisfaction with attributes of *service* contribute to service satisfaction?

5- Is the overall user satisfaction with an Information System a function of user satisfaction with its aspects?

To investigate overall user satisfaction with an IS, this study proposes an attribute-level model of satisfaction. This model suggests that overall user satisfaction is a summary outcome of user satisfaction with three aspects – the information output, the technical system and the

supporting services associated with a specific Information System. It further specifies that user satisfaction with each of these aspects is derived from user satisfaction with individual attributes linked to each aspect (e.g. the accuracy, format and completeness of the information outputs received).

This research is the first effort to address Information Systems satisfaction in such a holistic way. Further, most studies focus on the evaluative processes (i.e. assessments of quality) that inform user satisfaction. Only a few consider the outcome of these evaluations (e.g. information satisfaction, system satisfaction) and their role in determining overall user satisfaction, where overall satisfaction represents a summary judgment of one's satisfaction with the individual aspects (or attributes) that make up the IS being evaluated. This is particularly important as satisfaction with aspects (or attributes) of an object or experience has been considered a more direct and hence a more consistent predictor of overall satisfaction. This research will therefore address an important gap in Information Systems user satisfaction research by examining user satisfaction from the perspective of a multi-attribute model that considers the impact of information satisfaction, systems satisfaction and service satisfaction (and their related attributes) on user satisfaction. The attribute-level model provides greater analytical and diagnostic capabilities compared to process models, which focus on the evaluative processes underlying satisfaction formation. By shifting the focus of investigation from process to outcomes (i.e. attribute-level satisfaction) this study also provides both practitioners and academics with an instrument to identify the IS attributes that are most important to overall user satisfaction.

Scope

Consumer satisfaction is a central concept in the marketing literature and revolves around keeping consumers satisfied for the ultimate goal of gaining profit (Yi 1989). Due to its importance for organizations and businesses, many scholars have been actively studying consumer satisfaction, its drivers, and its consequences over the last four decades. There have been many studies in the marketing literature addressing various consequences of consumer satisfaction for individuals such as complaining behavior and repurchase intentions and for organizations such as increased profits and consumer loyalty (e.g. Anderson and Sullivan 1993; Curren and Folkes 1987; Nyer 1999; Oliver 1980; Oliver and Swan 1989; Richins 1983).

There are also many scholarly works in the field of Information Systems that investigate the consequences of user satisfaction for organizations and users such as perceived usefulness and continued use (Bhattacherjee 2001b; Dabholkar et al. 2000; Khalifa and Liu 2003; Morgeson et al. 2011; Wixom and Todd 2005). These findings point to the centrality of the user satisfaction concepts for IS use and IS success. There are also many studies focusing on the antecedents of satisfaction, in particular the processes involved in forming consumer satisfaction in the marketing and IS literature (e.g. Hom et al. 1999; Khalifa and Liu 2003; Mano and Oliver 1993; Nevo and Chan 2007; Oliver 1980; Spreng et al. 1996; Spreng and Olshavsky 1992).

As stated earlier few studies take an outcome-oriented view of satisfaction, which suggests that satisfaction with attributes informs overall satisfaction. This study adopts an outcome-oriented view of satisfaction toward the study of user satisfaction with Information Systems. The research model is not concerned with process-oriented antecedents of user satisfaction. Instead, the focus is on the satisfaction judgments that arise from the evaluative processes that precede satisfaction formation. The proposed model therefore suggests that

overall satisfaction with an Information System is derived from satisfaction with three major aspects of an IS, namely information output, (technical) system and support services. These in turn derive from satisfaction with their associated attributes, for example, information accuracy, system reliability, and the responsiveness of support services. Each judgment of satisfaction whether overall satisfaction, satisfaction with an IS aspect (e.g. information satisfaction) or attribute-level satisfaction (e.g. satisfaction with the completeness of the information outputs received) may be viewed as an *outcome* of their respective evaluative processes. This study therefore adopts an outcome-oriented view of satisfaction; it focuses on attribute-level satisfaction and suggests that overall satisfaction is an aggregate function of other satisfaction judgments, that is, attribute-level satisfaction (Busacca and Padula 2005; Mittal et al. 1998; Oliver 1993a; Wirtz and Bateson 1995).

Research Design

To determine the relative importance of satisfaction with different Information System aspects (i.e. information, system and service) and their respective attributes to overall satisfaction with the IS, a model is developed that looks at satisfaction with information attributes, system attributes and service attributes. Prior research identifies several attributes of an IS that are important to users. These include: (i) information attributes, such as the accuracy, content and understandability of the information outputs received (McKinney et al. 2002; Wixom and Todd 1995); (ii) system attributes such as system reliability, availability and response time (DeLone and McLean 2003; Wixom and Todd 1995) and; (iii) service attributes such as empathy, responsiveness and assurance (Kettinger and Lee 1994). To determine which attributes would be included in the research model, an extensive literature review was conducted and a

comprehensive list of attributes associated with each of the IS aspects was created. The list also included definitions for each aspect and the measures used, where available.

The list of attributes was reviewed; duplicates and overlapping constructs were removed and a short-list created of those attributes that were identified in the literature review as important to users. Each attribute was defined based on the literature, and care taken to ensure that the definitions (and hence the constructs) did not overlap. Based on the construct definitions, the measures that were available were reviewed and existing measures used where appropriate. All constructs were assessed using multiple indicators; if the existing measures were not adequate (e.g. this study used at least four indicators for each construct) new items were created. In some cases, where there were no appropriate instruments available items were developed to capture these constructs. A team of three researchers then carefully reviewed all the item measures. . Likewise, the definitions and measures for overall satisfaction as well as information satisfaction, system satisfaction and, service satisfaction were also determined based on prior research (Chin & Lee, 2000; Oliver, 1980; Wixom & Todd, 1995). A survey questionnaire was then created and distributed to 20 undergraduate students enrolled at the University of Houston. In this instrument pretest, students were asked to consider their satisfaction with different aspects of an Information System that is primarily used to enroll in classes and pay their tuition and fees, as well as their overall satisfaction with the IS. They were also asked to provide feedback on the readability and understandability of the survey and the accompanying instructions. Their feedback was then used to improve the questions and the readability of the survey.

Next, a pilot test of the survey was conducted with 48 students. The results of pilot test analysis were used to refine the research instrument further. Finally, the main survey was

conducted; data was collected in two studies. Data for Study One was collected in the fall

semester across three phases separated temporally; a total of 368 subjects participated in all the

phases of study. Data for Study Two was collected in one phase in the following spring semester

and resulted in 432 usable responses. In both studies, only those responses received from

subjects who have has a service encounter associated with the IS were used in the main study for

testing the proposed model. Further description of the study design and details of the outcomes

of the two studies and their implications for research and practice are provided.

Dissertation outline

This dissertation is composed of five chapters and five appendixes. Chapter 1 has

presented the motivation for the study and study objectives, scope of the study, overview of the

research design, and dissertation outline. Chapter 2 provides a comprehensive review of the

consumer satisfaction literature in marketing and the user satisfaction literature in the

Information Systems field. Chapter 3 reviews the research model and its development process

and discusses the research method used to test the model. Chapter 4 presents the data analyses

and detailed findings for the group of subjects with service encounter experience. Chapter 5

provides a summary of findings and discusses the research contribution to academics and its

implications for practitioners. Study limitations and suggestions for future research are also

presented in this chapter.

This dissertation also contains five appendixes. Appendix A outlines the ideal literature

search procedure that was proposed for this dissertation. However, due to the lack of resources,

especially the time limit and human resources required, the primary researcher followed the steps

as outlined but did not do those procedures that required the help of additional research assistants

and researchers. Appendix B provides the survey questionnaires used for the pilot study.

Appendix C contains the improved and shortened questionnaire used in the main data collection. Appendix D provides all the same type of analyses (figures and tables) reported in Chapter 4 for the total population of subjects including both groups, that is, those with and without service encounter experience. Appendix E provides the same kind of analyses that were presented in Chapter 4 and Appendix D for subjects that participated in both studies but did not have prior service encounter experience.

CHAPTER 2: LITERATURE REVIEW

Definitions of Satisfaction and Consumer Satisfaction

Satisfaction

What makes satisfaction an important subject to study is its critical role in human well-being. According to the need-satisfaction model (Maslow 1943), satisfaction plays an important part in human motivation and life achievements. However, despite the importance of satisfaction, no univocal definition of satisfaction exists in the literature (Szymanski and Henard 2001). The presence of different definitions for satisfaction makes measurement of satisfaction a confusing process. Little agreement in the literature exists on the nature of satisfaction, whether it is an affective or cognitive construct or a combination of both.

Oliver (e.g. Oliver 1980; Oliver 1981; Oliver 1989; Oliver and Bearden 1983; Oliver and DeSarbo 1988) has extensively researched satisfaction and its antecedents. According to his view, satisfaction is a type of emotion. He believes that emotions of happiness, enjoyment and pleasure relate closely to satisfaction and dissatisfaction is related to negative affect and surprise. In short, satisfaction relates to pleasurable emotions (relaxation, contentment, delight, excitement, etc.) and dissatisfaction relates to unpleasant emotions such as disappointment, sadness, discomfort and angry feelings (Oliver 1981; Oliver 1993a). Satisfaction as an emotion is also endorsed by Westbrook et al. (1978) which considered satisfaction as an aggregate feeling about the main aspects of the consumption experience. Furthermore, Arnold et al. (2002)

believed that satisfaction might be equivalent to emotions of contentment, pleasure, delight, relief and ambivalence. However, for the majority of research studies even though satisfaction is defined as a feeling it is measured through cognitive processes or a combination of affective and cognitive antecedents (Yi 1989).

Consumer Satisfaction

Consumer satisfaction (CS) definitions either focus on the process of satisfaction or consider satisfaction as a result of the consumption process. CS as a process is defined by Tse and Wilton (1988, p. 204) as "the 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." Hunt (1977, p. 459) also offered an evaluative and process oriented definition of satisfaction. He believed consumer satisfaction is "an evaluation rendered that the consumption experience was at least as good as it was supposed to be." Process-oriented definitions of consumer satisfaction suggest that an evaluative process is a critical factor in forming satisfaction.

On the other hand, some scholars believe consumer satisfaction is an outcome of consumption experience. Oliver (1981, p. 27) stated that consumer satisfaction is "the summary psychological state resulting when the emotion surrounding disconfirmed expectations is coupled with the consumer's prior feelings about the consumption experience". Westbrook and Reilly (1983) believed that process-oriented definitions of satisfaction are unable to define the nature of satisfaction per se, and suggested an initial outcome evaluation that leads to a state of satisfaction or dissatisfaction. In order to recognize the unique nature of satisfaction, Westbrook and Reilly (1983, p. 256) defined CS 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."

According to Yi (1989) process-oriented definitions of consumer satisfaction are useful in that they cover the whole consumption experience and focus on important processes that may lead to satisfaction. These conceptualizations of consumer satisfaction should help us to create distinctive measures to capture unique aspects of each stage involved in the satisfaction process. Process-oriented definitions have been adopted by many scholars and seem to shed light on the perceptual, evaluative, and psychological processes that interact to generate consumer satisfaction.

Theories of Satisfaction

In order to understand better, the factors affecting consumer satisfaction and the results of these interactive processes in this section we will review underlying theories that have been used in different studies to explain consumer satisfaction, its determinants and outcomes.

Contrast Theory

Contrast theory situates consumer satisfaction as the 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 higher than the actual performance if their initial expectations were lower than the objective performance and vice versa. Conversely, consumers will evaluate a product performance lower than the 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 and reduced through negative disconfirmation. Disconfirmation is defined as the difference between performance and expectations. Thus, positive disconfirmation occurs when performance exceeds expectation and negative disconfirmation when performance falls below expectations.

Cardozo (1965) created expectations of high and low quality in subjects by presenting them catalogues containing different quality ballpoint pens. Following that, the subjects were presented with the actual pen. Those who had formed the expectations in accord with the pens' actual quality evaluated the product performance higher than those who formed expectations that were higher than the objective quality. In other words, when the expectations were negatively disconfirmed, the pens' qualities were perceived lower than when expectations were confirmed. Even though the Cardozo results are consistent with contrast theory, the research failed to include a comparison with a control group without expectations. Also, the study failed to examine the positively disconfirmed effects on perceived quality. These shortcomings weaken the support for a contrast effect. According to Yi (1989), there might be some moderating variables – such as effort to obtain the product and imperfect product quality judgment - that could be useful in determining if the contrast effect actually exists and to what extent.

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 out of the acceptance zone, then a contrast

effect will happen and the consumer magnifies the difference between product performance and prior expectations (Anderson 1973). Based on this theory promotional messages should overstate the product performance and quality just a bit so that the disconfirmation falls in the acceptance zone and causes an assimilation effect, which returns higher product ratings.

Anderson (1973) compared four underlying theories for consumer satisfaction and found that assimilation-contrast theory best describes the satisfaction behavior among other theories. He found that consumers' product satisfaction is assimilated toward expectations when the disconfirmation of expectation is small enough to fall into the acceptance zone. In his study, he successfully used a no-expectancy and an accurate expectancy group as control groups. However, it is hard to pinpoint the magnitude of disconfirmation that is needed for contrast effect to take place. Anderson could not find any contrast effect. He reasoned that this might be because he could not create consumer expectations that were high enough for the disconfirmation to fall out of the assimilation zone. The assimilation zone may also differ greatly from one person to another depending on the personality traits and product involvement. In short, people who are highly involved with a product tend to have larger acceptance zone than those who are less involved.

Olshavsky and Miller (1972) examined both the understatement and overstatement of product quality effects on product ratings. They found assimilation effects for the smaller discrepancies. In short, they found that product quality overstatement leads to better performance ratings and understatement of quality leads to less favorable ratings when the subject is presented with the product. Even though they used consistency models from cognitive dissonance theory in developing their hypotheses, they acknowledged that the theoretical concept of assimilation and contrast is a better alternative in explaining their results.

Dissonance Theory

According to 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 or the old belief, or maybe both, to make them more consonant in order to cope with the mental discomfort that is created by the presentation of the new fact. Based on this theory, in the context of product and service evaluation when an expectation does not match the product performance or service quality, individuals may try to reduce the psychological tension that gets created because of the existing disparity between expectation and performance or quality (Yi 1989).

In order to demonstrate that dissonance occurs because of disconfirmation there needs to be: 1) strong conviction or desire, 2) public and irreversible commitment to a product or service, 3) grounds for explicit disconfirmation, and 4) the actual occurrence of disconfirmation (Festinger 1957). Even though there have been studies that provides support for the dissonance theory (e.g., Olshavsky and Miller 1972; Olson and Dover 1979), it is difficult to assume that all these conditions can be met in a typical experiment where inconsequential expectations are created through product or service information (Yi 1989).

Expectation-Disconfirmation Theory

According to many studies that used the expectation-disconfirmation model to explain consumer satisfaction (e.g.Oliver 1977; Oliver 1979; Olson and Dover 1979; Swan and Trawick 1981; Weaver and Brickman 1974), consumers compare product performance with their expectations to judge satisfaction with a product. If the performance turns out to be above the prior expectation (positive discrepancy) then consumers would be more satisfied with the product. However, if performance is below the prior expectation (negative discrepancy) then consumers would be less satisfied or dissatisfied with the product. In short, in the expectation-

disconfirmation paradigm, satisfaction is seen as a function of expectation and disconfirmation when expectations are being used as a standard of comparison.

Expectation-disconfirmation model is further supported by adaptation level theory which suggested that individuals interpret stimuli in light of an adapted standard (Helson 1964). The standard (or benchmark) against which performance is judged is a function of the individual's perception, the context and the nature of the stimulus. Once this standard is formed, it will guide succeeding evaluations. Thus, the positive and negative deviations from the standard depend solely on the individual's adapted levels and are different from one person to another. Expectations about the product performance will act as the adapted standard against which the real performance will be compared.

Oliver (1980) believes that disconfirmation is positively related to consumer satisfaction. He states that positive disconfirmation (performance above the expectations) increased consumer satisfaction while negative disconfirmation (performance below the expectations) decreased consumer satisfaction with products.

LaTour and Peat (1979) criticize the expectation-disconfirmation paradigm because it assumes only predictive expectations that are situationally created through advertising, text reports, or unspecified sources, would affect consumer satisfaction. This assumption clearly ignores other resources that may affect consumer satisfaction such as word of mouth and consumers' past experience with similar products.

Comparison Level Theory

According to Thibaut and Kelley (1959), consumer satisfaction with a purchase would be determined based on the discrepancy between the actual outcome and a standard comparison

level. 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. The comparison level itself is said to be determined by many salient factors that may affect the consumers' experience such as word of mouth and consumers' past experience with similar outcomes.

To address shortcomings regarding the source of the expectation in expectation-disconfirmation paradigm LaTour and Peat (1979) employed a modified version of the comparison level theory in a consumer satisfaction study. They argued in favor of three factors that determine the comparison level of a product: (1) similar product experience; (2) situationally produced expectation (e.g. advertisement, promotional offer, etc.); and (3) other consumers' experience with the product that may serve as a reference point. Conducting a field study, they found that situationally induced expectations, that were the focus of the majority of research in the expectation-disconfirmation paradigm, had little impact on consumer satisfaction compared to consumers' past experience with similar products.

Furthermore, Swan and Martin (1981) tested both predictive and comparison level expectations in a study of automobile satisfaction. They found that satisfaction with a car was not related to predictive expectations that were created through advertising but to the disconfirmation of comparison level created through factors suggested by LaTour and Peat (1979).

Equity Theory

Equity theory indicates that people compare the ratio of outcomes to the inputs and effort they invested in outcomes with those of others that they know (e.g. Adams 1963; Walster et al. 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. The equity theory has been applied to the study of consumer satisfaction by many scholars (e.g. Hess and Hightower 2002; Oliver and DeSarbo 1988; Oliver and Swan 1989; Patterson et al. 1997; Swan 1982).

Fisk and Young (1985) employed equity theory in the context of 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 results in dissatisfaction and reduces the intention to repurchase the service. However, the results were only valid for inexperienced subjects. The subjects that have had prior experience with air travel seemed to be less sensitive to the manipulations. Joshi (1990) examined 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 inclusion of equity improved the predictive power of the model and the equity itself turned out to be the most related construct to users' information satisfaction.

Norms as Comparison Standards

According to Yi (1989), many researchers have suggested the use of norms as a comparison standard. Even though these researchers used different terminologies for its proposed standards, they all refer to what "should be" the performance or quality of a product while the predictive expectation that has been used in the majority of consumer satisfaction research refers to what "will be" the product performance or quality.

Experience-based norms were used by Woodruff et al. (1983) 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 the focal brand only. They reasoned that a consumer's idea of the focal brand and what it "should be" is a collection of experience one has had with the same brand, similar brands, or even a whole class of competing and substitute products. Cadotte et al. (1987) tested the proposed model and confirmed that comparison standards are based on consumers' total experience with the focal brand and its related brands and products.

Sirgy (1984) argues 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 additive would affect consumer satisfaction. These findings suggest that what consumers believe a product performance "should be" had a great effect on their satisfaction with the product.

Swan et al. (1982) investigated the desired (should be) versus predictive (will be) expectation effects on consumer satisfaction. The study was conducted in a restaurant context where customers filled out a self-administered questionnaire. The restaurant was described as superior in food and service to fast foods but not as good as a fancy restaurant. The first part of the questionnaire asked customers to rate what they expect (predictive) and what they want (desired) before they taste the food and observe the service. The second part asked customers to evaluate their experience with the food and service. The results of the study show that satisfaction was at its highest level when there was a positive discrepancy between desired expectation and the actual quality of food and service.

Value-Percept Disparity Theory

Value-percept disparity has been used as an alternative to the expectation-confirmation model and can be categorized under the norm-based theory, discussed above (Yi 1989). Westbrook and Reilly (1983) stated that the expectation-confirmation model is incapable of differentiating between cognitive and evaluative notions. What is expected from a product might be different from what is desired or valued in a product. For example, it might be expected that a product breaks down after a certain time but product failures are not desirable or valued, no matter if they are expected or not. Thus, values are expected 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) have tested the value-percept disparity model against the expectation-confirmation model and found that none of the models were sufficient on their own to explain consumer satisfaction. They defined value-percept disparity as the extent to which the product performance and characteristics match consumers' needs and desires. They asked each participant to list what they wanted or needed to see in a product and then measured the value-percept disparity using a 7-point Likert scale anchored with "provides far less than my needs" and "provides exactly what I need". Despite their theory, they found that disconfirmation of expectation had stronger effects on satisfaction than desires disparity. However, their results were not conclusive since they only used one single indicator to measure value-percept disparity.

Hypothesis Testing Theory

Hypothesis testing theory is essentially very similar to dissonance theory. It is a purely cognitive approach to satisfaction testing. It indicates that consumers tend to form hypotheses around the product performance and would like to see them confirmed (Yi, 1989). It suggests that advertising would affect consumers in two interactive steps. First, it arouses a weak expectation in individuals. The weak nature of expectations is due to recognition of probable bias in advertising by individuals. Second, people tend to confirm their expectations upon exposure to the actual product. The theory predicts that inferences from the objective evaluation of products, in the presence of relevant advertising, are more consistent with the values and expectations asserted and implied by the advertising. In other words consumers tend to confirm their expectations where they exist (Deighton 1984).

Generalized Negativity Theory

Based on the generalized negativity theory any disconfirmation of expectation, whether positive or negative, will be perceived as less pleasant than a confirmation of expectations (Carlsmith and Aronson 1963). This theory states that disconfirmation of expectation results in a hedonic negative state in individuals. 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 the time when they have no specific expectations. Both positive and negative deviations from expectations lower the 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, the theory was supported. In short, hedonic reactions as hypothesized by

generalized negativity theory appeared to hold true only under certain conditions, which can result in strong expectations.

Summary

We can identify a direct or indirect comparison mechanism in all of the theories that have been used in the studies of consumer satisfaction to date. However, the nature and the standard of comparison differ from one theory to another. In contrast, theory and assimilation-contrast theory, satisfaction is determined based on the comparison between consumer expectations and perceived performance. The expectation-disconfirmation paradigm uses adaptation level theory to explain adaptation of a comparison level by consumers that is used in satisfaction judgments. Comparison level theory tries to provide a clearer picture of how different factors influence standard comparison level formation in individuals and views satisfaction as determined by the discrepancy between actual outcome and the standard comparison level. Norms as a comparison standard and value-percept theory both identify new comparison standards that have not been typically used in measuring consumer satisfaction in prior research, compared with standards such as desires, needs, and ideals. These theories suggest that satisfaction is influenced more by the incongruence between desires, needs, wants and ideals, and actual outcome than the discrepancy between expectation and performance. Hypothesis testing theory states that individuals tend to form hypotheses regarding the outcomes of certain purchases, and would like to see their hypotheses confirmed. They compare the outcomes to their hypothesis. Generalized negativity theory is also based on the comparison between expectation and performance. However, it states that any disconfirmation of expectation will result in dissatisfaction or disconfirmation.

Dissonance theory does not directly try to define and measure satisfaction but it implies that when expectations are disconfirmed a feeling of discomfort will arise that leads to dissatisfaction. Consumers tend to adjust their expectations or perception of performance in order to decrease this discrepancy and feel more consonant and satisfied. Even though the comparison mechanism does not directly influence satisfaction in this theory, it is a part of dissonance formation, which will affect satisfaction. Equity theory also uses a comparison mechanism but of a different nature. The comparison in equity theory is made up of two ratios. It is the comparison between ratios of outcomes to inputs for self and inputs for others, which results in a perception of fairness. This perception of fairness would then affect satisfaction levels.

Antecedents of Consumer Satisfaction

Factors affecting consumer satisfaction are of critical importance to researchers. It is important to recognize and discuss major determinants of satisfaction to be able to have a better understanding of the phenomenon. Since the beginning of the consumer satisfaction research many factors have been investigated as determinants of satisfaction including but not limited to perceived performance (e.g. Churchill and Surprenant 1982; Khalifa and Liu 2003; Spreng and Olshavsky 1992; Szymanski and Henard 2001), expectations and disconfirmation (e.g. Fornell et al. 1996; McKinney et al. 2002; Oliver 1980; Spreng and Mackoy 1996; Spreng and Olshavsky 1993), desires and desires' disconfirmation (e.g. Khalifa and Liu 2003; Spreng et al. 1996; Spreng and Mackoy 1996; Spreng and Olshavsky 1992) , experience (e.g. Brown et al. 2007; Hom et al. 1999; Irving and Meyer 1994), affect (e.g. Mano and Oliver 1993; Oliver and Rust 1997; Szymanski and Henard 2001; Westbrook and Oliver 1991), equity and fairness (e.g. Fisk and Young 1985; Joshi 1990; Oliver and Swan 1989; Patterson et al. 1997), service quality (e.g.

Ekinci and Sirakaya 2004; Lee et al. 2000; Spreng and Mackoy 1996; Woodside et al. 1989), perceived value (Fornell et al. 1996; Westlund et al. 2001), and attitude (Yi 1989).

In the following pages we will provide a detailed description of each antecedent and how it relates to satisfaction with the exception of attitude that was only briefly mentioned in the Yi (1989)'s review article but no prior study was found that empirically investigates the direct effects of attitude on satisfaction.

Expectation

It is believed that expectations as anticipations have a direct influence on satisfaction levels. This influence is in the absence of any direct comparison to actual performance of outcome of consumption and is formed completely before the consumption experience (e.g. LaTour and Peat 1980; Oliver and DeSarbo 1988; Yi 1989). Expectations are found to have mixed effects on satisfaction (Yi 1989). Some studies have found that expectation directly affects consumer satisfaction (e.g. Bearden and Teel 1983; Oliver 1980; Oliver and Linda 1981) while others could not confirm the effects of expectations on consumer satisfaction (e.g. Oliver and Bearden 1983). Churchill and Surprenant (1982) found that expectations would directly affect satisfaction when the object of performance evaluation is a non-durable product but when it comes to durable products expectations have been found to have no relationship with consumer satisfaction.

According to Spreng and Olshavsky (1992) there are widespread disagreements among scholars about the definition and operationalization of expectation. Some scholars look at the expectation as a belief about the future (e.g. Bearden and Teel 1983; Olson and Dover 1979; Westbrook 1987). Others used expectation to refer to customer's wants or needs (e.g.

Parasuraman et al. 1988) while some others included evaluation of beliefs about the future in the definition of expectation (e.g. Oliver 1980; Tse and Wilton 1988).

Spreng et al. (1996) lists different definitions in use for expectations in the marketing literature. According to them, some view expectations as the probability of occurrence of some event (e.g. Westbrook 1987; Westbrook and Reilly 1983), while others add an evaluation of goodness or badness of events to the probability of occurrence (e.g. Churchill and Surprenant 1982). To further clarify, Oliver (1981) states that expectations have two aspects. One is the likelihood of occurrence, for example the probability of having a clerk waiting on consumers in a bank. The other is the evaluation of the occurrence (how desirable, good or bad, the clerk will do his job). However, the second part has roots in personal preferences, which arise from desires and needs that are different in individuals. Thus to avoid confusion of "predictive" expectation with evaluations we need to have a separate construct that taps into the evaluative processes (as in desires). Also, expectations tend to be future oriented and malleable while desires are oriented towards the present and are relatively stable (Spreng et al. 1996).

Parasuraman et al. (1988) believe that expectation carries a different meaning in the literature addressing service quality compared to the consumer satisfaction literature. In the satisfaction literature, expectations are mostly viewed as predictions about what is likely to happen during or after the use of the goods. In other words, expectations are believed to be "consumer defined probabilities of occurrence of positive and negative events if the consumer engages in some behavior (Oliver 1981, p. 33)". On the other hand, when it comes to service quality, expectations are defined as desires, needs, or wants of consumers. Expectations are what consumers think a service provider "should" offer rather than "would" offer.

Desire

Unlike expectations that are predictive and usually stimulated in consumers by manufacturers and service providers, desire is stemmed from consumers' needs and wants. Desire refers to what consumers would like to happen rather that what they think will happen (e.g. Nevo and Chan 2007; Parasuraman et al. 1988).

Spreng et al. (1996) suggest that due to its nature, desire can be conceptualized at various levels of abstractions; hence, there are different definitions of desire in the literature. At the most abstract level, desire can be defined as basic and fundamental needs whereas at higher levels of abstraction, desire can be defined 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 for certain product attributes such as, infant safe products. Therefore, desire can be an abstract end-state such as the desire to provide safety for one's family, intermediate benefits such as means to keep one's family away from harm, or concrete means of achieving those benefits such as buying a product that follows specific standards to make it safe for infants and toddlers.

Spreng et al. (1996) also suggest that desire should be defined at concrete levels such as product attributes or benefits that a consumer assumes will lead to or are associated with his or her higher-level values and desires. Individuals tend to, either explicitly or implicitly, evaluate how product attributes will lead to attainment of their end-state desires and judge a product performance by the extent to which the product helps them to achieve their basic values (Spreng et al. 1996; Spreng and Olshavsky 1992; Spreng and Olshavsky 1993). Wirtz and Mattila (2001) adopted a definition of desire developed by Spreng et al (1996) , in which they assume that

needs, wants, desires and value all represent the same construct, which can be called *'desired expectations'*.

Khalifa and Liu (2003) used the Gutman (1982) means-end theory to define desires. According to means-end theory, desires are formed based on inner emotional needs or wants rather than realistic prediction of actual performance. They argued that the speed of innovation and novelty inherent in the IT industry hinders formation of concrete expectations and thus desires would be more salient determinants of satisfaction because their formation is less dependent on past experience and knowledge.

Nevo and Chan (2007) defined desire by contrasting it with expectation. To them desire represents what people would like to happen as opposed to what will happen. Investigating an organizational knowledge management system, they found that desire is formed based on what a knowledge management system (KMS) is and how it benefits the organization. Users' mostly desired a KMS to be able to address fully the business needs that led to the purchase and implementation of the system. On the other hand, expectations were formed mostly through the past experience with similar systems or through promises made by the vendor.

Experience

Despite its intuitive importance, experience is mostly used in job satisfaction studies and is posited as a major determinant of job satisfaction (e.g. Hom et al. 1999; Irving and Meyer 1994). In this view, actual job experience is believed to have a direct and strong effect on future job satisfaction and its outcomes such as turnover intentions and counterproductive work behaviors. However, recent studies found that prior expectations are inconsequential in determining the ultimate satisfaction; rather it is the daily experience of the job that directly

influences the satisfaction outcome (Brown et al. 2007). It is also argued that the recency effect –

the mental characteristic to recall recent events in a more salient way – is the underlying reason

behind the role of experience in the satisfaction process. Hom et al. (1999) believe that direct

experience would have a stronger effect on satisfaction than expectations created through

realistic job previews.

Parasuraman et al. (1985) used past experience as a predictor of service expectations

which would influence service quality perceptions in turn. Zeithaml et al. (1993) posited past

experience as an antecedent of both predicted expectation and desired expectation. However,

both studies are theoretical ones and no empirical study has been found that has investigated the

direct effects of past experience on either expectation formation or satisfaction. On the other

hand, studying satisfaction with an Information System, Brown et al. (2007) found that ease of

use and usefulness that derived from the actual experience would affect Information Systems

users more than ease of use and usefulness expectations.

Affect

Yi (1989) calls for the examination of the possibility that formation of satisfaction is not

completely a cognitive evaluation process and includes some affective aspects. So far affective

aspects of satisfaction have been the subject of little research studies (e.g. Mano and Oliver

1993; Westbrook and Oliver 1991). Studies of this kind elaborate the dimensionality of the

satisfaction and focus on the role of affect in shaping satisfaction (Szymanski and Henard 2001).

Affect, in consumption emotions, is defined as "set of emotional responses elicited specifically

during the product usage or consumption experience" (Westbrook and Oliver 1991, p. 85).

These emotions can be described either as expressions such as joy, anger, and fear or categories

such as pleasant/unpleasant, relaxation/stress, or calmness/excitement. According to Westbrook

and Oliver (1991) affective experience is distinguished from mood in that mood is not as severe, urgent, motivational and situationally specific as affective responses to consumption experience. Based on this model emotions elaborated during consumption would leave an affective trace in memory which will be available to consumers when they are forming satisfaction perceptions.

Mano and Oliver (1993), drawing on a large body of literature on affect, stated that emotions can be explained in terms of two general dimensions (pleasantness-unpleasantness and arousal-quietness or positive and negative affectivity) that create a circular configuration known as circumplex. They mentioned that the previous studies mostly focused on the negative feelings and have failed to take, both dimensions into account completely. Oliver et al (1997) modified the affective framework developed by Mano and Oliver (1993) to study customer delight and satisfaction, with delight being the ultimate satisfaction level. They modeled arousal and positive affect as predictors of satisfaction with arousal effects being moderated by positive affect.

Equity

Early studies that applied equity theory to consumer satisfaction research were concerned about the effects of perception of equity and inequity of a specific transaction on subsequent consumer satisfaction and dissatisfaction (Fisk and Young 1985). According to Oliver and Desarbo (1988), consumers are able to assume inputs and outcomes for themselves and merchants and form a judgment based on the comparison between their own input/outcomes ratio and that of merchants. They hypothesized and found that (p. 496) "when inputs are disproportionately higher for the focal person [the consumer], satisfaction should increase as that person's outcomes increase relative to those of others, and decrease as outcomes decrease relative to those of the others".

Oliver and Swan (1989) used fairness and preference (two of the most common interpretations of equity/ inequity) to avoid the confusion that results from varying interpretations of equity and inequity. Fairness refers to the individual perception that forms based on the comparison between the ratios of input to outcomes for self to that of the merchant. Preference refers to maximizing the individual's own outcome relative to that of the merchant. They found that preference has no significant effect on satisfaction while fairness was strongly related to consumer satisfaction. The fairness notion was adopted by future researchers as the accepted interpretation and operationalization of equity theory (Patterson et al. 1997).

Perceived Performance

Perceived performance generally has been used as a reference point to which expectation is compared in disconfirmation of satisfaction models. While many studies manipulate performance or measure perceived performance, only a few scholarly works have considered performance as a direct antecedent of satisfaction. It is believed that a strong relationship between perceived performance and satisfaction exists when perceived performance is included in the model (Spreng and Olshavsky 1992).

Yi (1989) believe that we need to conceptually differentiate between objective and perceived performance. Objective performance is assumed to be, the actual level of product performance that should be constant across all consumers. Thus, we can only imagine one constant level of objective performance for a product. However, consumers, based on their individual differences, may have different perceptions of product performance that varies from one consumer to another depending on their desires and expectations.

Churchill and Surprenant (1982) tested two products - a video disc player (VDP) and a hybrid plant - in a study of consumer satisfaction and found that while perceived performance was a strong predictor of satisfaction among other predictors in one of the products (hybrid plant), it was the only variably related to satisfaction for the other (VDP). They concluded that the only way to increase satisfaction for the second product is to increase its performance. To further test the claim by Churchill and Suprenant (1982), Tse and Wilton (1988) designed a 2 by 2 factorial design experiment to manipulate expectations and performance about a product. They found that when a product performs well, the consumer tends to be happy regardless of the levels of expectation disconfirmation. They confirmed the results of Churchill and Suprenant in that performance turned out to be the strongest predictor of satisfaction even in the presence of disconfirmation and expectations as direct antecedents of satisfaction.

Spreng and Olshavsky (1992) separated perceived performance into two distinct constructs of perceptual performance and evaluative performance. Perceptual performance refers to cognitive beliefs about a product's attributes, levels of attributes, or outcomes. These beliefs serve as general product descriptions as perceived by individual consumers. Evaluative performance, on the other hand, is defined as an evaluation of products' attributes or outcomes. These evaluations are formed by comparing the product outcome against one's desires.

Service Quality

The direction of causality between satisfaction and service quality has been the subject of much debate. Parasuraman et al. (1988) consider service quality as a long-term overall evaluation of a service and satisfaction as a transaction specific evaluation. Thus, they claim that positive evaluation of service satisfaction over time will lead to perceptions of service quality. Bitner (1990) developed a service encounter evaluation and empirically tested a model in which

satisfaction was posited as an antecedent to service quality. Furthermore, Bolton and Drew (1991), proposed and tested a multi stage model of consumers' assessments of service quality and value in which they draw a direct path from consumer satisfaction to service quality.

On the other hand, Woodside et al. (1989), in their study of health care satisfaction propose that overall quality of care leads to patient satisfaction. Cronin and Taylor (1992) compared their proposed model against the SERVQUAL suggested by Parasuraman (1988) and reported that service quality actually leads to consumer satisfaction despite Parasuraman (1988)'s claim. Spreng and Mackoy (1996) also investigated the relationship between service quality and satisfaction based on a modified model that was borrowed from Oliver (1993b). They suggested and empirically showed that service quality has a positive and direct relationship with consumer satisfaction in which service quality influences satisfaction. Moreover, Lee et al. (2000) attempted to resolve the mixed findings on the direction of causality through gathering data from a facility/equipment based service firm (an amusement park) and a people-based/consulting firm. They reported that perceived service quality in fact leads to consumer satisfaction. Ekinci et al. (2004) investigated the relationship between service quality, customer satisfaction and attitude in a restaurant context. Their results suggested that service quality leads to satisfaction and modifies attitudes through satisfaction.

Furthermore, Iacobucci et al. (1995) conducted a triangulation study using both qualitative and quantitative research methods in order to distinguish similarities and differences in satisfaction and service quality. Their results indicated that - from the customers' point of view – purchase attributes of price, back stage (i.e. the processes behind a specific service encounter) and expertise are causal factors for service quality while timeliness, service recovery, and physical environment affect customer satisfaction. They concluded that service quality is in

the control of management and satisfaction is in the domain of customers. Thus if service firms want to satisfy customers they need to provide quality service.

Unlike goods and product quality, service quality cannot be measured objectively through indicators such as number of defects and longevity of the product (Garvin 1983). There are unique service features that make the subject of service quality an abstract and elusive one. These features are service intangibility, heterogeneity, and inseparability of service production and consumption (Parasuraman et al. 1988).

According to Parasuraman et al. (1985), most services are not tangible like goods because they are performances rather than objects. When buying products, consumers can use many tangible features to evaluate the product quality such as style, color, label, finishing touches, etc. However, consumers can employ fewer tangible cues and features when it comes to service quality. The cues available to them are often limited to service provider facility features, and representatives. Services are also heterogeneous and their performance varies from one provider to another. Especially, in the case of services that are very labor dependent performance may vary from one service representative to another, from one consumer to another, and from one day to another. Last, but not least, the production and consumption of many services are inseparable. Thus, quality of service cannot be engineered in the production facility and then delivered intact to consumers. For many services, quality occurs and is evaluated during the service delivery process through the interaction between the consumer and service provider representative.

Due to the lack of tangible cues, it is difficult to measure service quality as objectively as we measure product quality. Thus, one way to evaluate service quality is to measure consumers'

perceptions of service quality. Parasuraman et al. (1988) believe that perceptions of service quality are formed through individuals' comparison between what they think the service firm should offer (i.e. their expectation) and their perception of the service performance. They further define perceived service quality as "a global judgment, or attitude, relating to the superiority of the service" (p. 16).They proposed a model (SERVQUAL) with five dimensions to measure service quality across industries. These dimensions are: (1) "Tangibles" that includes anything that can be objectively observed by consumers such as physical facilities, equipment, and appearance of service personnel; (2) "Reliability" that refers to the firm's ability to deliver the promised service dependably and accurately; (3) "Responsiveness" which refers to how sensitive, responsive, and prompt a service provider is to issues raised by consumers and their needs; (4) "Assurance" is about the employee's knowledge, courtesy and integrity that can inspire trust and confidence in consumers; and (5) "Empathy" that involves conveying a sense of caring and individual attention to customers. This definition of perceived quality and its measures have been adopted by many researchers in the service quality and satisfaction area (Spreng and Mackoy 1996).

The service quality and satisfaction literature both maintain that consumers make a comparison between the performance of a product or service and some standard. However, these comparison standards differ from each other. For example, when evaluating a product's performance to make a satisfaction judgment consumers often use predictive expectations, or what they believe "will" happen. On the other hand, service quality evaluations stem from what consumers believe the service firm "should" provide (Parasuraman et al. 1988; Spreng and Mackoy 1996).

Perceived Value

The concept of 'perceived value' as an antecedent of consumer satisfaction was introduced to satisfaction research by Fornell et al. (1996) who used it in their model of the American Consumer Satisfaction Index (ACSI) to incorporate price information into satisfaction measures. Here, perceived value is defined as the perceived level of product or service performance/quality relative to the price paid. They believed that incorporating value judgments would control for differences in income and budget across respondents and make the satisfaction results comparable across different social classes, product categories, and industries. Perceived quality and customer expectations were defined as two antecedents of perceived value. They believed that higher perception of quality should lead to higher perceived value, which in turn increases satisfaction.

Summary

This section discussed major antecedents of satisfaction and provided a detailed description of each antecedent. Expectation is the first and most studied antecedent of satisfaction. We discussed how desires, needs, or wants emerged as a separate comparison standard from the expectation-disconfirmation literature to eliminate the confusion between evaluative and predictive expectations. We discussed the lack of consensus present in the literature regarding definitions of expectations and, how these explanations may differ according to the context of the study. Studies of service quality and satisfaction usually used expectation in its evaluative capacity and studies of product satisfaction employed a predictive definition of expectations. Unlike expectations, desires stem from consumers' value system, their needs, wants, and ideals. They are what consumers would like to see in a product or experience in a service rather than what consumers believe they will see or encounter. Consumer satisfaction

scholars have used desires, values, needs, wants and to some degree 'ideals' interchangeably throughout the literature with desire being the most prevalent one. Due to the nature of desires, there are disagreements on its definition and thus its operationalization. It is suggested that desires be defined at the level of a service or product attribute in order to measure them more easily.

Experience is another predictor of satisfaction that has been employed mostly in measuring an individual's satisfaction with a job. Because people interact with their work environment and perform their job duties on a daily bases, prior expectations have been shown to be inconsequential in determining job satisfaction when they are compared to daily experience. This is due to the recency effect that assumes people tend to recall recent events in ways that are more salient and base their decisions on more recent information. Past experience has been used in conceptual studies of service satisfaction but not in empirical ones. We are not aware of any study that has used the ongoing experience effect on consumers' satisfaction with either services or product.

Even though satisfaction is considered a feeling - an emotional response to aggregated consumption experience (Westbrook et al. 1978) - for the most part it is measured through cognitive processes. However, a few scholars have tried to include affect in satisfaction research and define an affective process that leads to satisfaction. They considered positive and negative feelings as two broad affective dimensions that influence satisfaction and found weak but statistically significant relationships between these dimensions and satisfaction.

Equity and its related constructs, fairness and preference, are other determinants of satisfaction. Initial application of equity theory in consumer satisfaction has resulted in confusion

over the meaning and operationalization of equity in consumer transactions. To avoid this confusion scholars employed two of the most prevalent interpretations of equity: fairness and preference, and found that only the consumers' perception of fairness in a transaction is related to satisfaction. Next, perceived performance proved to predict satisfaction even better than expectation and disconfirmation, especially for durable products. Researchers believe that when a product performs well consumers tend to be happy regardless of the expectations they held before the consumption. Perceived value is another antecedent of satisfaction that incorporates price information into satisfaction models. Even though its use has been limited to a specific satisfaction model advocated by Fornell et al. (1996), perceived value construct looks promising and can be used in future satisfaction studies.

The most debatable determinant of satisfaction is service quality. There are many discussions on the direction of causality between service quality and satisfaction. Few researchers believe that satisfaction is an outcome of service quality while many others believe otherwise. Service quality measurement presents its own challenges. Unlike product quality service quality cannot be easily quantified and measured due to intangibility and heterogeneity of service as wells as the synchronous production and use of service.

Among the discussed antecedents of satisfaction, there are some that have been used in measuring service and product satisfaction such as expectations, desires, and their incongruences, equity and fairness, affect, and perceived value. However, some variables were used only for measuring satisfaction with products such as perceived performance and others used only in for measuring satisfaction with services such past experience and service quality.

Consequences of Consumer Satisfaction

Studying consumer satisfaction consequences would enable us to understand better the importance that this construct holds in regard to organizations. Outcomes of satisfaction, what consumer satisfaction leads to or causes, will justify the efforts in studying it. Some consumer satisfaction studies initially focused on one or more satisfaction outcomes and investigated satisfaction as the determinant of those outcomes (e.g. Fornell et al. 1996). These types of research studies are specifically prevalent in the job satisfaction and organizational behavior area (e.g. Turnley and Feldman 2000).

Consequences of satisfaction have been discussed in two ways: individual and organizational. Individual effects are focused on the consumer and how they react as a result of satisfaction or dissatisfaction. The most studied individual factor is behavioral intentions (e.g. Bhattacherjee 2001b; Dabholkar et al. 2000; Oliver 1980; Oliver and Swan 1989). However, because behavioral intentions is a very broad concept that can cover a range of possible intentions held by satisfied/dissatisfied consumers, in most cases researchers break down this construct to more specific intentions such as complaining behavior (e.g. Nyer 1999; Oliver 1987; Szymanski and Henard 2001), word of mouth (e.g. Curren and Folkes 1987; Morgeson 2011; Yi 1989), repurchase behavior, retention, royalty, and continuance intentions (e.g. Anderson and Sullivan 1993; Bhattacherjee 2001b; Newman and Werbel 1973; Westlund et al. 2001). The other individual outcome of satisfaction that is service quality (e.g. Bitner 1990; Bolton and Drew 1991), is discussed in detail in the previous section. Organizational outcomes of satisfaction that have been discussed in the literature include market share (Fornell 1992) and shareholder value (Anderson et al. 2004).

Since the focus of this dissertation is on the IT satisfaction and its antecedents, we only briefly discuss the most studied individual outcomes (Szymanski and Henard 2001) of consumer satisfaction - namely complaining behavior, word of mouth, and repurchase intentions - to give readers a brief understanding of the outcomes.

Complaining Behavior

Complaining behavior is the most studied consequence of consumer satisfaction and its intensity is in direct relationship with the level of dissatisfaction (Yi 1989). Consumers' tendency to complain is believed to be an effective way in relieving anger and frustration associated with dissatisfaction as well as a starting point for a process to get compensated for a bad consumption experience (Nyer 1999). It is also thought to be a mechanism that people choose to alleviate the cognitive dissonance effect resulting from a dissatisfying experience (Oliver 1987). According to Andreasen (1985), consumers usually stop purchasing the good or using the service when their dissatisfaction is not very severe, while severe dissatisfaction usually leads to a complaining behavior especially when consumers perceive they may get compensated or the complaining may change the dissatisfactory attribute of the product or service.

There are many factors that affect consumer complaining behavior ranging from consumer characteristics to product and service attributes. Whether consumers have the minimum communications skills, their willingness to confront, and know how to complain would affect their ability to file a complaint. The next factor is consumers' motivation to complain that results from their perceived cost and benefits of complaining as well as their assessment of achieving their desired outcomes such as getting reimbursed or somehow compensated for their dissatisfying experience (Oliver 2010).

Word of Mouth

Word of mouth could be negative, positive, or neutral. However, only positive and negative word of mouth are discussed in the literature. Negative world of moth conveys consumers' frustration and dissatisfaction with a product or service and positive word of mouth would be a source of encouragement for other people to try a product or service. However, negative word of mouth has been in the center of academic research since it is more likely to happen and it can cause damage to firms' reputations more than complaints since its communicated to other consumers instead of the corporate staff (Curren and Folkes 1987).

According to Yi (1989), word of mouth appears to significantly influence consumers' reactions for several reasons. Word of mouth is a face-to-face type of communication and it seems to have noticeably greater impacts on recipients when compared to written or mass communications. In addition, word of mouth that originates from other consumers instead of organizations or marketers and people tends to trust each other's words more than marketers and official corporate correspondence.

Nyer (1999) believes that negative word of mouth provides consumers the opportunity to alleviate their disappointment, get back to the product seller or service provider by spreading the word about their dissatisfying experience, recapture the control over a painful situation, win others' sympathy, and convey to others that they hold high standards. Richins (1983) finds that consumers tend to vent (express negative word of mouth) to their counterparts when the problem causing dissatisfaction is severe, and when the corporate reaction to the complaints is negatively perceived.

Repurchase Behavior

Oliver (1980) states that satisfaction would affect consumers' attitude and that in turn influences repurchase intentions. His results suggest that satisfaction has a positive impact on attitude. Newman and Werbel (1973) report that satisfied customers are more likely to repeat their purchasing behavior and stay loyal to the brand than dissatisfied customers. According to Szymanski and Henard (2001) many studies have found a positive relationship between satisfaction and repurchase intentions and behavior (e.g. Bearden and Teel 1983; Boulding et al. 1993; Oliver and Swan 1989). Furthermore, Yi (1989) reports that there is a 30% to 90% chance that dissatisfied consumers would not stay loyal to the brand.

Summary

In this section, we briefly reviewed three of the most studied consequences of satisfaction: complaining behavior, word of mouth, and repurchase intentions. Complaining behavior is the type of action that consumers choose in the face of severe dissatisfaction when they perceive that complaining would decrease their dissatisfactory feelings or when they think they may get compensated for the dissatisfactory experience given the reasonable time and effort they set aside to complain to the product manufacturer or service provider. In addition, word of mouth is another outcome of satisfaction that can be either negative or positive. Negative word of mouth is considered as a means that dissatisfied consumers use to alleviate their dissatisfaction usually when their complaining efforts fail. Since it originates from other individuals instead of the organization, it is believed to have a greater positive or negative impact in consequent decisions that others make as to whether to continue to use, abandon, buy, or recommend a product or service. Repurchase behavior is the third most important outcome of consumer satisfaction that we reviewed in this manuscript. It is studied under different names

such as loyalty, consumer retention, and continuance behavior. All these terms are concerned about consumers' behavior in continued reusing/repurchasing a service or product. It is stated that consumers tend to repeat a purchase experience or service encounter when they are satisfied with the results of their experience.

Models of Consumer Satisfaction

One of the most studied models of satisfaction in the psychology and marketing literature is the disconfirmation model (e.g. Oliver 1980; Olshavsky and Miller 1972; Olson and Dover 1976). The underlying logic of the disconfirmation model is that if the performance of the goods or services exceeds consumers' expectations, then consumers are going to be more or less satisfied and vice versa. Consumer satisfaction studies started with a focus on satisfaction with goods. Service satisfaction and service quality studies and models mainly followed research on product satisfaction. These studies usually modified and adopted models initially developed by customer satisfaction scholars who were focusing on satisfaction with manufactured products and goods (Yi, 1989). In this section, we categorize the models according to their application to products, services, or products and services. We use the authors' explanations of the purpose of their models as the criterion for this categorization. In the absence of researchers' statements of purpose we consider whether empirical test of the model is conducted using a product setting, a service setting or both.

Consumer Satisfaction with Product

The consumer satisfaction research began by measuring satisfaction with products. Early research on consumer satisfaction usually tested few variables using analysis of variance or other similar methods (Yi 1989). Due to the simplicity of earlier models that usually included a limited number of constructs and variables, researchers did not see the need to provide a schematic

representation of their models. Many of the antecedents and outcomes of consumer satisfaction that were included in early stages of research are discussed previously in this manuscript. This section discusses models that were complicated enough for authors to provide a schematic representation.

Following the expectation-disconfirmation framework, Oliver (1980) proposed a model (Figure 1) in which he suggested that post-purchase evaluations of product performance and the comparison made between prior expectations and product performance is the source of either positive or negative disconfirmation that in turn leads to satisfaction or dissatisfaction. Oliver observed expectation as an additive combination of the expectation level and the disconfirmation that results from product usage experience. He provides a cognitive definition of expectations as beliefs regarding the occurrence of an attribute. Using the model, he explained how attitude and purchase intentions are influenced cognitively through disconfirmation of expectations and satisfaction.
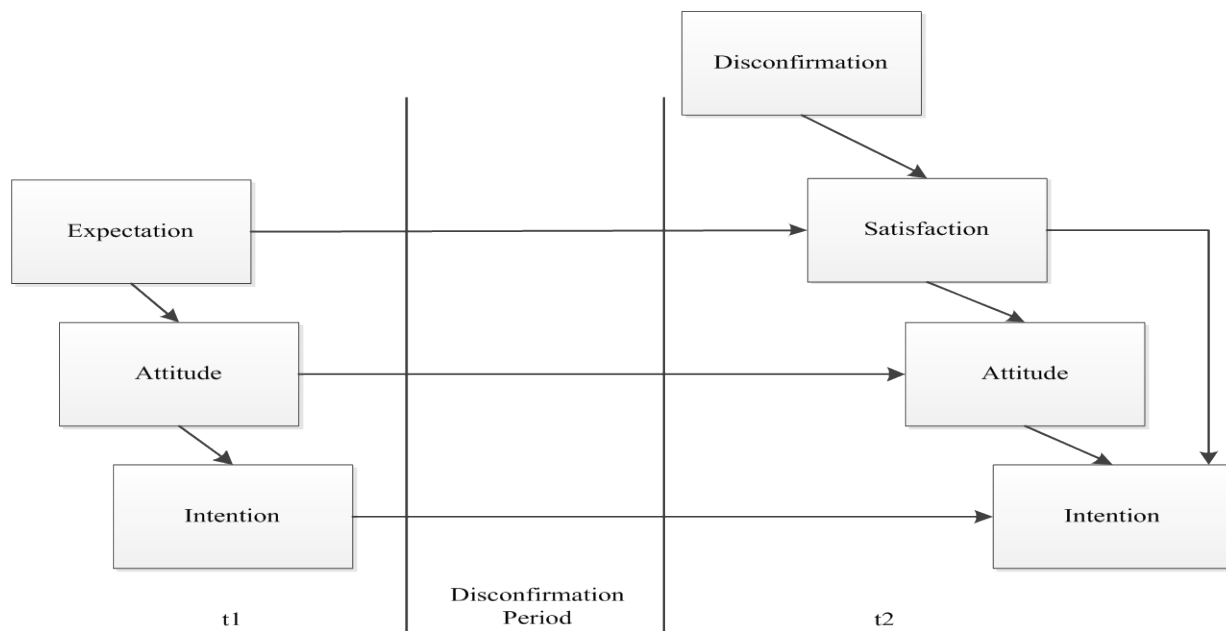
Figure 1: Oliver (1980) Cognitive Model

Churchill and Surprenant (1982) conducted a study to investigate the effects of disconfirmation on satisfaction. They argued that common predictors of satisfaction (i.e. disconfirmation, expectation, and perceived performance) differentially influence satisfaction based on the type of product. To test their prediction they chose one durable product and one nondurable product. They found performance is the most important predictor of satisfaction for both durable and nondurable products. They also reported that for nondurable goods satisfaction is influenced by all three antecedents as typically hypothesized in the literature. However, satisfaction with durable goods was affected only by the performance of the product. Their model is presented in Figure 2.
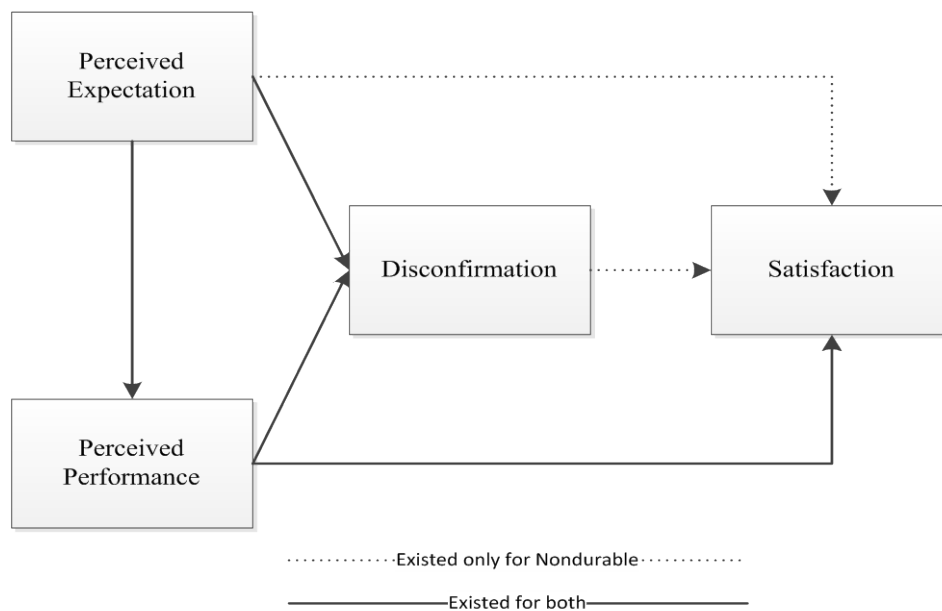
Figure 2: Churchill and Surprenant (1982) Durable v.s. Nondurable Model (Adapted)

Spreng and Olshavsky (1992) suggested a theoretical model (Figure 3) in which they used "desire" as a new comparison standard. They also introduced satisfaction with information as a new concept that would influence overall satisfaction together with product satisfaction. They stated that overall satisfaction with the consumption experience is not only influenced by satisfaction with the product but also by satisfaction with information that relates to the product. Satisfaction, either with the product or with information, is determined through the comparison between desires and perceptual performance of the product/information. If the consumer's perception of performance exceeds or equals the desires for the product/information then the consumer will be satisfied otherwise he or she will be dissatisfied. The model also assumes that the perceptual performance of the information is influenced by perceptual performance of the product to a certain extent.
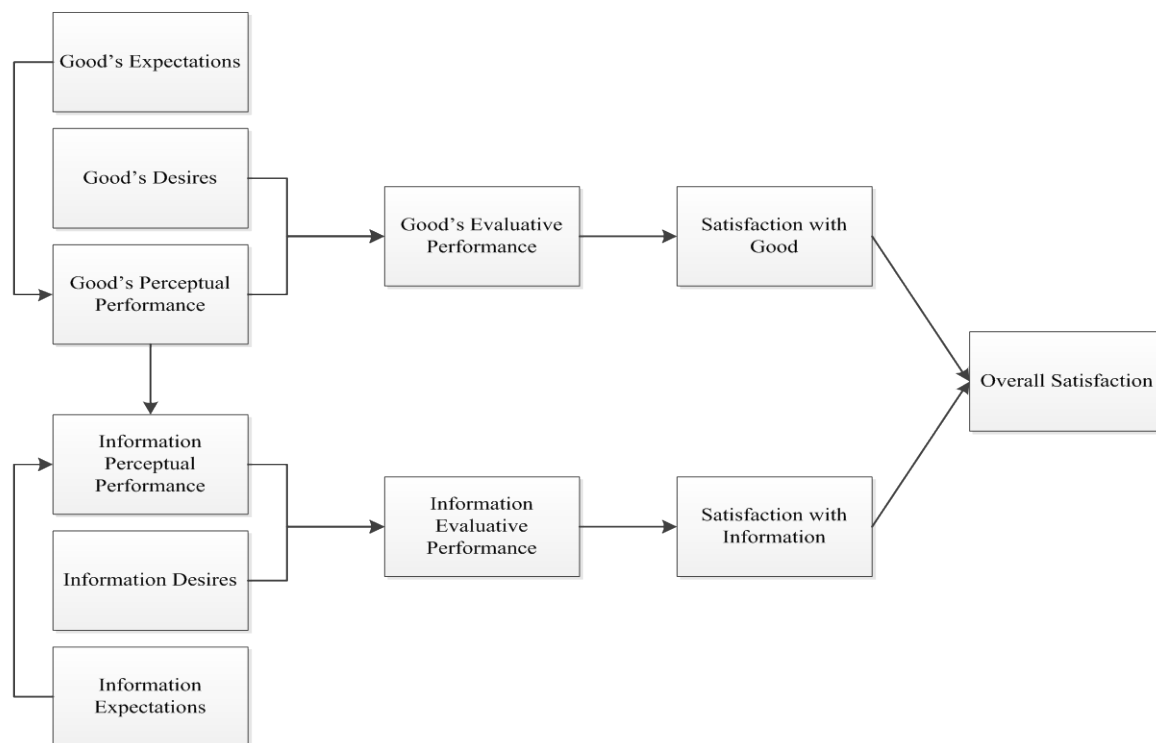
Figure 3: Spreng and Olshavsky (1992) Desires-as-Standard Model

Using means-end theory (Gutman 1982) to precisely distinguish desires from

expectation, Spreng and Olshavsky (1993) developed and empirically tested a desires

congruency model of consumer satisfaction based on their pervious theoretical works (Olshavsky

and Spreng 1989; Spreng and Olshavsky 1992). The desires model does not carry the limitations

of an expectations-based model in that satisfaction is not constrained to be affected by only the

attributes and characteristics of the product that were known to the consumer before use. This

model allows any aspect of the product to influence satisfaction. As consumers use a product

they get to know new aspects or product attributes that they did not know before, and so had not

developed expectations for these features. Although, there were no expectations about these new

product attributes to be disconfirmed, consumers would still compare them to their desires and

this would affect their overall satisfaction. Spreng and Olshavsky (1993) investigated the direct

effects of both disconfirmation of expectations and desires congruency on satisfaction, as well as

direct and indirect effects of performance on satisfaction. They report that the extent to which

performance is concurrent with desires is a powerful antecedent of satisfaction, while the effects

of disconfirmation of expectations were non-significant. The model is depicted in Figure 4. The

dotted line represents the non-significant links.
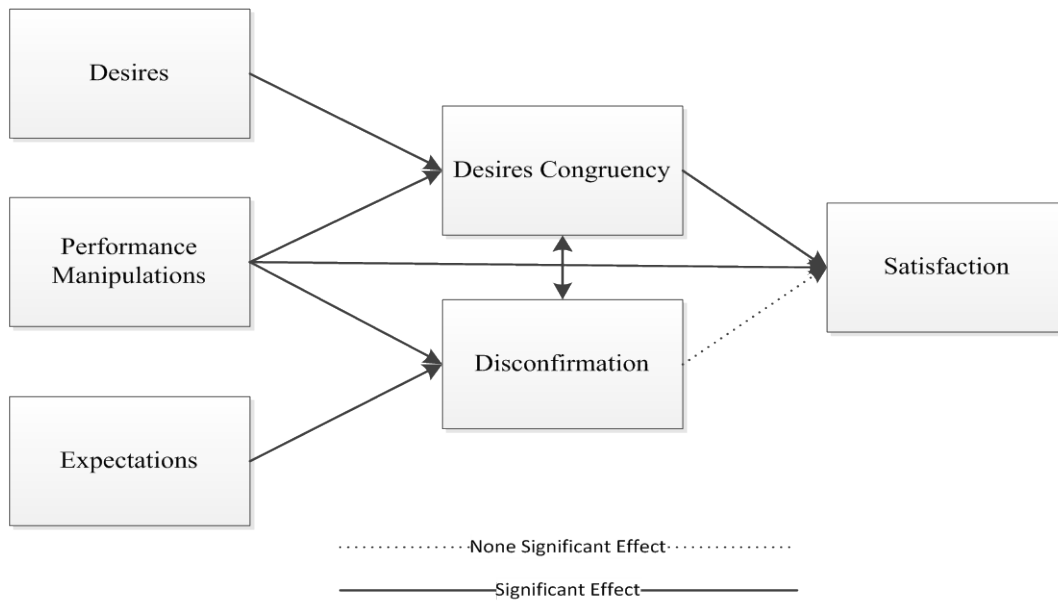
Figure 4: Spreng and Olshavsky (1993) Desires Congruency Model

Yi (1989) provided a model that contains a number of important antecedents and consequences of consumer satisfaction. The model is basically a schematic representation of what has been discussed in the literature since the inception of consumer satisfaction research. He divides his model into four stages of pre-consumption, post-consumption, consumer satisfaction (CS) and post-consumer satisfaction (post-CS). The model has not been tested thoroughly; however, it includes all the proposed relationships between variables of interest to date of publication. Figure 5 is a reproduction Yi's model.
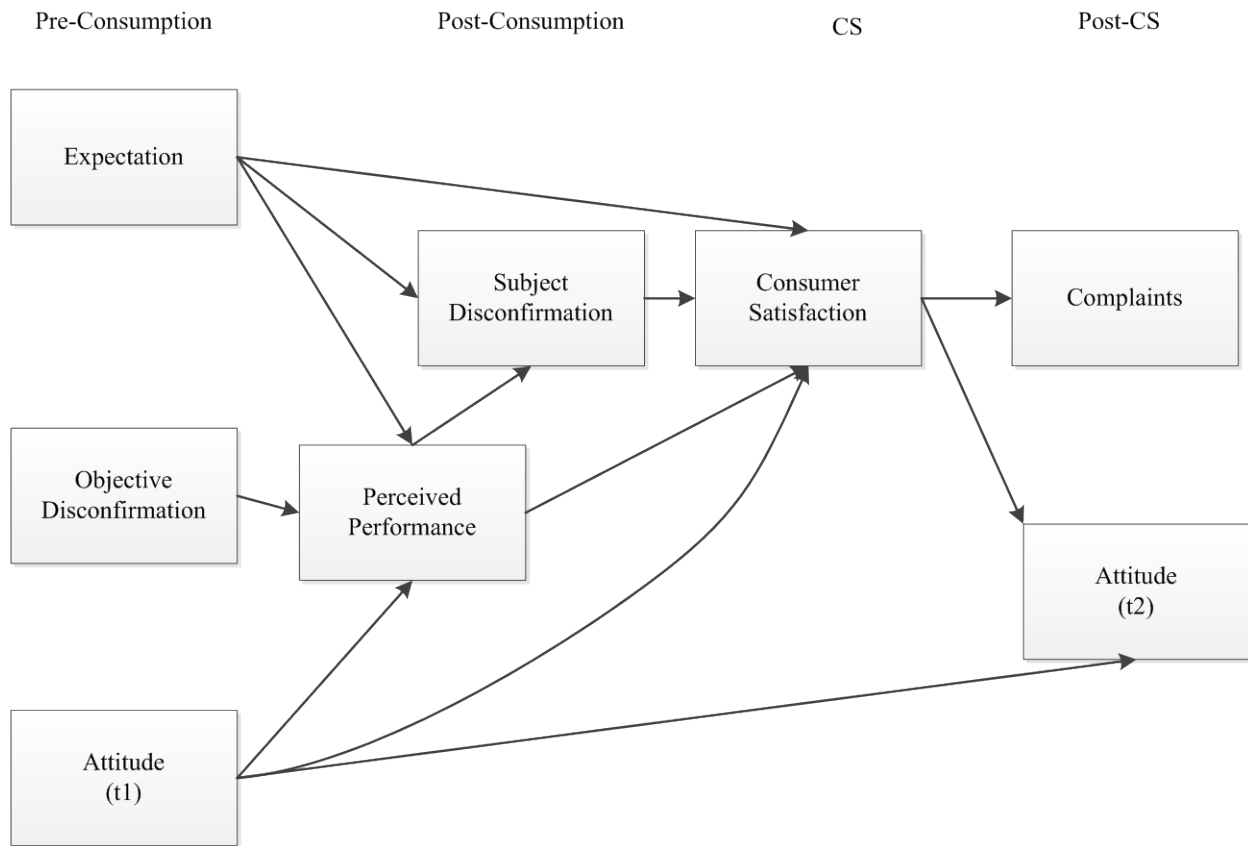
Figure 5: Yi (1989) Processes of Consumer Satisfaction

Using equity theory, Oliver and Swan (1989) investigated the effects of fairness and preference on satisfaction. They surveyed automobile buyers and captured their perceptions of their own inputs and outcomes as well as buyers' perception of sellers' inputs and outcomes. They found that fairness mediates the effects of inputs and outcomes on satisfaction while preference does not. They also reported that satisfaction is strongly related to the behavioral intentions. Their model is depicted in Figure 6. Significant paths are shown using a solid line and insignificant paths are shown using a dotted line.
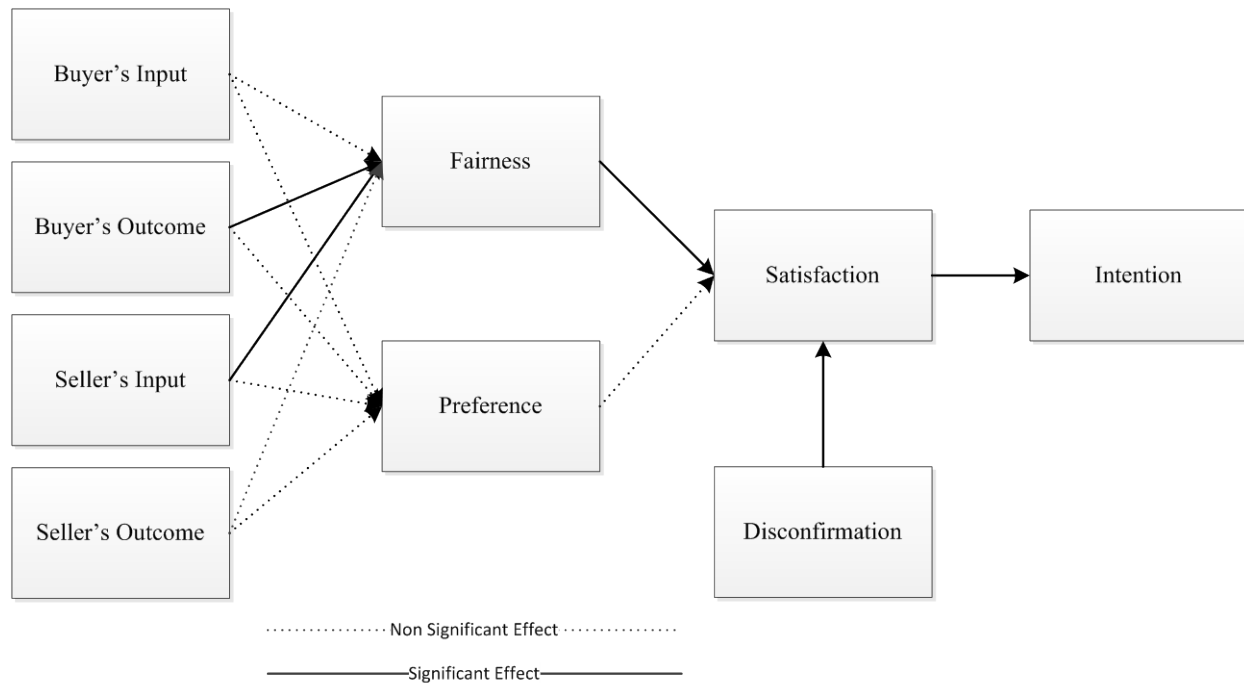
Figure 6: Oliver and Swan (1989) Buyer Satisfaction Model

Mano and Oliver (1993) studied consumer's affective response impact on satisfaction. They argued that there is an affective dimension to satisfaction that is in close interaction with the cognitive processes causing satisfaction. They investigated the structural interrelationships among three aspects of post consumption experience including evaluations, feelings, and satisfaction. Mano and Oliver examined whether utilitarian and hedonic product appraisal would affect product overall judgment. They found that utilitarian appraisal directly affects satisfaction while the influence of hedonic appraisal on satisfaction is mediated through positive affect. They also reported that arousal is a direct antecedent of both positive and negative affect. Their model summary is presented in Figure 7.
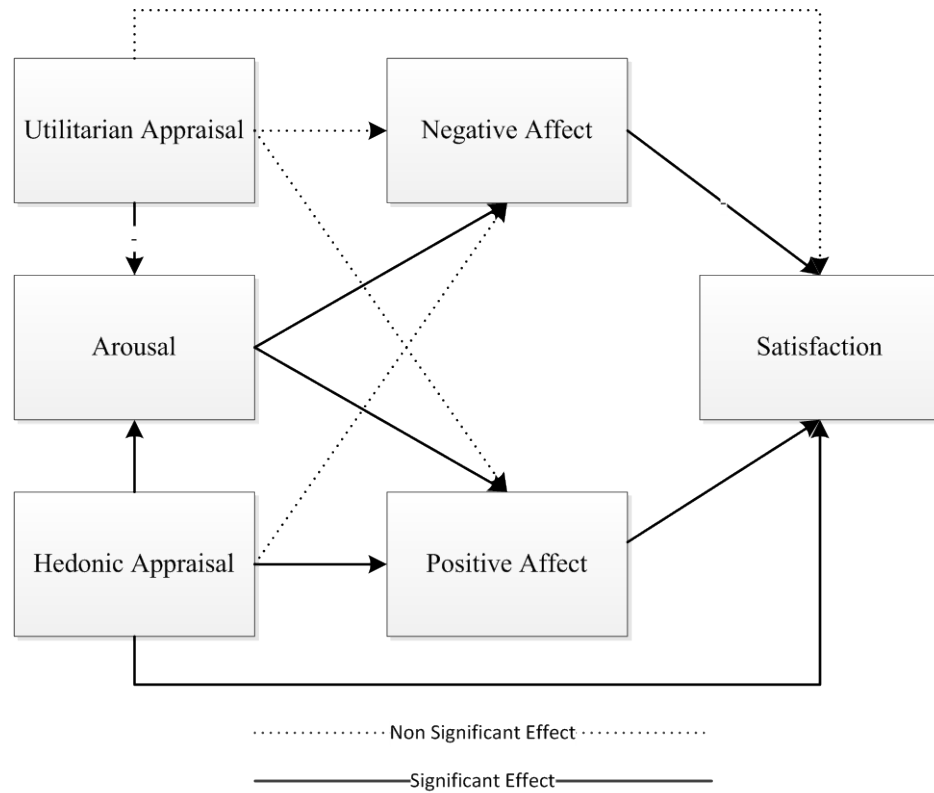
Figure 7: Mano and Oliver (1993) Affect and Satisfaction Model (Adapted)

Szymanski and Henard (2001) conducted a meta-analysis study of over fifty empirical research studies that had been published to date on consumer satisfaction mostly focusing on satisfaction with products. Through reviewing of the literature, they identified antecedents and outcomes of consumer satisfaction that were frequently cited as well as some moderator variables. For antecedents they listed expectations, disconfirmation of expectations, performance, affect and equity. For outcomes, they listed complaining behavior, negative word of mouth and repurchase intentions. They also named comparison standard, measurement level, methodological approach, participants, and type of offering (durables vs. nondurables) as potential moderator (control) variables. They further discussed the relationship between

antecedents and suggested an aggregated model to account for all the found antecedents and outcomes of satisfaction. They represented their findings in a consolidated model depicted in Figure 8.
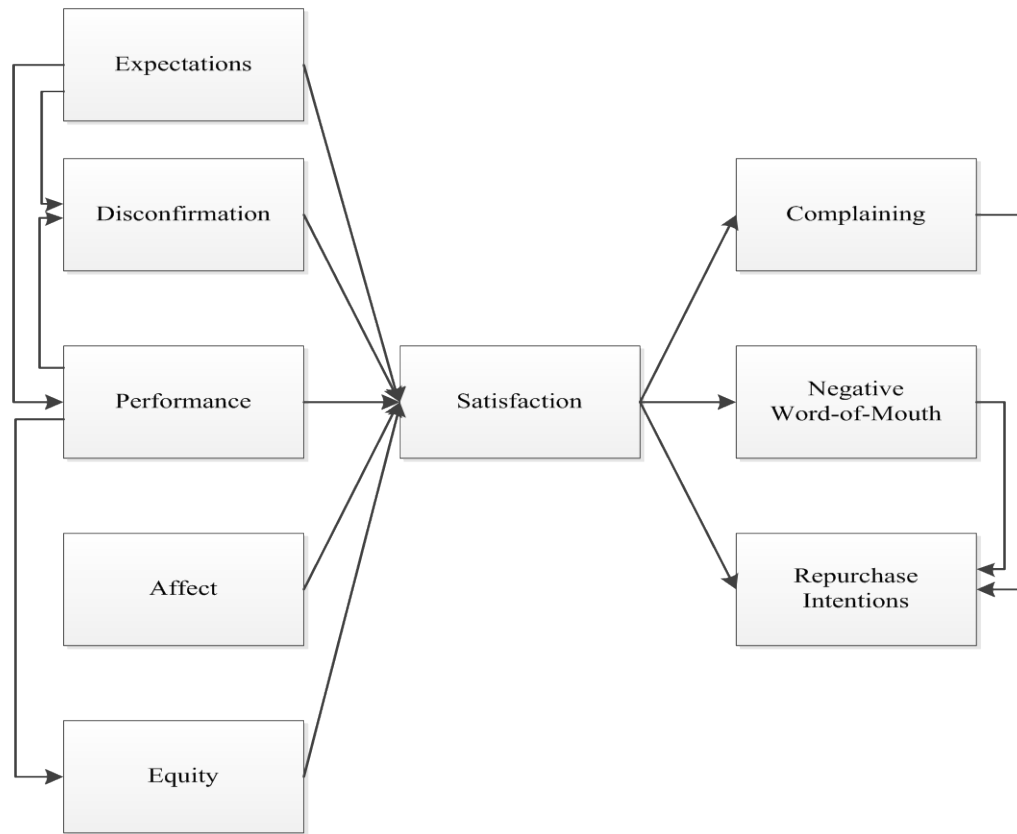
Figure 8: Szymanski and Henard (2001) Customer Satisfaction Model

Consumer Satisfaction with Product/Service

This section reviews the models that either were claimed by the authors to measure satisfaction with both products and services, or were tested empirically using data from both the service and product context. On a few occasions authors claim that, their model is developed having satisfaction with both products and services in mind even though they only tested the model using a product context.

Anderson and Sullivan (1993) took the basic expectation-disconfirmation model developed by Oliver (1980) and divided the disconfirmation construct into negative and positive disconfirmation to precisely measure the effect of disconfirmation valances on satisfaction. In this model (Figure 9) satisfaction is defined to be a function of perceived quality and disconfirmation. Expectation directly influences disconfirmation and perceived quality and only affects satisfaction through these two constructs. In addition, they propose "ease of evaluating quality" as an important moderator that influences the extent of disconfirmation. This construct is expected to lead to greater disconfirmation in both directions. They report that perceived quality affects satisfaction more than expectation or disconfirmation.
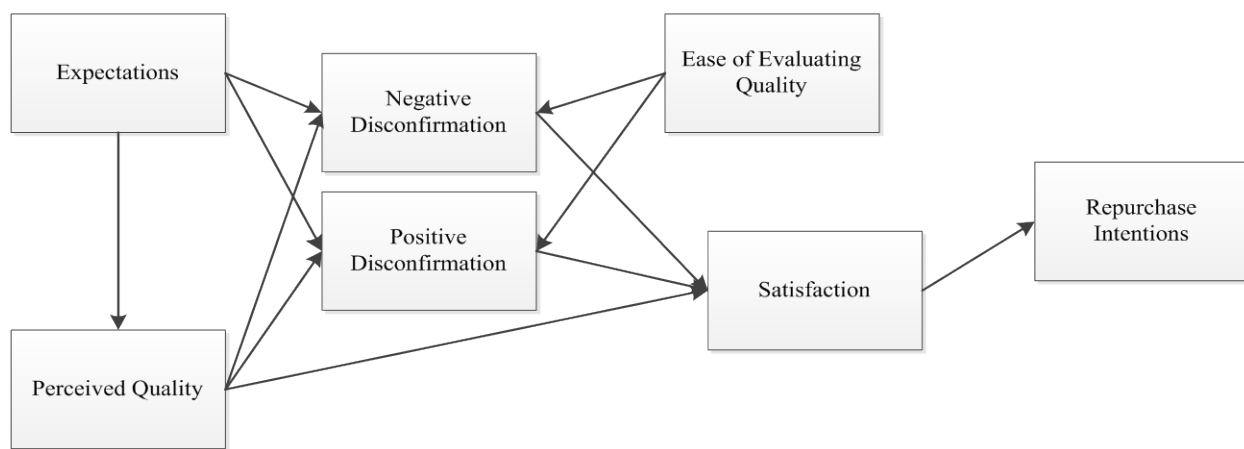
Figure 9: Anderson and Sullivan (1993) Analytical Frame Work

Considering the problems associated with the "disconfirmation of expectation" paradigm Spreng et al. (1996) offered a new perspective on consumer satisfaction. The model (Figure 10) incorporates the effects of marketing communication through including two standards, desires and expectations. It suggests that satisfaction is formed in consumers when they compare their perception of performance to both their expectations and desires. The model not only

incorporates the satisfaction with products or services, but also satisfaction with information (often provided by marketers) on which consumers' expectations are based. Overall satisfaction is estimated through satisfaction with attributes and satisfaction with information. Unlike previous models in consumer satisfaction, perceived performance does not directly affect satisfaction. Even though Spreng et al. tested their model through measuring satisfaction for a product, they believe that their model would yield significant results when it comes to measuring service satisfaction.
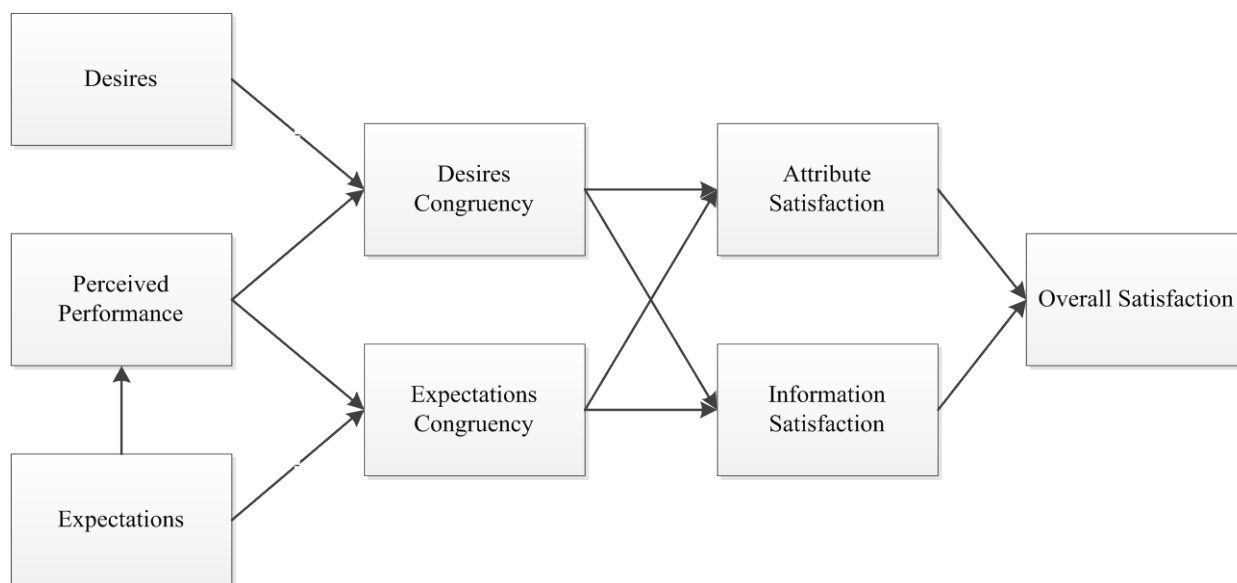
Figure 10: Spreng et al. (1996) Satisfaction Formation Process

Fornell et al. (1996) developed a new market based satisfaction model (Figure 11) called: The American Customer Satisfaction Index (ACSI). The model defines perceived quality (perceived performance), perceived value and customer expectations as determinants of overall customer satisfaction (ACSI) and customer complaints and loyalty as outcomes of satisfaction. Perceived quality is composed of two dimensions: customization and reliability. According to

Morgeson (2011) the model is used to measure satisfaction with all kinds of products and services for over 80,000 consumers annually in North America. Using the model to measure consumer satisfaction across many industries in public and private sectors, Fornell et al. reported that consumer satisfaction is greater for goods compared to services and greater for private services than government agencies. They also found that customer satisfaction is more sensitive to quality than value or price.
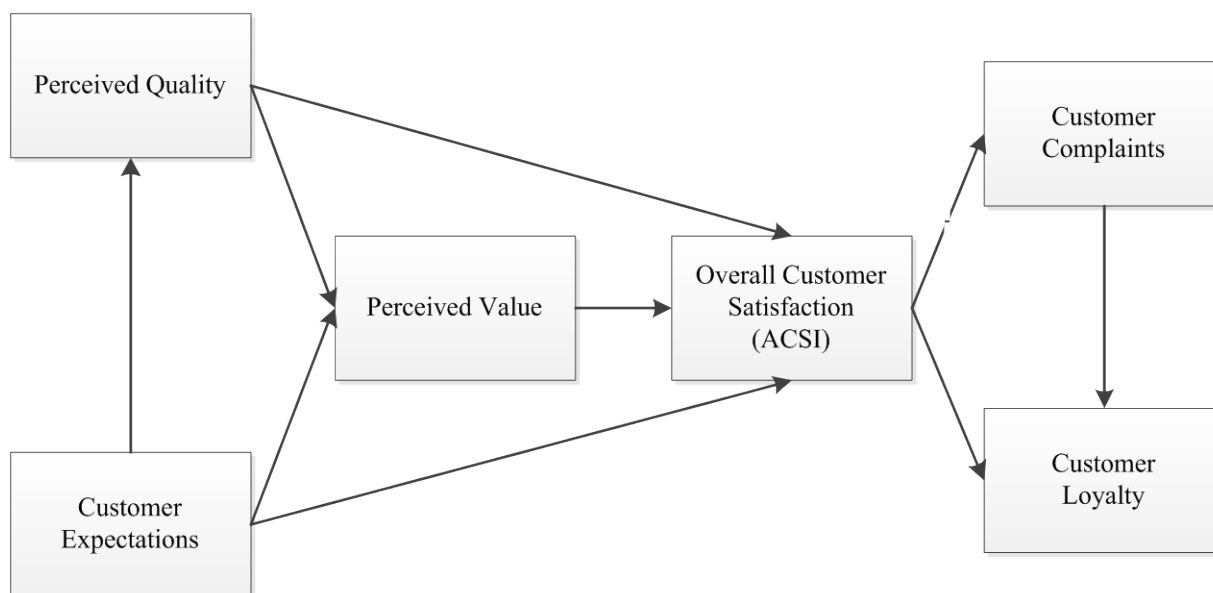
Figure 11: Fornell et al. (1996) ACSI Model

The European Foundation for Quality Management (EFQM) in a joint effort with the International Foundation for Customer Focus (IFCF) has developed an instrument to measure intangible dimensions of quality. Westlund et al. (2001), employed the Partial Least Squares (PLS) approach to test and verify this model. The model (Figure 12), which is called the European Performance Satisfaction Index, focuses on consumer satisfaction, its antecedents and one major outcome, consumer loyalty. The model can be used for both products and services,

and includes perceived quality of both product and service as satisfaction antecedents. It also utilizes Fornell et al. (1996) perceived value construct that directly leads to customer satisfaction. Image is another antecedent to both customer satisfaction and loyalty. However, it is not very clear what was meant by image and how the study differentiated between product and service image.
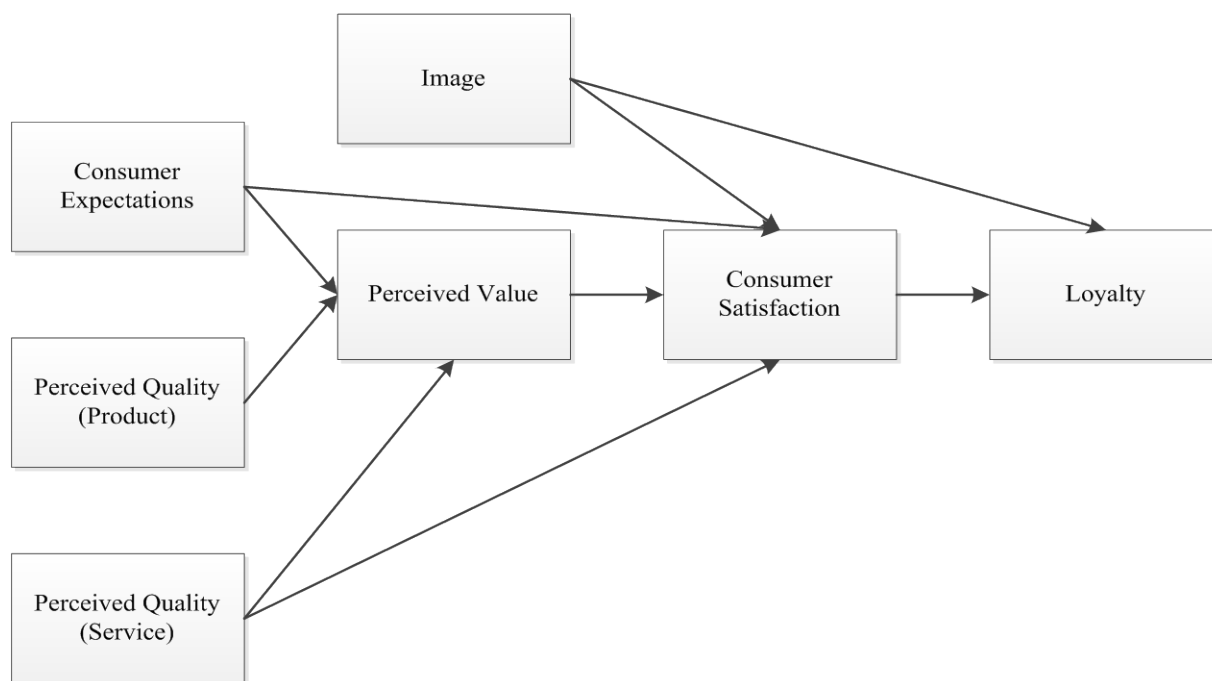
Figure 12: Westlund et al (2001) Model of Consumer Satisfaction

Wirtz and Mattila (2001) investigated the effect of perceived performance on satisfaction and claimed that previously found effects of perceived performance on satisfaction might be a measurement artifact or due to insufficient modeling of the satisfaction process. Their results suggest that the direct link between perceived performance and satisfaction weakens when more objective measures of performance are replaced with value-laden measures that were used in the past research. They also found that desire-congruency influence satisfaction independent of

expectation-disconfirmation and have higher ability to predict satisfaction. In the end they offered an integrative model (Figure 13) of consumer satisfaction that consolidates both expectation-disconfirmation and desire-congruency. Even though they implicitly claimed that their model would explain satisfaction with both products and services, they only tested the model using a product where its performance can be easily measured objectively.
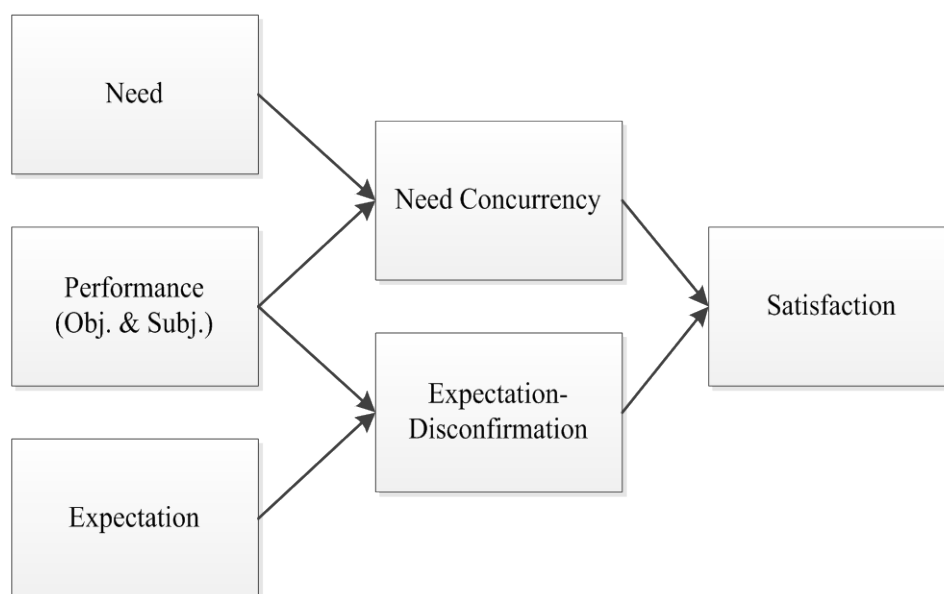
Figure 13: Wirtz et al. (2001) Model of Consumer Satisfaction

Consumer Satisfaction with Service

In this section we first review the models that are focused on service quality then moved to models that specifically address consumer satisfaction with service. There are extended discussions on the direction of causality between consumer satisfaction and service quality. However, the majority of research studies hypothesized and confirmed that causality runs from service quality to consumer satisfaction (e.g. Cronin Jr and Taylor 1992; Ekinci and Sirakaya

2004; Lee et al. 2000; Woodside et al. 1989). In spite of the direction of causality, service quality remains a key construct in the study of consumer satisfaction with service.

Gronroos (1984) suggested a model of how service quality is perceived by consumers and defined factors that impact service quality. He defined notions of expected and perceived quality similar to expected and perceived product performance. Focusing on the intangibility feature of service, Gronroos differentiated between technical quality and functional quality aspects of service. He further introduced the "image" construct as a substitute for brand names. "Image" relates to how consumers perceived the firm and is created through technical and functional quality perceptions of service. Figure 14 illustrates his model.
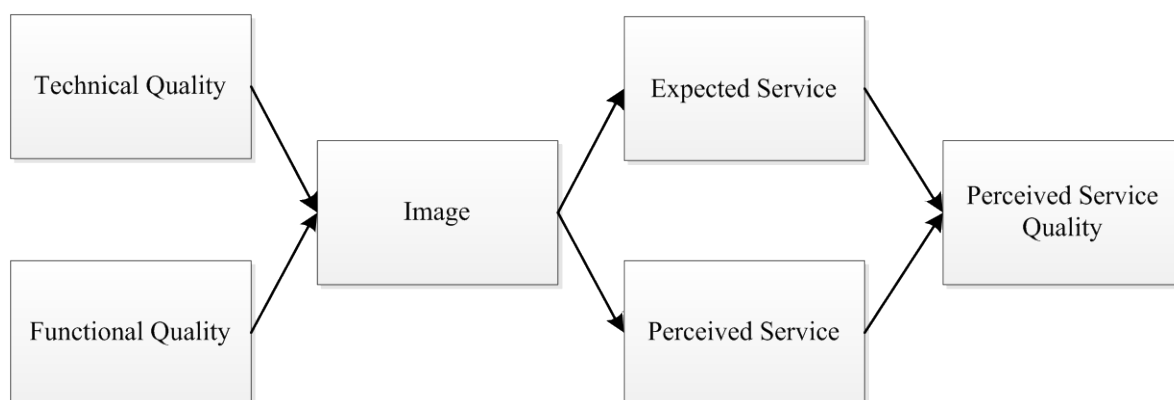
Figure 14: Gronroos (1984) The Service Quality Model

Parasuraman et al. (1985) stated that delivering high service quality is of critical importance to service organizations since it would produce measurable increases in profits, cost savings and market share. However, unlike product quality, service quality cannot be easily determined and controlled at the point of manufacturing before delivering to customers; rather, service quality is an outcome of service encounters with consumers. In order to help service

organizations to achieve higher service quality offerings, they conducted an exploratory study

using 12 focus groups to understand and model the factors affecting service quality. The research

resulted in a conceptual model (Figure 15) of service quality in which perceived quality is

defined as the gap between expected service and perceived service.

Bitner (1990) developed and empirically tested a model (Figure 16) of service encounters

in which she described both antecedents and outcomes of service encounter satisfaction. Bitner

situated perceived service quality as a direct consequence of service satisfaction. She divided her

model into four parts. The first part suggests that consumers' pre-attitude would affect

expectations about the results of a particular service encounter. The second part describes that

the consumer's immediate reaction after consumption depending on the comparison between

expectations and perceived performance. Results of this comparison then lead to confirmation or

positive/negative disconfirmation of prior expectations.
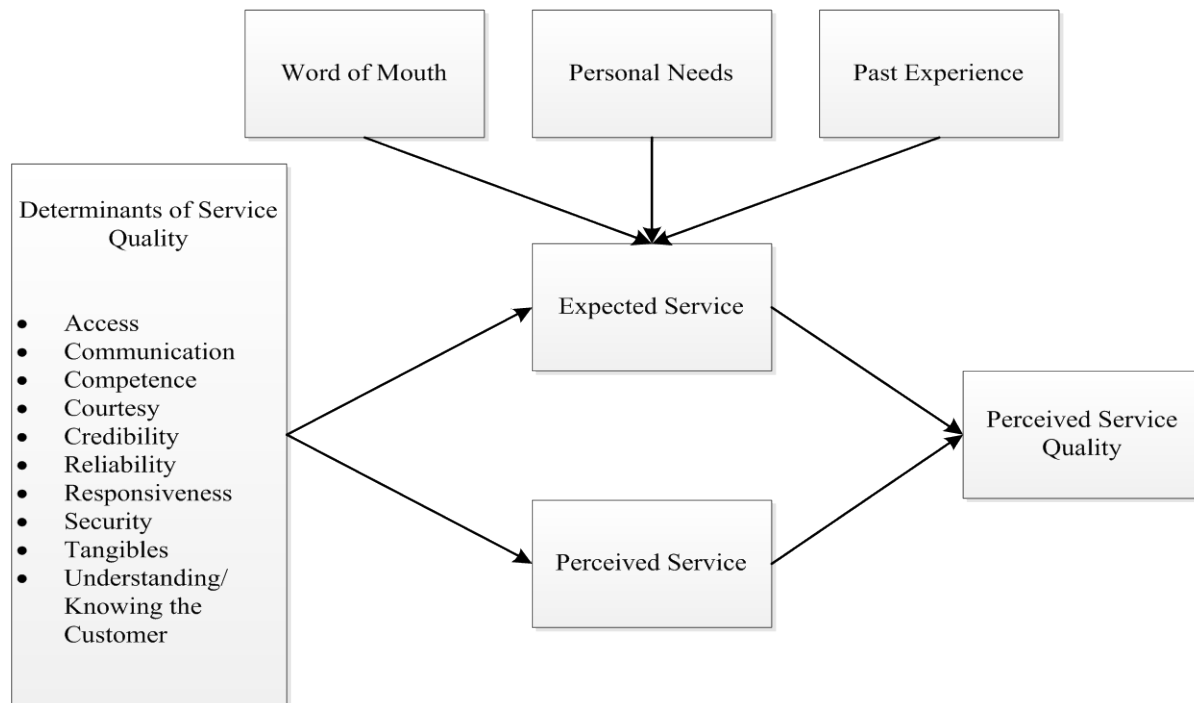
Figure 15: Parasuraman et al. (1985) Determinants of Quality

The last part of the model depicts that the causal attribution of disconfirmation would mediate satisfaction. This implies that individuals first determine the causes of the disconfirmation and depending on the perceived nature of the causes, the level of dis/satisfaction and subsequent outcomes may be modified. The fourth and final part of the model suggests satisfaction as an input to the "more general construct" of perceived service quality, or attitude as Bitner explains.

Bolton and Drew (1991) suggested a multi stage model (Figure 17) of consumers' assessment of service quality and value. They depicted consumer satisfaction as an antecedent to service quality. They believed perceived service quality is a less dynamic attitude influenced by satisfaction. Bolton and Drew stated that consumers' overall assessment of a service can be depicted through a series of interrelated stages: assessment of performance, service quality and value. They believed that most services, in their totality, are composed of core, facilitating and supporting services.
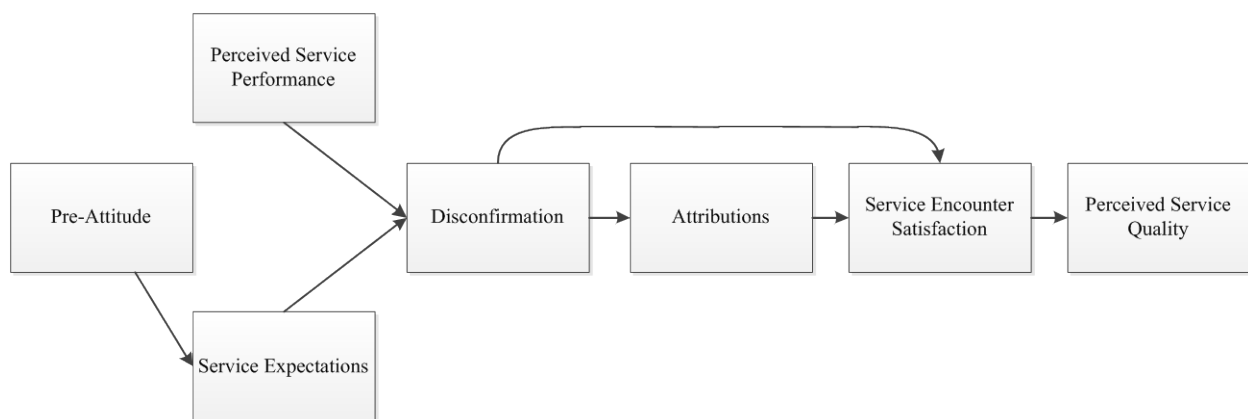
Figure 16: Bitner (1990) Model of Service Encounter Evaluation

To illustrate, imagine an airline service. The core service is transportation, ticketing and check-in are facilitating services, and in-flight services are considered supporting services. Thus a consumer's perception of service performance and quality is an aggregate assessment of performance on all dimensions and attributes of a service.
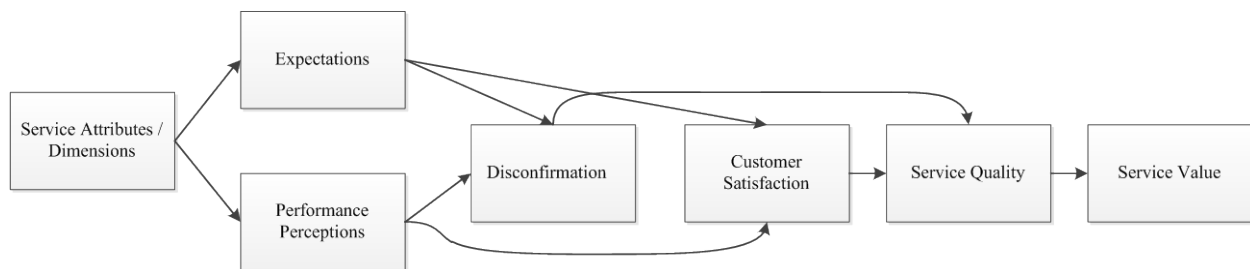
Figure 17: Bolton and Drew (1991) Multistage Model of Service Quality and Value

In an effort to conceptualize determinants of customer expectations of services, Zeithaml et al. (1993) developed a conceptual model articulating the nature and determinants of customer expectations of service. The model (Figure 18) describes different types of expectations (desired service, adequate service, predicted service, and expected service) and their predictors. The model introduces the zone of tolerance concept in service for the first time. The zone of tolerance is identified as the difference between adequate and desired service such that customers would be either more or less satisfied with the service. Desired service is a level of service that a customer hopes to receive. It is a mix of what a customer believes a service "can be" and "should be". Adequate service describes a level of service encounter that a customer will accept. The gap between expected service (which is composed of adequate service and desired service) and perceived service is defined as overall perceived service quality. Zeithaml et al. referred to the

gap between desired service and perceived service as "perceived service superiority" and the gap between adequate service and perceived service as "perceived service adequacy". They also defined the gap between predicted service and perceived service as perceived customer satisfaction. However, they failed to explain the difference between expected service (the composite construct) and predicted service and how these two service levels interact with each other.
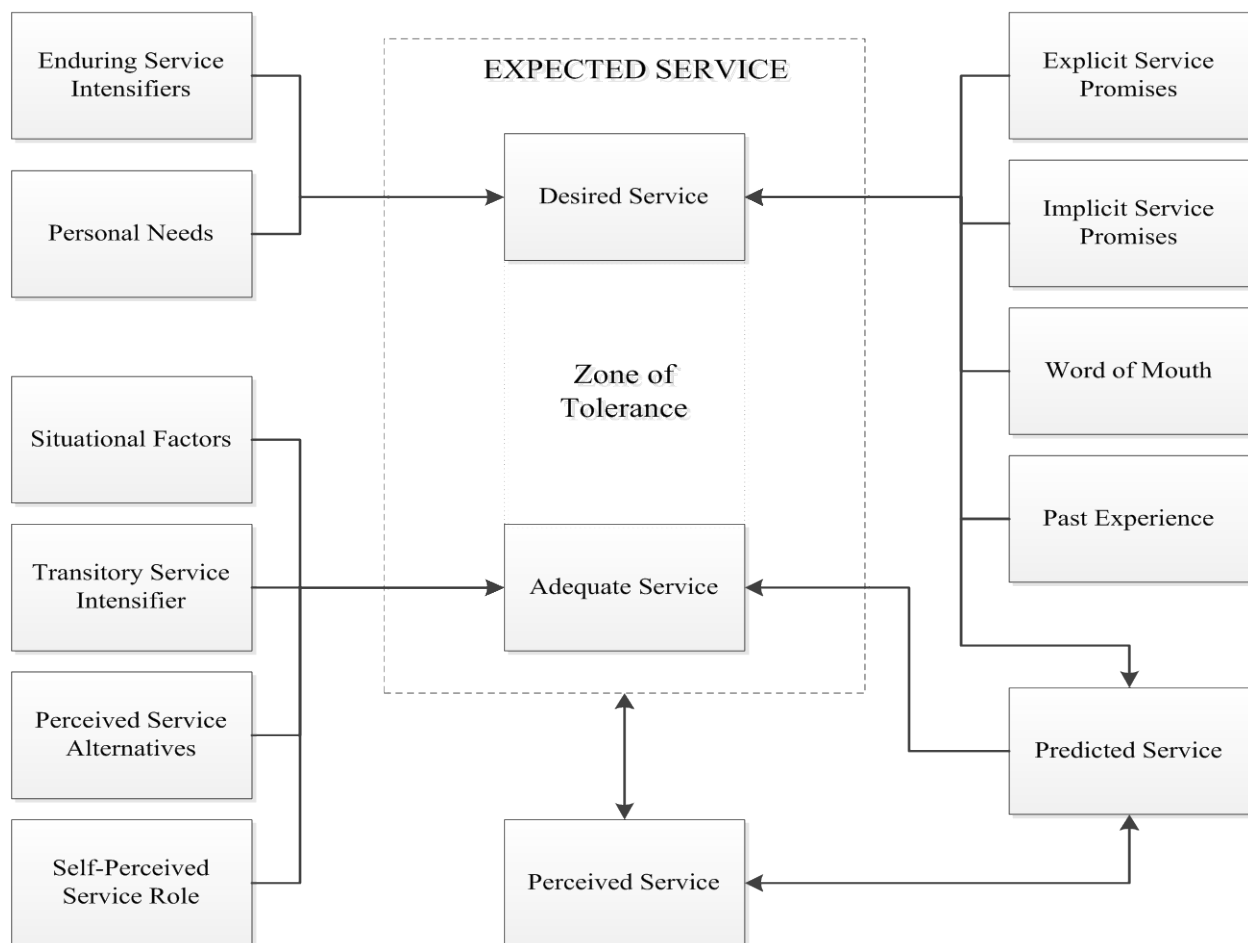
Figure 18: Zeithaml et al. (1993) Customer Expectations of Service Model

Oliver (1993a) measured students' satisfaction with an introductory course in marketing. He proposed a model in which he combined both affective and cognitive views of consumer satisfaction. Oliver proposed that attribute satisfaction/dissatisfaction causes positive and negative emotions in consumers and in turn these emotions would lead to consumer satisfaction/dissatisfaction. He also proposed that attribute satisfaction/dissatisfaction and disconfirmation of expectations would also affect final consumer satisfaction directly.

Spreng and Mackoy (1996) suggested a service satisfaction model (Figure 19) based on Oliver (1993b). Spreng and his colleague designed a study to overcome limitations of the Oliver study. The limitations were mainly due to the discrepancies between what major service satisfaction literature suggests that Oliver failed to take into account. Oliver suggested that satisfaction is related to the incongruence of ideals only through service quality perceptions while a fair amount of literature on service satisfaction suggests that satisfaction is a direct outcome of disconfirmation of desires or ideals. Moreover, in spite of a large body of literature, the Oliver model suggests that expectations do not affect perceptions of performance.

Using confirmatory factor analysis methods, Spreng and Mackoy (1996) measured students' satisfaction with advising services in the college of business. They found support for both the Oliver (1993) model and their modified model that includes paths from desires congruency to overall satisfaction and from expectations to perceived performance. However, the modified model fitted the data better and showed a significant decrease in the chi-square.
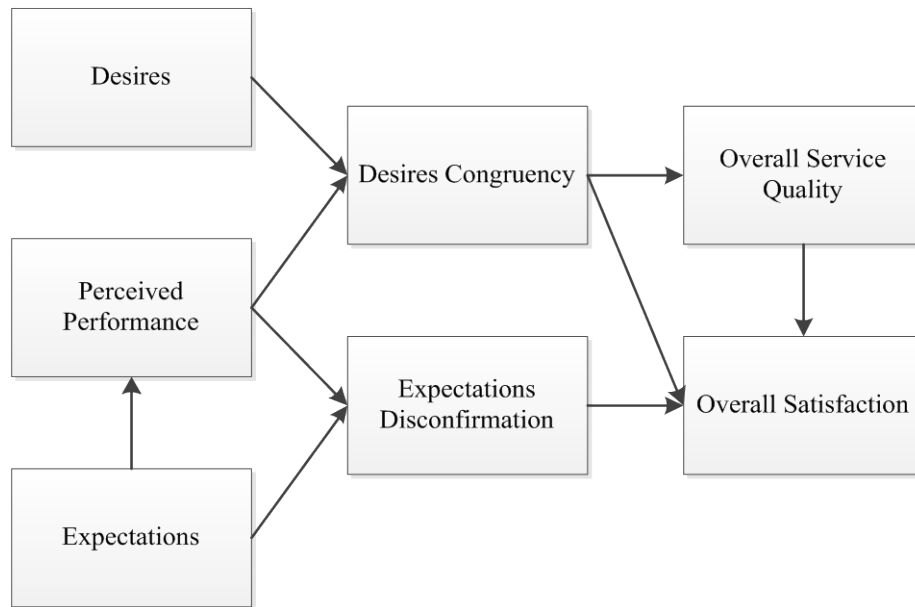
Figure 19: Spreng and Mackoy (1996) Model of Service Quality and Satisfaction

Customer delight is the reaction of customers when they receive a service or product that not only satisfies, but provides unexpected value or unanticipated satisfaction (Oliver and Rust 1997, p. 313) ." Oliver and his colleagues introduced the concept of customer delight, which at the time was overtaking practitioner journals. They offered an initial perspective on delight and suggested how it operates for service satisfaction. Their results indicated that high levels of satisfaction initiate an arousal, which leads to pleasure and delight. The research indicated that delight and satisfaction are two different construct that separately affect behavioral intentions and are strongly related to disconfirmation and pleasure. However, the effects of delight on behavioral intentions were not consistent across studies and appear to be moderated by the service type. Their model is depicted in Figure 20.

Patterson et al. (1997) examined customer satisfaction with services in the context of business-to-business professional services. They used both the disconfirmation paradigm and

equity theory in constructing their model (Figure 21). The model also includes some situational

level and individual level variables that were shown in previous research to affect organizational

decision-making processes.
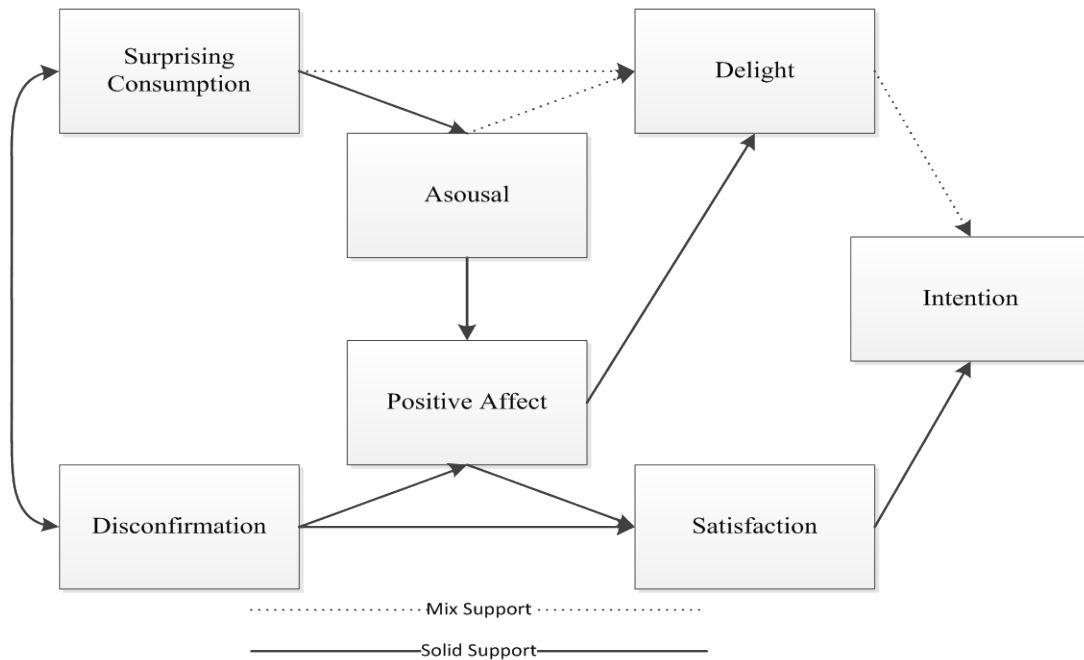
Figure 20: Oliver et al. (1997) Model of Delight and Satisfaction

Situational variables include novelty, importance and decision complexity. Individual

level variables include stakeholding and uncertainty. "Novelty" refers to the lack of experience

of individuals who are in charge of purchasing in organization, with situations they face; m

"importance of the purchase decision" refers to responsible individual's perceived effect of

purchase on organizational productivity and profitability; and decision complexity refers to the

complexity of the purchase situation. Stakeholders are those employees - among people who are

in charge of making an organizational purchase - that would be affected the most by the outcome

of the purchase decision. Finally, uncertainty refers to lack of adequate information about the

outcome of a purchase, hence, the greater the level of decision uncertainty the lower the level of expected performance. Their results indicated a strong support for the whole model. However, stakeholding was found not to have a significant effect on either expectations or performance. Patterson et al. reported that the five antecedents explained 27% of the variation in expectations and 22% of the variation in performance.
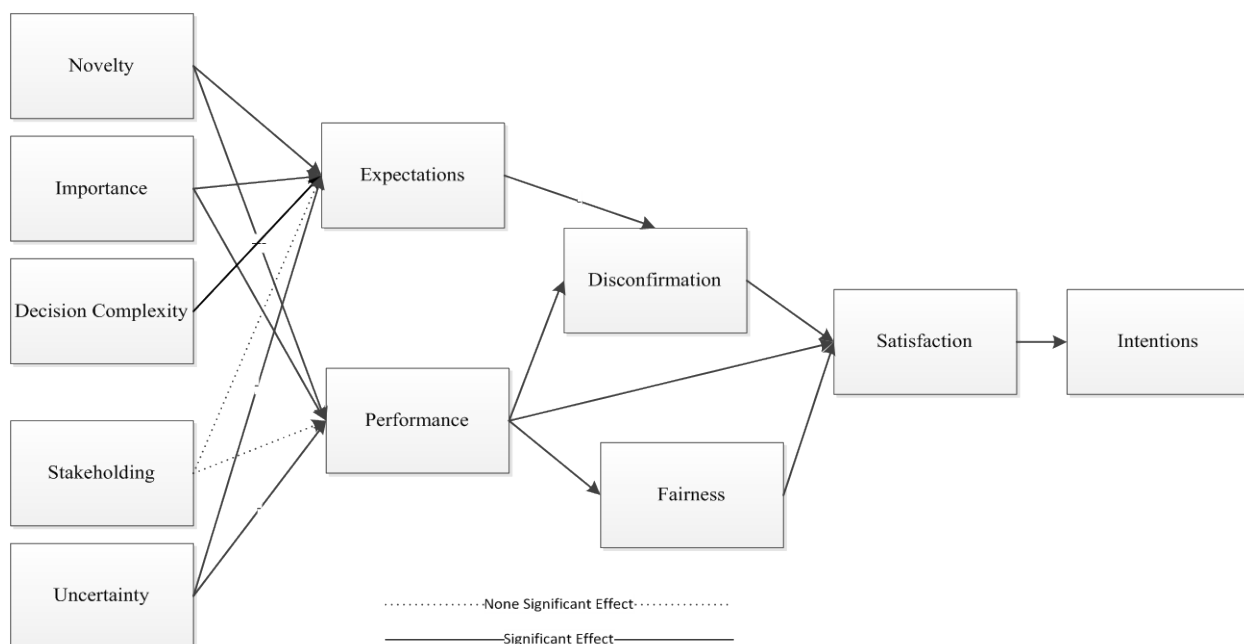
Figure 21: Patterson et al. (1997) Professional Services Satisfaction Model

Dabholkar et al. (2000) proposed a model (Figure 22) of service quality, its antecedents and outcomes. They argue that despite what is implied by SERVQUAL, factors related to service quality are not its components but its antecedents. They identified reliability, personal attention, comfort and features as antecedents of service quality and argued that service quality leads to customer satisfaction and in turn to behavioral intentions.
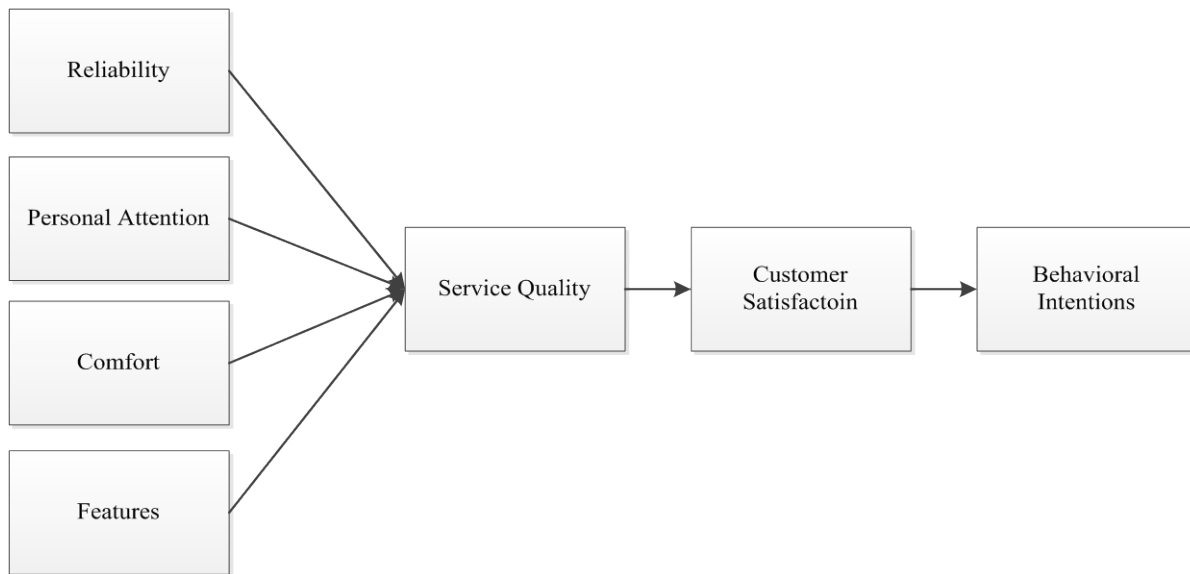
Figure 22: Dabholkar et al. (2000) Service Quality Framework

Consumer Satisfaction with Information Systems

Consumer satisfaction notion was adopted into Information Systems (IS) studies under the concept of user satisfaction. User satisfaction was mostly defined and measured as a proxy for Information System success (Khalifa and Liu 2003). Ives et al. (1983) adopted Bailey and Pearson (1983)'s user information satisfaction survey instrument and reported an improved and shorter version of the instrument. Not only had they deleted items within each scale that had low factor loadings, they also eliminated scales, which failed to show satisfactory psychometric qualities to improve the overall reliability of the survey. Following Ives et al. (1983), Doll and Torkzadeh (1988) developed and validated a survey instrument to measure end-user computing satisfaction. They explained satisfaction through five key features of a system: content, accuracy, format, ease of use, and timeliness.

DeLone and McLean (1992) reviewed empirical articles published between 1981 and 1987 in the seven leading MIS journals in search for dependent variables that are used to measure MIS success. They provided a conceptual model that summarizes these variables and their effects. They stated that system quality and information quality directly influence system use and user satisfaction while system use and satisfaction interact with each other. The results of the interaction between system use and user satisfaction then leads to individual and organizational impacts of Information Systems. Ten years later DeLone and McLean (2003) conducted a follow up study to include new studies of IS success in their model as well as focusing on those studies that had used their former framework to conduct research. In their updated model they slightly differentiated between "intention to use" and "actual use" and added system quality into the antecedents of user satisfaction and intention to use.

Many scholars have tested the relationships presented in the first DeLone and McLean model. However, according to DeLone and McLean (2003), Seddon and Kiew (1994) were the only researchers who tested the antecedents of user satisfaction as presented in DeLone and McLean original model (DeLone and McLean 2003). In the journal edition of their 1994 conference paper, Seddon and Kiew (2007) focus on user satisfaction and its antecedents from the DeLone and McLean (1992) Model. They changed the "use" construct in the original model into usefulness and added a new construct called "importance of the system". They found that system quality, information quality and usefulness can explain the majority of the variance in user satisfaction. Further, they concluded that the "importance of the system" does not have a significant effect on user satisfaction in spite of their hypothesis. Moreover, Gelderman (1998) investigated the relationship between user satisfaction and performance. He used the five factors

developed by Doll and Torkzadeh (1988) to measure user satisfaction. His results indicated a significant relationship between user satisfaction and performance.

Further on user satisfaction, Joshi (1990) investigated the effects of perceived inequity in allocation of MIS resources. His results demonstrated a strong correlation between equity and user satisfaction. He also used equity in combination with previously identified antecedents of user satisfaction and reported a significant increase in the explained variance. Joshi (1992) investigated the role of equity along with role ambiguity and role conflict. He found that equity positively affects user satisfaction while role ambiguity and conflict negatively influence user satisfaction.

Henry and Stone (1994) stated that self-efficacy and outcome expectancy positively impact user's perception of satisfaction. In addition, management support, ease of use, and computer experience would affect satisfaction through outcome expectancy and self-efficacy. Igabaria 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 as well as user computer literacy, attitude and system utilization affect user satisfaction.

In an effort to investigate the relationship between user computing satisfaction and user performance, Etezadi-Amoli and Farhoomand (1996) developed an instrument, including documentation, ease of use, functionality of system, quality of output, support, and security dimensions to measure user computing satisfaction and its connection with performance. Palvia (1996) developed a model to measure small business satisfaction with Information Systems. Their model include elements from end-user computing satisfaction literature, traditional data

processing environments and factors specific to small business IT needs. The model consists of factors such as software adequacy, software maintenance, information content, information accuracy, information format, ease of use, timeliness, security and integrity, productivity, documentation, vendor support, training and evaluation, and an aggregate construct measuring over all evaluation of the system.

Mahmood et al. (2000) conduct a meta-analysis on the end-user satisfaction and its antecedents. They identify nine commonly used 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 indicate that all of these variables are significantly related to user satisfaction.

Pitt et al. (1995) stated that most of the user satisfaction research focuses on IT products instead of services. They explain how the role of IT departments in organizations has changed from being a developer and operator of Information System to include more services to employees. With the introduction of personal computers to organizations, more users are interacting with computers and in turn with the IT department. These users expect IT departments to help them with different aspects of their daily jobs that requires computer interaction such as installing the correct software and training, choosing the right hardware, computer and network problem shooting, and any other activity that relates to information technology. To have a more realistic measure of IS effectiveness; Pitt et al. (1995) suggested a slightly modified version of SERVQUAL as a reliable and valid instrument to measure IS service quality. However, among the five dimensions of the SERVQUAL, tangibles showed unacceptable reliability measures across majority of firms that they tested.

Later on, Van Dyke et al. (1997) criticized the use of SERVQUAL in IS mostly based on the general criticism of the instrument in the marketing and consumer satisfaction literature. They mentioned both conceptual and empirical shortcomings of SERVQUAL such as problems with the use of difference scores in operationalizing perceived service quality and the unclear definition of expectation. They also questioned the applicability of SERVQUAL to IS quality measurement calling for a better instrument that can measure IS service quality without the pitfalls of SERVQUAL. In response to this criticism, mostly using the available literature in marketing as well, Pitt et al. (1997) defended their position on the applicability of SERVQUAL to the IS context and provided counter arguments for conceptual and empirical shortcomings elaborated by Van Dyke et al.

Further, Kettinger and Lee (1994) adopted SERVQUAL into IS studies. Compared to Pitt et al (1995) their instrument deviated more from the original instrument developed by Parasuraman et al (1988) in order to fit the IS context using existing user satisfaction with IS literature and instruments. They compared SERVQUAL to a modified version of an existing user satisfaction measure and found significant correlations between the two models. They also found similar results and ended up removing tangibles from the dimensions that affect quality of service in the IS.

Among the IS studies that adopted marketing theories, expectation-disconfirmation theory so far has been the dominant paradigm (Nevo and Chan 2007). It has been employed in IS to study many subjects such as adoption and continuance intentions (Bhattacherjee 2001b; Bhattacherjee and Premkumar 2004), assessing perceived net benefits of a system (Staples et al. 2002), and satisfaction with various aspects of systems and services (e.g.Kettinger and Lee 2005; McKinney et al. 2002; Wixom and Todd 2005). Next comes desires congruency models and

other theories and paradigms that has been discusses earlier in this chapter (Nevo and Chan 2007).

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 reported that user satisfaction with the initial service encounter, perceived usefulness of service usage, and the interaction between perceived usefulness and loyalty incentives are key determinants of users' intentions to continue their service usage. The initial research model suggested that loyalty incentives directly affect continuance intentions. He also found that confirmation of expectation affect both users' satisfaction with the service and their perceived usefulness. Further, Bhattacherjee (2001b) expanded the initial model to include satisfaction processes. He stated that users' satisfaction with online banking systems is influenced by their confirmation of expectation from prior IS use and perceived usefulness. His model is demonstrated in Figure 23.

Szajna and Scamell (1993) examined the effects of manipulated expectations on Information Systems performance perception. They used cognitive dissonance theory (Festinger 1962) to formulate their hypothesis. They predicted and confirmed that any unrealistic expectations, whether it is too high or too low, will result in less favorable user evaluations of the system.
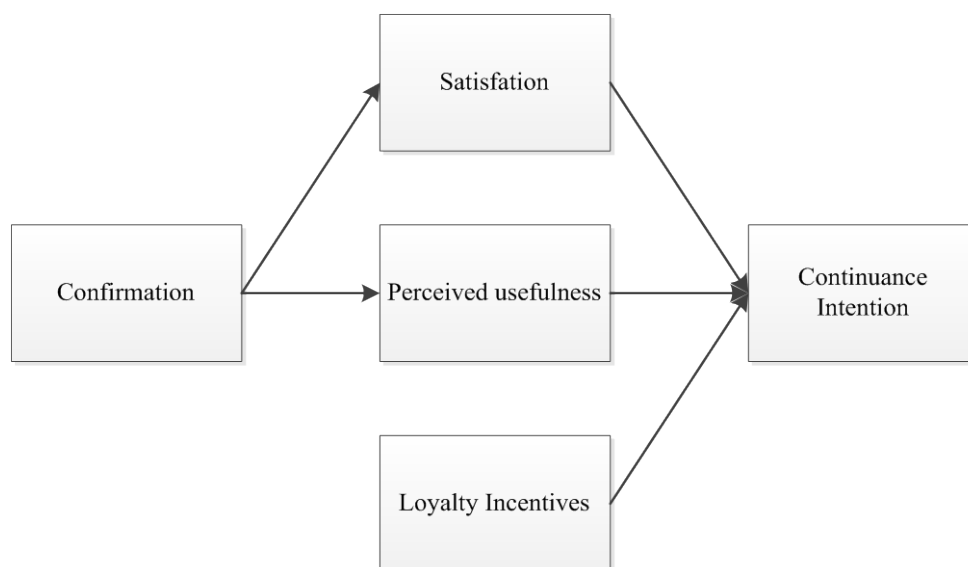
Figure 23: Bhattacherjee (2001b) IS Continuance Model

Staples et al. (2002) investigated the effects of prior expectations on users' perceived benefits after system encounter and found that negative disconfirmation of expectations would result in lower levels of perceived benefits. They categorized users' expectations into having expectations of system usefulness, ease of use, compatibility with work, information quality, ease of learning, and personal benefits. They reported that only expectations for system usefulness, ease of use and information quality would affect perceived benefits and should be managed by executives.

Using expectation-disconfirmation paradigm, McKinney et al. (2002), tested user satisfaction with online shopping experience. They divided website quality into information quality and system quality and then measured customers' expectations, disconfirmation, and perceived performance regarding each dimension. The McKinney et al. model is presented in Figure 24.
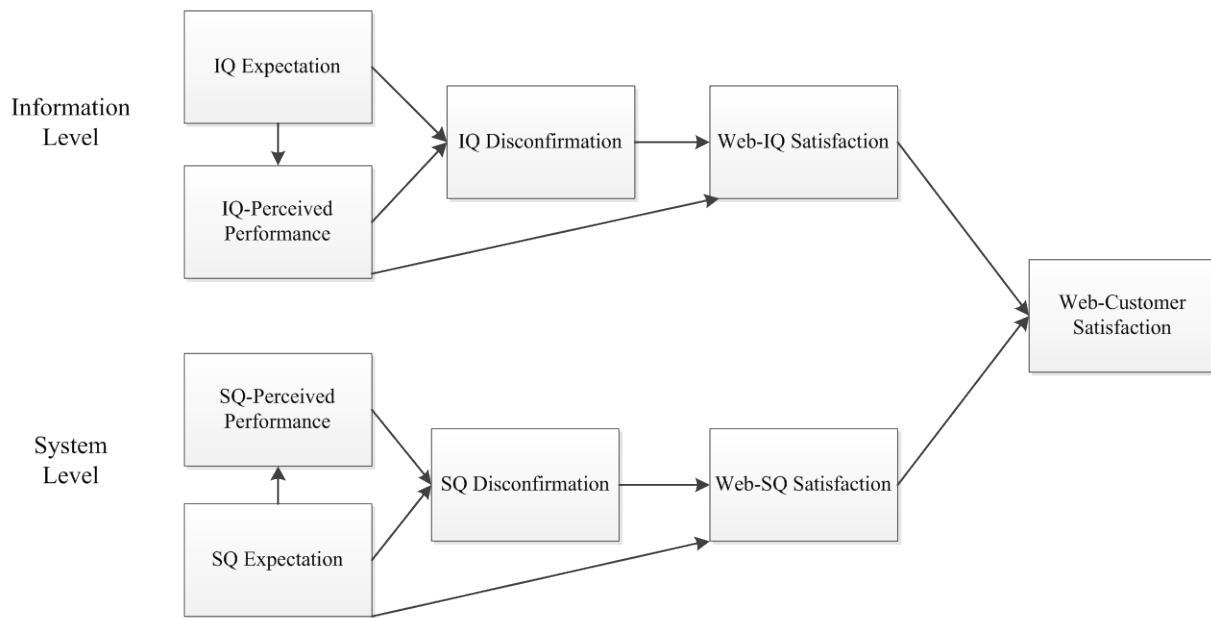
Figure 24: McKinney et al. (2002) The Web-Customer Satisfaction Model

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 in order to identify determinants of "e-satisfaction" through qualitative research methods. Analysis of the interviews resulted in four factors that directly influence e-satisfaction: online convenience, merchandising (product offerings and product information), site design, and transaction security. They further empirically tested these factors and reported statistically significant correlations between satisfaction and each factor. Shopping convenience and site design were reported as leading factors followed by financial security, product information and product offerings.

Erevelles et al. (2003) measured customer satisfaction with Internet Service Providers (ISPs) using three different satisfaction models: expectation-disconfirmation, attribution, and affective response. They found that despite generally low expectations customers are not

satisfied with their ISPs. Using attribution theory (Kelley 1973), Erevelles et al. suggest that customers believe their dissatisfaction is an outcome of ISPs' ignoring their needs. In the end, they stated both affective and cognitive causes are involved in customer's switching behavior.

Susarla et al. (2003) viewed satisfaction from a process perspective (Oliver, 1980) and developed a customer satisfaction model (Figure 25) based on the Bitner (1990)'s satisfaction with service encounters model to measure consumer satisfaction with Application Service Providers (ASP). They borrowed perceived provider performance and disconfirmation constructs from the marketing and consumer satisfaction literature and modeled these as direct antecedents of consumer satisfaction. Sursarla et al. further defined new constructs under two broader concepts of "prior experiences and attitudes toward ASP" and "expectations about ASP service" and investigated their effects on perceived performance and satisfaction. They found that prior internet usage and maturity of internal IT from the "prior experiences" concept have no significant effect on either, perceived performance or satisfaction. Past system integration experience had a significant negative impact on perceived performance and significant positive impact on satisfaction. Moreover, they found that technical service guarantees only has a significant positive impact on perceived performance but not on satisfaction. Functional capability of the ASP was reported to have significant and positive relationship with both satisfaction and perceived performance. Finally, they concluded that the effect of perceived provider performance on satisfaction is significant and positive while the effect of disconfirmation is significant and negative.
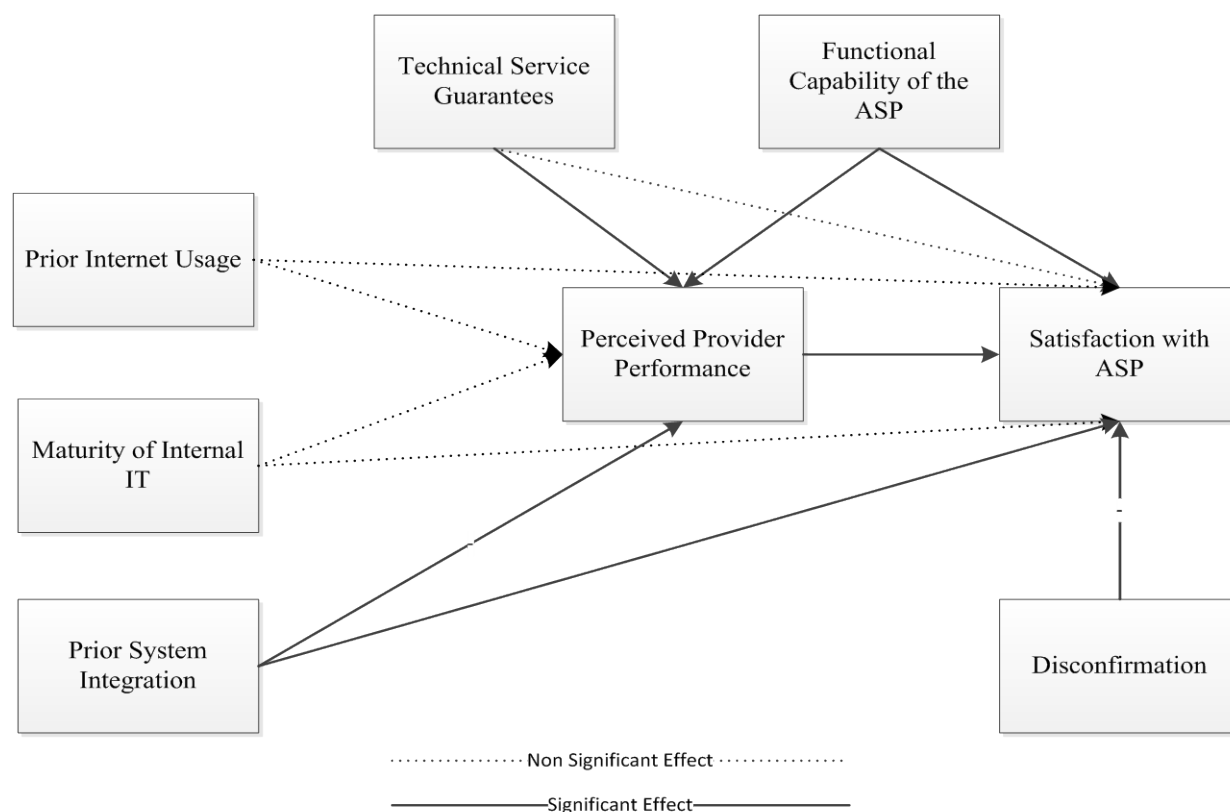
Figure 25: Susarla et al. (2003) Conceptual Model of Satisfaction with ASP

Suh et al. (1994) were the first to use the notion of desires instead of expectations in an Information Systems study. They found that Information Systems success is positively correlated with the disconfirmation of actual system performance and desired performance. Further, Chin and Lee (2000) proposed a model that differentiates the effects of disconfirmed expectations from those of disconfirmed desires on end-user satisfaction and present them both in an integrated conceptual model. However to date, there are no known studies that explicitly attempt to empirically test Chin and Lee (2000)'s proposed model.

Khalifa and Liu (2003) pointed out the novelty effects associated with the rapid advances in information technology and argued that conventional consumer satisfaction models developed

by marketing scholars are not good enough to address all aspects of user satisfaction with Information Systems. Considering these novelty effects, they developed and empirically tested a user satisfaction model (Figure 26) for explaining and predicting satisfaction with the 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 adoption stage; its effects are insignificant at the post-adoption stage. They also reported a non-significant relationship between satisfaction with services at the adoption point and post adoption.

Figure 26: Khalifa et al (2003) Satisfaction with Internet-Based Services Model

Wixom and Todd (2005) combined two streams of popular research in IS to form their satisfaction with Information System model. They integrated the user satisfaction and the technology acceptance concepts in one model distinguishing between beliefs and attitudes about

the system (system quality) from those about the use of the system (information quality). Their results supported the integration efforts and suggested that successful integration of these two research streams can be done. They acknowledged the impact of service quality on user satisfaction; however, they left it out of the model arguing that inclusion of service quality would have made their study very system specific and their intent was to measure characteristics of Information Systems that are fairly general and shared among many systems. Figure 27 depicts their model.
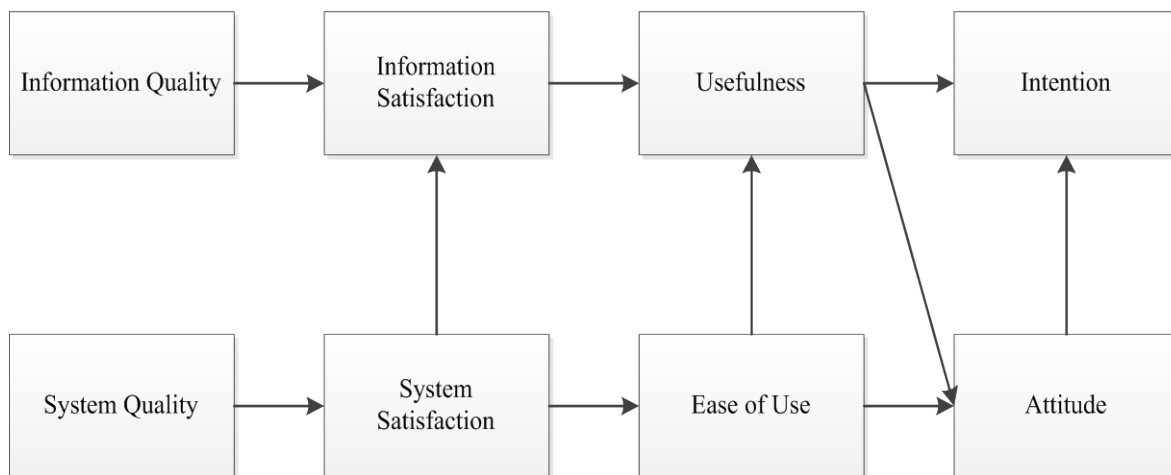
Figure 27: Wixom and Todd (2005) Integrated Research Model

Lankton and Wilson (2007) examined multichannel service providers (e.g. health care services) where customers and providers have a long history of interaction and services are provided both offline and online. They investigated the effects of information-seeking needs and prior satisfaction with services on the initial expectation while defining expectation as an aggregate combination of usefulness, ease of use and enjoyment. They concluded that information-seeking need and prior service satisfaction are significant predictors of expectations. Their model is presented in Figure 28.
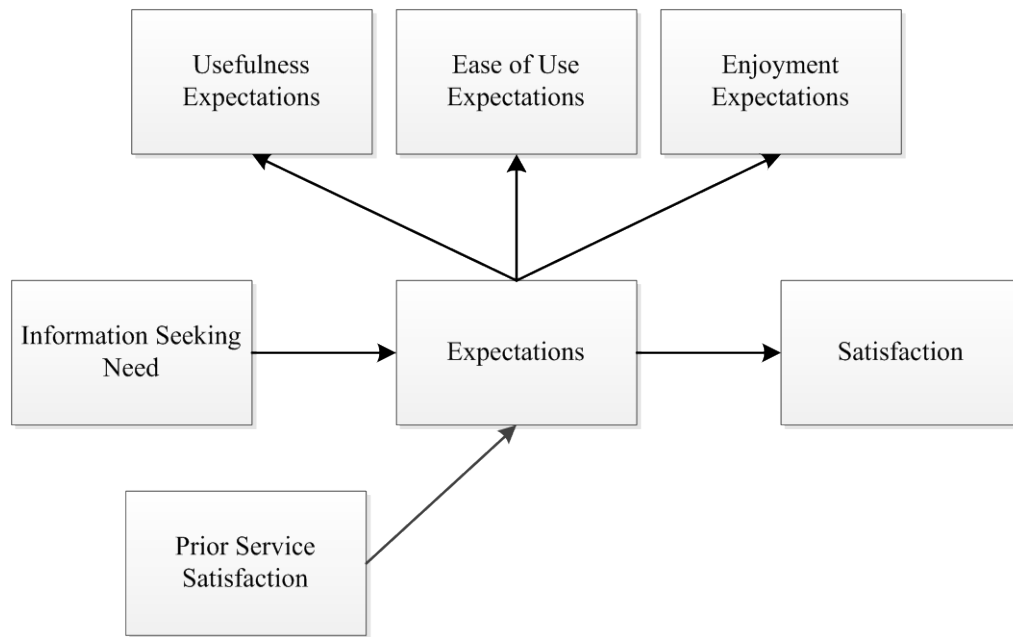
Figure 28: Lankton and Wilson (2007) Expectation Antecedents Model

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 are two different constructs that affect user satisfaction in specific ways. They stated that the effects of expectations and desires on satisfaction varies with time, in that, expectations play a more important role in shaping performance perceptions at the beginning of usage thus disconfirmation of expectations is a stronger determinant of user satisfaction when individuals start using a knowledge management system. On the other hand, desires affect satisfaction in the long run, meaning after the initial period of user experience with a system, disconfirmation of desires would become the stronger determinant of user satisfaction with system. Nevo and Chan conceptualized their qualitative findings in a model (Figure 29) of user satisfaction.
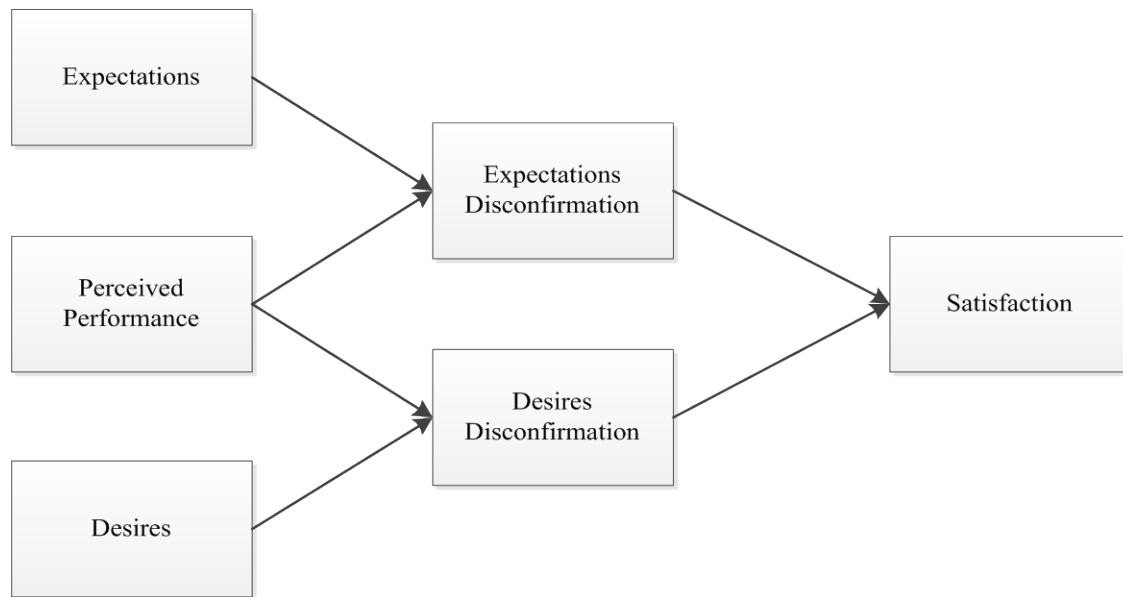
Figure 29: Nevo and Chan (2007) Knowledge Management Satisfaction Model

Morgeson (2011) studied customer (end-user) satisfaction with government and private business websites. He offers an end-user satisfaction and loyalty model (Figure 30) based on Fornell et al. (1996) to measure users' satisfaction with both public and private sector websites. The model suggests organization, personalization, navigation, and reliability as determinants of consumer satisfaction with websites and retention and word of mouth as its outcomes. The results indicated that satisfaction for private sector websites is predominantly determined by the personalization while satisfaction with public sector websites is determined, more or less, equal across various determinants.
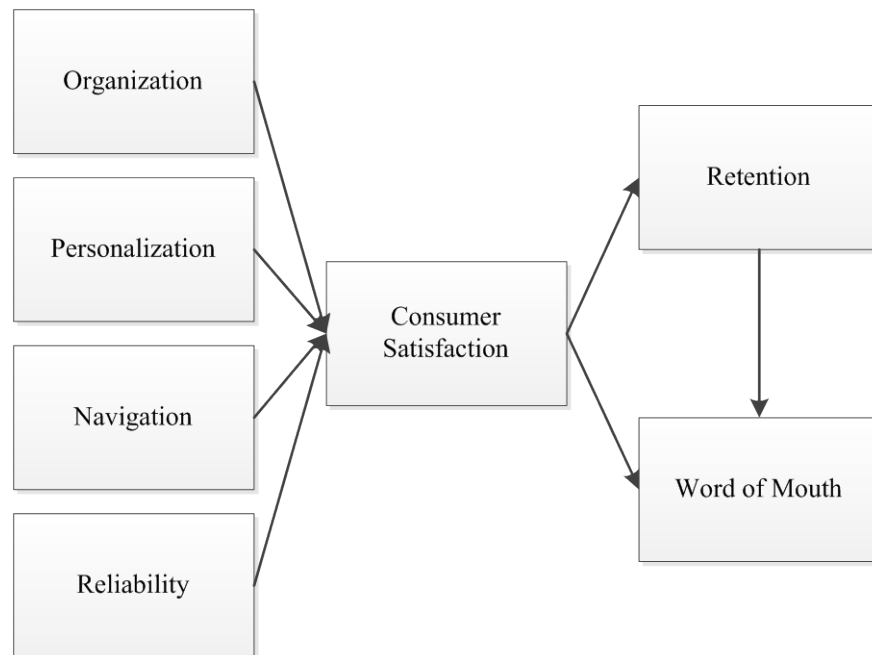
Figure 30: Morgeson (2011) Conceptual Model of Website End-User Satisfaction

CHAPTER 3: RESEARCH MODEL

This chapter explains the processes involved in development of the research model, the research methodology, and the survey instrument. The user satisfaction model is constructed to address the issues and gap in the research identified through the review of the literature and briefly explained in the introduction chapter. As discussed, to date no other scholarly research has investigated all together, the impact of information satisfaction, system satisfaction, and service satisfaction, and satisfaction with their associated attributes on overall user satisfaction. The decision to focus on these three aspects of an IS and their attributes as modeled in this study is based on an extensive review of the literature and identification of those attributes that are considered most by users when evaluating an IS (DeLone and McLean, 2003; McKinney et al., 2002; Wixom and Todd, 2005) .

Despite there being many and varied theories and models of satisfaction in the marketing as well as IS literature, for those studies in IS that draw on the marketing literature the dominant paradigm has been expectation-disconfirmation theory, focusing on the discrepancy between expectations and perceptions, and their impact on user satisfaction (e.g. Bhattacherjee 2001b; McKinney et al. 2002). In this study, however the emphasis shifts from discrepancy-based models of satisfaction to adopting an outcome-oriented view to the study of satisfaction. This study therefore proposes and tests an attribute-based model of user satisfaction (see Figure 31) in which summary judgments of satisfaction with key aspects of an IS (i.e. information satisfaction, system satisfaction, and service satisfaction) are aggregated into more global judgments of

satisfaction (i.e. overall user satisfaction with an IS). At the same time, satisfaction with key aspects of an IS are themselves posited as aggregates of attribute-level satisfaction, that is lower-level judgments of satisfaction with attributes of each aspect of the IS (e.g. satisfaction with information accuracy, information completeness, etc. for information output). This focus means that the research model will not explain the process by which satisfaction is formed from an evaluative perspective such as that emphasized in assessments of quality or expectations-disconfirmation theory. Rather, this study investigates the aggregate contribution of attribute-level satisfaction towards satisfaction with key aspects of an IS (i.e. information, system, and service) and in turn overall user satisfaction. Studying attribute-level satisfaction as well as aspect-level satisfaction is expected to provide a more diagnostically powerful and useful model of user satisfaction and avoid the theoretical controversies associated with many of the process-oriented models of satisfaction, such as those based on evaluations of quality and expectation-disconfirmation theory.

The schematic representation of the proposed user satisfaction model is depicted in Figure 31. The model suggests user satisfaction with attributes of information output, the technical system and support services leads to satisfaction with each aspect, and these in turn contribute to overall user satisfaction. Construct definitions for each of these elements of user satisfaction are provided later in this chapter.

Attribute Satisfaction

Bettman (1974) introduced the concept of attribute satisfaction to satisfaction research grounding this in the Fishbein (1972) multiple-attribute attitude model in which overall attitude toward an object is determined based on the evaluation of the object's attributes. Bettman (1974) suggested that the decision to purchase certain products comes from the belief that first, a
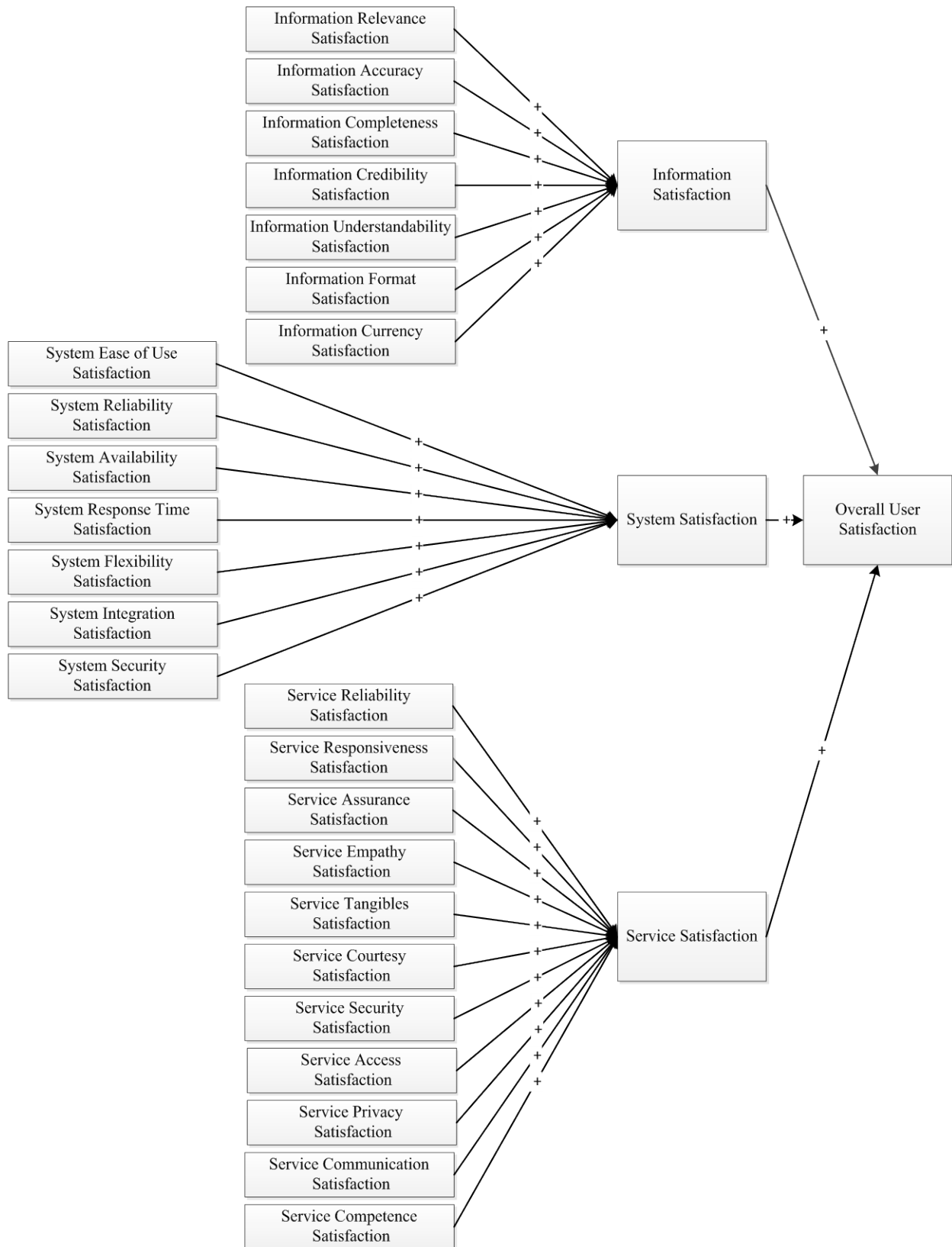
Figure 31: Attribute Model of Overall User Satisfaction

product possesses certain attributes and second, the attribute is judged to be satisfactory. However, he modeled satisfaction with an attribute as a binary variable. Based on his model people are either satisfied or dissatisfied with an attribute.

In an effort to explain how consumers process attribute experiences into a summary satisfaction judgment, Oliver (1993a) used attribute satisfaction as a causal agent for emotions (affect) leading to overall satisfaction. In addition to affecting satisfaction through emotion, he proposed that attribute satisfaction would affect overall satisfaction directly as well. 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 kind 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 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 (1993a, p. 421) further suggested that attribute satisfaction is a result of evaluating attribute performance and defined attribute satisfaction as a "consumer's subjective satisfaction judgment resulting from observations of attribute performance and can be considered to be the psychological fulfillment response consumers make when assessing performance".

Mittal and his colleagues proposed that satisfaction with attributes and their relative contribution to overall satisfaction may change over time due to changes in consumer expectations and behavior. They suggested that companies and researchers need to keep track of their consumers' satisfaction with different product and service attributes over time to ensure lasting consumer satisfaction (Mittal et al. 2001; Mittal et al. 1999).

According to Prospect Theory (Kahneman and Tversky 1979) people tend to weight losses and negative feelings more than gains and positive feelings. This means that an equal amount of loss is usually weighted more than the same amount of gain. Using Prospect Theory, Mittal et al. (1998) investigated the asymmetric effects of attribute satisfaction on overall satisfaction and found that attribute dissatisfaction has a greater impact on overall satisfaction than attribute satisfaction.

Studies of satisfaction at the attribute level are rare in the Information System literature. To date, we are aware of only a handful of studies that have conceptualized judgments such as information satisfaction and system satisfaction (McKinney et al. 2002; Nelson et al. 2005; Wixom and Todd 2005). Others that do consider aspects or attributes of an IS tend to do so from a quality or performance perspective. For example, Cheung and Lee (2005) investigated the asymmetrical effects of selected system quality and information quality attributes on retail websites. Their analysis of the asymmetric nature of attribute performance effects on overall satisfaction was inconclusive. Wixom and Todd (2005) also examined the impact of attributes of information quality and system quality on information satisfaction and system satisfaction, respectively. However, none examined the judgments of satisfaction associated with each attribute, and their relationship to higher levels of satisfaction such as satisfaction with the key IS aspects of an IS.

Research Method

This research takes a positivist approach to identifying and measuring user satisfaction. Positivist philosophy of science asserts that the subject of investigation – user satisfaction – can be measured in a way such that the relationships among its proposed constructs can be captured accurately. This view suggests that the proposed relationships exist in reality and tries to prove

their existence through scientific methods. Therefore, it is of utmost importance to employ a robust and yet parsimonious methodology to ensure that the construct measures, the collected data and resulting analyses are accurate representations of the proposed constructs and the relationships between them (Straub et al. 2004).

This research adopts a survey questionnaire approach in order to test the proposed model. According to King and He (2005) employing survey questionnaires to measure and assess constructs and relationships, has been the preferred research methodology among IS scholars in 1990s and early 2000s. Likewise, survey questionnaires have been the preferred method for IS scholars studying user satisfaction (e.g. Doll and Torkzadeh 1988; Ives et al. 1983; Kettinger and Lee 1994, McKinney et al. 2002, Wixom and Todd 2005). Questionnaires provide an easy way to collect data from a large population. Furthermore, in most cases, their results hold a stronger external validity compared to other positivist methodologies such as experiments and field studies (Straub 1989).

This study follows Straub et al's (2004) guidelines in the construction of the survey questionnaire to ensure the maximum content validity of the instrument. The items are either adapted from validated research or carefully developed based on the construct definitions. A readability pre-test was then conducted using 20 undergraduate students from a marketing class the University of Houston. The results of the readability pre-test suggested a few minor changes to item wording, the introduction and the survey instructions. A pilot test was then conducted to test the initial research model using 48 undergraduate students enrolled in an introduction to Information Systems course at the University of Houston. The results of the pilot test were used to further improve the survey. This was followed by the main data collection in two studies. Study One consisted of three phases of data collection that were separated from each other across

the fall semester. Phase 1 data was collected at the beginning of the semester testing the full model. Phase 2 data was collected in the middle of the semester focusing on user satisfaction with only the key IS aspects; and Phase 3 data was collected toward the end of the fall semester focusing also on user satisfaction with the key IS aspects. Subjects were asked to provide a unique identifier known only to them so their responses could be tracked and matched across the phases in Study One. Concerns regarding the data gathered in Study One for user satisfaction with service attributes led to the collection of further data for service attributes and the incorporation of Study Two into the overall study. Study Two data was therefore collected at the beginning of spring semester using different subjects from Study One and tested user satisfaction with key IS aspects and user satisfaction with service attributes.

Construct Definitions

This study reviewed the consumer satisfaction literature in marketing and psychology as well as the user satisfaction literature in the Information Systems area to determine appropriate IS aspects and attributes to include in an attribute-based model of user satisfaction. In addition to overall user satisfaction, satisfaction with three key IS aspects (i.e. information, system and service) were modeled as major constructs in the research model, that is, information satisfaction, system satisfaction and service satisfaction. These were chosen based on prior research, which suggests these three aspects of IS are important in user evaluations that lead to overall satisfaction (DeLone and McLean 2003; Wixom and Todd 2005). Construct definitions for the four main satisfaction constructs were adopted from the literature in IS and marketing.

Utilizing the IS and marketing literature (Bhattacherjee 2001b; DeLone and McLean 2003; McKinney et al. 2002; Oliver 2010) **overall satisfaction** is defined *as a summary affective state resulting from the entire experience of interacting with the Information System*. This

experience includes the information output, the technical system, and the services surrounding the system (i.e. supporting services). Based on this definition of overall satisfaction and DeLone and McLean (1992; 2003)'s definitions of the key aspects of IS linked to information quality, system quality and service quality, construct definitions for information, system and service satisfaction were also developed. Thus, **information satisfaction** is defined as *a summary affective judgment of the information output provided by the system;* **system satisfaction** is defined as *a summary affective judgment of the technological system and mechanics of interaction*; and **service satisfaction** is defined as a *summary affective judgment of the supporting services surrounding the Information System.* In this study, service means to help, support and facilitate the operation and use of an Information System (DeLone and McLean 2003).

To determine the key attributes that pertain to information satisfaction and system satisfaction the literature was reviewed and a comprehensive list of attributes that were examined in the past research prepared. A team of three researchers then reviewed and discussed each attribute; duplicates were removed and based on the findings in the literature the most appropriate attributes chosen for this study. Except for system security, all other information and system attributes were selected based on their importance in the literature as well as how often they had been included in IS satisfaction models in the prior research. Tables 1 and Table 2 presents the full list of information and system attributes that were considered for the study and identifies those that were selected for the research model.

Past studies on Information Systems (IS) security were concerned with different aspects of security such as the role of employees' involvement in IT security (Dinev et al. 2009), security threats and incidents (Farahmand et al. 2003), security counter measures (Straub and Welke

1998), and so on. These studies highlight the importance of security in evaluating an IS. However, the impact of perceived system security on user satisfaction has not yet been studied. This research adopted Whitman and Mattord (2011)'s definition of IS security and modified it for the study context. Related measures of system security satisfaction are therefore developed based on the adopted definition.

Service attributes were determined based on the service quality literature in combination with IS literature. To determine key service attributes, Parasuraman et al. (1985)'s, Parasuraman et al. (1988)'s, and Parasuraman et al. (2005)'s proposed attributes were adopted for two reasons. First, they provided one of the most comprehensive lists of service attributes used in the service satisfaction literature. Second, most of the user satisfaction with IS studies that have considered IS services have adopted Parasuraman (1988)'s attributes of service quality (e.g. DeLone and McLean 2003; Kettinger and Lee 1994; Pitt et al. 1995). Table 3 reports the summary results of the literature survey on IS service attributes.

In summary, 25 attributes are included in the model of satisfaction. This is therefore one of the most comprehensive models of satisfaction, in terms of breadth of attributes studied. Tables 4, 5, and 6 list the information, system, and service attributes that are used in this research along with their definitions and supporting scholarly works.

<div align="center">**Construct Measures**</div>

Construct measures were adopted where these existed in the literature and new ones created when no suitable measures were found. This study uses 7 items to measure overall satisfaction, four of which were adopted from Spreng et al. (1996), and three items adapted from Chin and Lee (2000). Using 7-point Likert scales, anchor points for the three items adapted from

Chin and Lee were given as: extremely dissatisfied (-3), quite dissatisfied (-2), slightly dissatisfied (-1), neither dissatisfied nor satisfied (0), slightly satisfied (+1), quite satisfied (+2), and extremely satisfied (+3) for the first question. Anchor points for the other two questions follow a similar pattern, except for the end-points, which are given as: very dissatisfied/very satisfied (instead of extremely dissatisfied/extremely satisfied).

The four items adopted from Spreng et. al. (1996) have been used in measuring user satisfaction with IS (Bhattercherjee 2001b) and information output and technical system satisfaction (Wixom and Todd 2005; McKinney et al. 2002). They measured user satisfaction using four sets of opposing adjectives referring to satisfaction feelings. Measured using 7-point semantic differential scales, the pairs of adjectives are: very dissatisfied (-3)/very satisfied (+3), very displeased (-3)/very pleased (+3), very frustrated (-3)/very contented (+3), very disappointed (-3)/very delighted (+3). These items are also used for measures of information satisfaction, system satisfaction and service satisfaction (See Appendix C).

The study uses six items each to measure information satisfaction, system satisfaction, and service satisfaction. Similar to the measures for overall satisfaction, four of these six items were adapted from Spreng et al. (1996), and assessed using 7-point semantic differential scales (i.e. very dissatisfied/very satisfied, very displeased/very pleased, very frustrated/very contented, very disappointed/very delighted).

Table 1: Summary Results of Literature Search for Information Attributes

	Seddon (1997)	Myers et al. (1997)	Sedera & Gable (2004)	Petter et al. (2008)	Halawi et al. (2007)	Leclercq (2007)*	Shaw et al. (2002)	Chiu et al. (2007)	McKinney et al. (2002)	Wixom & Todd (2005)	Chang & King (2005)	Doll & tokzadeh (1988)	Ives et al. (1983)	DeLone & McLean (1992)	DeLone & McLean (2003)
Relevance	X		X	X	X		X	X	X				X	X	X
Timeliness	X			X	X				X			X	X	X	
Accuracy	X	X		X	X	X	X	X		X		X	X	X	
Content		X				X						X			
Availability		X	X												
Usability			X	X											
Understandability			X		X			X						X	X
Format			X		X	X				X			X	X	
Conciseness			X	X	X									X	
Completeness				X	X		X	X		X			X	X	X
Currency				X	X					X			X		
Precision					X	X	X						X	X	
Credibility/Reliability					X			X	X		X		X	X	
Meaningfulness					X										
Comparability					X										
Scope									X					X	
Usefulness									X		X				
Flexibility											X				
Accessibility											X				
Intrinsic Quality											X				
Contextual Quality											X				
Presentational Quality											X				
Confidence in the system													X		
Volume													X		
Importance														X	
Sufficiency														X	
Freedom From Bias														X	
Comparability														X	
Quantitativeness														X	
Personalization															X
Security															X

Table 2: Summary Results of Literature Search for System Attributes

	Seddon (1997)*	Sedera & Gable (2004)	Myers et al. (1997)*	Petter et al. (2008)*	Halawi et al. (2007)	Leclercq (2007)*	Chiu et al. (2007)	Palmer (2002)	McKinny et al. (2002)	Wixom & Todd (2005)	Chang & King (2005)	Kositanurit et al. (2006)	Doll & torkzadeh (1988)	Ives et al. (1983)	DeLone & McLean (1992)	DeLone & McLean (2003)
Consistency	X															
Ease of use	X	X	X	X		X	X				X	X	X		X	
Documentation	X											X				
Accuracy		X														
Flexibility		X	X	X	X	X				X				X	X	
Integration		X		X						X					X	
Customization		X														
Reliability			X	X			X			X	X	X			X	X
Response time			X	X	X		X				X	X			X	X
Timeliness										X						
Usefulness			X	X											X	
Accessibility			X	X					X	X					X	
Ease of learning		X		X											X	
Intuitiveness				X												
Sophistication				X											X	
User Requirements		X			X										X	
Functionality						X						X				
Availability							X		X							X
Responsiveness									X							
Interactivity									X	X						
Usability										X						
Navigation										X						
Currency												X				
Resource utilization															X	
Investment util.															X	
Adaptability																X
Usability																X

Table 3: Summary Results of Literature Search for Service Attributes

	Blanton et al. (1992)	Kettinger & Lee (1994)	Pitt et al. (1995)	Igbaria et al. (1997)	Gefen & Keil (1998)	Aladwani (2002)	Chang & King (2005)	Parasuraman et al. (2005)	Halawi et al. (2005)	Chui et al. (2007)	Petter et. Al. (2008)	Myers et al. (1997)	Ives et al. (1983)	DeLone & McLean (2003)	Parasuraman et al. (1985)
Tangibles		X	X						X			X		X	X
Reliability		X	X				X		X		X	X		X	X
Responsiveness		X	X				X	X	X		X	X		X	X
Assurance		X	X	X					X		X	X	X	X	
Empathy		X	X				X		X		X	X		X	
Tech. Competency											X				
Support				X		X	X			X					
Training				X		X	X								
Upgrading						X									
Importance	X														
Availability	X							X					X		
Utilization	X														
Effectiveness	X														
Cost/Benefit							X								
Flexibility							X						X		
Efficiency								X							
Fulfillment								X							
Privacy								X							
Compensation								X							
Staff relationship													X		
Staff Attitude													X		
Communication													X		X
Access															X
Competence															X
Credibility															X
Courtesy															X
Security															X
Understanding															X

The other two items were adapted from Chin and Lee (2000). Based on the construct definitions, each item measure was adapted such that the focus was on the respective key aspect of information, system and service satisfaction, instead of overall satisfaction. Each scale therefore uses a 7-point scale to capture responses, but different wordings from those used for overall satisfaction. For example, the two items adapted from Chin and Lee (2000) for information satisfaction read as: (1) I am satisfied with the information I get from the system, and (2) I am very satisfied with the information I receive from the system. Items for system satisfaction and service satisfaction are similarly worded and scaled, except that these focus on the satisfaction with the system and with the support services respectively. The scale points for these items are labeled: strongly disagree (-3), quite disagree (-2), slightly disagree (-1), neither agree nor disagree (0), slightly agree (+1), quite agree (+2), strongly agree (+3). See Appendix C for details.

Finally, items for measuring satisfaction with information, system and service attributes are constructed based on the attribute definitions. After determining the attribute definitions based on the literature, the team of three researchers reviewed existing questions as well as alternative wordings with similar meanings that could be used in constructing additional measurement items where needed. Measurement items for attribute satisfaction use 7-point Likert scales with labels reading: very dissatisfied (-3), quite dissatisfied (-2), slightly dissatisfied (-1), neither dissatisfied nor satisfied (0), slightly satisfied (+1), quite satisfied (+2), and very satisfied (+3). The survey questionnaire is provided in Appendix C.

Table 4: Information Attributes

Attribute	Definition	Supporting Literature
Relevance	The extent to which information is salient to one's job.	Ives et al. (1983), DeLone and McLean (1992, 2003), Seddon (1997), McKinney et al. (2002), Shaw et al. (2002), Sedera and Gable (2004), Chiu et al. (2007), Halawi et al. (2007), Petter et al. (2008)
Accuracy	The extent to which information is free from error.	Ives et al. (1983), Dol and Torkzadeh (1988), DeLone and McLean (1992), Myers et al. (1997), Seddon (1997), Shaw et al. (2002), Wixom and Todd (2005), Chiu et al. (2007), Halawi et al. (2007), Leclercq (2007), Petter et al. (2008)
Understandability	The extent to which information can be understood.	DeLone and Mclean (1992, 2003), Sedera and Gable (2004), Chiu et al. (2007), Halawi et al. (2007)
Format	The extent to which information is presented well.	Doll and Torkzadeh (1988), DeLone and McLean (1992), Sedera and Gable (2004), Wixom and Todd (2005), Halawi et al. (2007), Leclercq (2007)
Completeness	The extent to which the information contains all the necessary parts.	Ives et al. (1983), DeLone and McLean (1992, 2003), Shaw et al. (2002), Wixom and Todd (2005), Chiu et al. (2007), Halawi et al. (2007), Petter et al. (2008)
Credibility	The extent to which the information is trustworthy.	Ives et al. (1983), DeLone and McLean (1992), McKinney et al. (2002), Shaw et al. (2002), Chang and King (2005), Halawi et al. (2007)
Currency	The extent to which information is current and up-to-date	Ives et al. (1983), Wixom and Todd (2005), Halawi et al. (2007), Petter et al. (2008)

Table 5: System Attributes

Attribute	Definition	Supporting Literature
Ease of Use	The extent to which using a system is free of effort.	Dol and Torkzadeh (1988), DeLone and McLean (1992), Myers et al. (1997), Seddon (1997), Sedera and Gable (2004), Chang and King (2005), Chiu et al. (2007), Leclercq (2007), Petter et al. (2008)
Reliability	The extent to which a system functions dependably.	DeLone and McLean (1992, 2003), Myers et al. (1997), Wixom and Todd (2005), Chang and King (2005), Chiu et al. (2007), Petter et al. (2008)
Availability	The extent to which a system is available to use.	DeLone and McLean (2003), McKinney et al. (2002), Chiu et al. (2007)
Response time	The extent to which a system carries out requests for action in a timely manner.	Delone and McLean (1992, 2003), Myers et al. (1997), Chang and King (2005), Chiu et al. (2007), Halawi et al. (2007), Petter et al. (2008)
Flexibility	The extent to which a system adapts to changing requirements.	Ives et al. (1983), Delone and McLean (1992), Myers et al. (1997), Sedera and Gable (2004), Wixom and Todd (2005), Halawi et al. (2007), Leclercq (2007), Petter et al. (2008)
Integration	The extent to which a system brings together data and information from various sources.	Delone and McLean (1992), Sedera and Gable (2004), Wixom and Todd (2005), Halawi et al. (2007)
Security	The extent to which the information in the system is kept safe.	Whitman and Mattord (2011)

Table 6: Service Attributes

Attribute	Definition	Supporting Literature
Reliability	Consistency and dependability of service performance	Parasuraman et al. (1985), Parasuraman et al. (1988), Delone and McLean (2003), Kettinger and Lee (1994), Pitt et al. (1995), Myers et al. (1997), Chang and King (2005), Halawi et al. (2007), Petter et al. (2008)
Responsiveness	The ability to provide prompt service	Parasuraman et al. (1985), Parasuraman et al. (1988), Ives et al. (1983), Delone and McLean (2003), Kettinger and Lee (1994), Pitt et al. (1995), Myers et al. (1997), Gefen and Keil (1998), Parasuraman et al. (2005), Chang and King (2005), Halawi et al. (2007), Petter et al. (2008)
Assurance	Ability of the support service to inspire trust and confidence	Parasuraman et al. (1988), Delone and McLean (2003), Kettinger and Lee (1994), Pitt et al. (1995), Myers et al. (1997), Halawi et al. (2007), Petter et al. (2008)
Empathy	Individual attention and caring that is conveyed by the support services	Parasuraman et al. (1988), Delone and McLean (2003), Kettinger and Lee (1994), Pitt et al. (1995), Myers et al. (1997), Chang and King (2005), Halawi et al. (2007), Petter et al. (2008)
Tangibles	physical evidence of the service	Parasuraman et al. (1985), Parasuraman et al. (1988), Delone and McLean (2003), Kettinger and Lee (1994), Pitt et al. (1995), Myers et al. (1997), Halawi et al. (2007)
Courtesy	The support service's politeness and respectfulness	Parasuraman et al. (1985)
Security	The degree to which service encounters provide a safe and risk free environment	Parasuraman et al. (1985)
Privacy	Degree to which service support encounters are kept confidential	Parasuraman et al. (2005)
Communication	The support services ability to communicate clearly and understandably	Parasuraman et al. (1985), Ives et al. (1983)
Competence	The ability or capabilities of the support service to provide service	Parasuraman et al. (1985)
Access	The accessibility and availability of support services	Parasuraman et al. (1985)

CHAPTER 4: ANALYSIS AND RESULTS

This chapter explains the data analysis processes that have been used to analyze the

research model elaborated in Chapter 3. To test our model we have developed a questionnaire

that has been tested and modified in a pilot study and then employed in two studies using

subjects enrolled in business degrees at the University of Houston. This chapter describes the

analysis approach used and presents the results for the pilot test and the subsequent studies.

Further explanation of the results and their implications for theory, research and practice are

provided in the discussion and conclusion chapters that follow. The current chapter starts with

providing a brief description of the statistical methodology employed in data analysis and reports

the results of the pilot study in addition to the two main studies. All analyses has been done using

the partial least squares (PLS) methodology with the help of PLS Graph software version 3.01

developed by Chin (1993).

PLS Analysis

The PLS approach is capable of analyzing latent variable models with multiple constructs

and indicators. It is most suited for exploratory research and can explain variance by testing the

significance of relationships among constructs. The partial least squares methodology is most

similar to linear regression in which the relationships between constructs and their indicators can

be measured simultaneously. It also takes into account the measurement error unlike linear

regression which is based on the error free measurement assumption (Wold 1982). PLS in its

essence is a multivariate statistical analysis technique that is capable of evaluating the strength

and direction of the relationships among variables in a model. It assigns each indicator a weight based on its impact on the related construct. Thus, indicators with more impact would receive higher weights compared to indicators with less impact on the corresponding construct (Chin 1998).

The partial least squares methodology is a variance-based analytical methodology and has fewer restrictions compared to covariance-based structural equation modeling approaches in terms of sample size, measurement scales and residual distributions. Unlike the covariance-based SEM methods, PLS does not require data normality and can provide reliable analysis even with smaller sample sizes. This aspect fits well with the pilot phase of this study, which has a sample size of 48 responses. Compared with covariance-based approaches, the PLS approach can also handle larger and more complex models with many constructs and indicators which again aligns well with this study in which the measurement model consists of 29 constructs and 151 items in the pilot phase, and 121 items in the main study phase (Chin 1998).

The PLS methodology distinguishes two components of model building: the measurement model and the structural model. Although both models are evaluated simultaneously by the PLS software, the measurement model analysis results are typically examined before the structural model analysis results. Measurement model analysis reports on the indicator loadings for their respective constructs and cross-loadings for other constructs. These can be used to assess convergent and discriminant validity among the construct measures. The structural model analysis reports the path coefficient measures along with latent variable R-squares; together these reflect the explanatory power of independent variables (Fornell and Larcker 1981).

Pilot Study

To test the user satisfaction with Information Systems model that was proposed in the previous chapter, this study focused on the PeopleSoft System currently used by students at the University of Houston. Students use the PeopleSoft system to register for classes, pay their tuition and fees, request transcripts, track their financial aid, and make appointment with their academic advisers. The initial survey questions (Appendix B) were slightly modified (replacing Information System with the PeopleSoft System) and tested using an online survey hosting service (www.qualtrics.com). The survey was made available to participants over a 4-week period; a total of 48 subjects were surveyed and all 48 completed the survey questionnaire. The subjects were all undergraduate students in the Bauer College of Business enrolled in a marketing course as or Information Systems course. They were offered two extra credits for their participation; the response rate was 100%. Of the 48 respondents, 29 (60.4%) were male students. The majority of respondents (79.2%) were aged between 18 and 24 years. 60% of the students who filled out the survey responded that they have had a service encounter linked to the IS (either automated or through staff) in the past. 56% of students indicated they have been using the system more than 1 year, and 23% had used it for 6 months to 1 year. 35% of the respondents also indicated that they use the system regularly on an everyday basis, while 25% reporting using it only a few times a week, followed by 17% who log into system about once a month.

Survey Instrument Improvement

The goal of the pilot study was to test and refine instrument reliability and validity. To this end, a measurement model was constructed. Item composite reliability scores provided by PLS were used to assess indicator reliabilities. PLS provides a composite reliability index in which item loadings indicate the item reliability. The higher the loadings are, the better the

reliability of the measures. It is recommended that each item needs to have a loading of 0.7 and higher to present a shared variance of about fifty percent between the item and the construct (Fornell and Larcker 1981). The same criterion was used for the pilot study. However, all the reported composite reliability scores were above .80 suggesting a shared variance of 0.64 and above, and demonstrating strong convergence.

In order to reduce the time taken for respondents to fill out the survey and improve survey efficiency, items that were loading comparatively lower on their respective constructs were eliminated while keeping the model completely identified. Thus, we turned our attention to constructs that were measured using more than three indicators. Using a step-by-step procedure, items were marked for elimination one at a time and then the measurement model reassessed at each iteration to observe the impact of their elimination on the remaining constructs and item loadings[1]. The elimination process resulted in a final survey questionnaire with 30 questions less than the starting one used for the pilot study; none of the starting constructs were dropped in this analysis. The final survey questionnaire that was used in Phase 1 of the data collection is presented in Appendix C.

The final survey questionnaire reliability and validity was empirically test through two studies. Both studies contributed in establishing the goodness of measures and modeled described earlier. The following sections further elaborate on each study and the obtained results.

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[1] The details of this process are well documented and available to readers upon request.

Study One

Study 1 was conducted in the fall semester over a three month period and data were collected across three phases to provide a better test for suggested causalities and reduce common method bias as suggested by Podsakoff et al. (2003). The questionnaire for all three phases was implemented using the same survey hosting service as the pilot study. Phase 1 included the complete questionnaire (Appendix C) with items assessing user satisfaction with various attributes linked to the information, system and service aspects of an Information System, and their impact on respective aspects (i.e. information satisfaction, systems satisfaction, and service satisfaction). The influence of user satisfaction with information, system, and service aspects of the IS were also evaluated in terms of their impact on overall user satisfaction as depicted in the research model (Figure 31, chapter 3). Phase 2 and Phase 3 used a partial questionnaire focusing on measuring user satisfaction with each of the three key IS aspects (i.e. information, system and service) and their effects on overall user satisfaction.

Phase 1 was announced 3 weeks after the start of semester. The survey questionnaire for this phase was available to students for two weeks. Phase 2 was released two weeks after completion of Phase 1. It was available to students for 10 days. Phase 3 was also announced 2 weeks after Phase 2 was completed and was available to respondents for 10 days. This design allowed at least a two-week time lag between each data-gathering phase. The system under investigation (PeopleSoft) is usually used the most in the first few weeks of each semester followed by the last couple of weeks. Students use the PeopleSoft system in the first few weeks to pay their tuitions, add and drop classes, and follow up with their financial aid disbursement. They also use the system in last few weeks of each semester to schedule appointments with their academic adviser, enroll for next semester classes, check on their academic records, and pay any

fees that may have incurred to them during the semester. The lowest use of the system by students is expected in the middle of semester. Based on the students' usage patterns, Phase 1 data were gathered when students had to interact with the PeopleSoft the most followed by Phase 3 and Phase 2 released when students were expected to have fewer interactions with the system.

Undergraduate students enrolled in a core business course were asked to participate in the main study in return for 2 extra credits upon completion of all three phases. A total of 450 complete responses were collected for Phase 1 of the study followed by 403 for Phase 2 and 385 for Phase 3. 368 respondents completed all three phases of the survey study. The decrease in the number of participants over phases was expected, as many students tend to drop the course before the end of the semester. A total of 556 students were enrolled in the course in three sessions at the beginning of semester. The enrolment number decreased to 495 by the end of the semester. This puts the response rate at 81% for Phase 1, 78% for Phase 3, and 74.3% for those completing the survey across in each of the three phases of data collection (based on the final enrolments at the end of the semester).

The study controlled for service encounter (either automated or through staff). To provide consistency in analysis and reporting, only the responses from those who indicated that they have had a service encounter with IS support are used in the analyses presented in this chapter. However, the same types of analyses are conducted for those who indicated that they have not a service encounter in the past as well as the total population. The results of these analyses are provided in Appendix D for the total population, and Appendix E for the "No Service Encounter" group.

Phase 1

The data for Phase 1 was collected closer to the peak system usage period in the first few weeks of semester. A total of 450 students completed the online survey out of which 55% were male and 45% female. The majority (90.4%) of respondents aged between 18 and 24 years old. 54% (243 responses) of those who filled out the survey indicated that they have had a service encounter with the IS (either automated or through staff) in the past. Furthermore, in terms of duration of usage and system familiarity, 63% of the respondents indicated they have been using the system for more than 1 year, while 26% have been using the system for less than 6 months. 22% of the students also indicated they use the system regularly for a few times a week, and 19% for several times a day. The majority of respondents (86%) were active system users who used the system from a few times a month to a few times a day.

Phase 1 Measurement Model

Item composite reliability score shows whether indicators measuring a latent variable (LV) are consistent in their measurement error. According to Chin (1998) loading scores above 0.7 is a good indicator of item reliability. Item composite reliability scores can also be used as a measure of convergent validity when all indictors are reflective. Convergent validity is concerned with determining whether all the indicators related to a latent variable are measuring the same phenomenon.

In addition to composite reliability scores, average variance extracted (AVE) for each latent variable was used to better assess the reliability of the measures and their discriminant validity. Discriminant validity is concerned with whether each set of indicators that are measuring a latent variable are different from other indicators that are measuring other LVs. The AVE indicates the amount of variance among indicators that is explained by LV while taking

into account measurement error. It is suggested that for a construct to be reliable it should demonstrate an AVE value of 0.5 and higher. However, discriminant validity is only supported if average variance extracted values for latent variables are greater than the squared correlation among the LVs (Chin 1998).

There are total of 29 latent variables in this user satisfaction with IS model; 25 of the LVs represent attributes of information satisfaction, system satisfaction and service satisfaction; 3 latent variables were used to measure user information satisfaction, system satisfaction and service satisfaction with key aspects of the Information System, and 1 latent variable used to measure overall user satisfaction. Tables 7, 9, and 11 report the item reliability scores for individual items related to each attribute-level latent variable using data from those who indicated that they have had service encounter in the past.

All the item reliability scores exceeded 0.8, which is well above the suggested cut off point (0.7). There are also no major cross-loadings among the constructs measuring user satisfaction with information and system attributes suggesting discriminant validity of constructs. To further test construct reliability, convergent validity and discriminant validity, average variance extracted AVE, composite reliability scores (CR) and squared correlation among latent variables are also reported in Tables 8, 10 and 12. All the reported composite reliability scores are above 0.8, which is greater than the suggested cutoff of 0.7 and indicate adequate construct convergent validity (Chin 1998). Moreover, all the reported average variance extracted values are above 0.8, which is higher than the suggested 0.5 value indicating adequate convergent validity for the latent variables. AVE values for each construct are also higher than their squared correlations with other constructs for each of the Information System attributes, which suggest discriminant validity for these latent variables.

However, some anomalies among the service attributes are observed. Even through there is no item that loads more on a different construct than its own, there are alarming cross-loadings among items measuring user satisfaction with service attributes. Furthermore, the AVE values for most of the service attributes are higher than their squared correlations with other attributes except for one (i.e. Service Competence). There are also a few squared correlations that are close to their corresponding AVE value. For example, Service Assurance AVE reported 0.88, which is very close to its squared correlation with Service Reliability measures at 0.87. The same situation exists for Service Privacy (AVE = 0.88) and its squared correlation with Service Competence (0.86). There are also other cases of close AVE and squared correlation values for Service Tangibles with Service Empathy and Service Access, as well as Service Communication with Service Privacy. Even though these values are close, the AVE value in all cases is slightly higher than the squared correlation except for the AVE values for Service Competence (0.79) that is slightly lower than its squared correlation with Service Security (0.80).

Therefore, in order to further test and establish convergent and discriminant validity for the user satisfaction with service attribute measures, another set of data using students enrolled in the same core business cores were collected in the consecutive semester (Study Two). The new survey only measured user satisfaction with the key IS aspects (i.e. information, systems and service) as well as user satisfaction with each of the service attributes for the system under study. The results of the data analysis for the new survey are reported at the end of this chapter under the Study Two section.

Table 7: Information Attributes - Item Reliability (SrEnc: Yes, N=243)

	Relevance (IR)	Currency (ICU)	Accuracy (IA)	Understandability (IU)	Format (IF)	Completeness (ICO)	Credibility (ICR)
IR1	**0.95**	0.64	0.62	0.57	0.56	0.61	0.61
IR2	**0.95**	0.65	0.65	0.58	0.53	0.63	0.62
IR3	**0.94**	0.59	0.59	0.56	0.54	0.63	0.59
ICU1	0.61	**0.94**	0.70	0.67	0.62	0.78	0.72
ICU2	0.61	**0.94**	0.69	0.68	0.61	0.72	0.66
ICU3	0.65	**0.94**	0.69	0.65	0.60	0.74	0.69
IA1	0.58	0.60	**0.91**	0.53	0.49	0.62	0.61
IA2	0.60	0.77	**0.88**	0.58	0.52	0.72	0.73
IA3	0.59	0.61	**0.92**	0.55	0.49	0.64	0.62
IU1	0.55	0.63	0.53	**0.91**	0.70	0.74	0.67
IU2	0.55	0.65	0.53	**0.91**	0.72	0.76	0.69
IU3	0.56	0.67	0.62	**0.93**	0.78	0.79	0.71
IF1	0.56	0.61	0.53	0.73	**0.94**	0.73	0.65
IF2	0.55	0.62	0.55	0.76	**0.94**	0.74	0.66
IF3	0.51	0.59	0.49	0.76	**0.93**	0.66	0.64
ICO1	0.65	0.80	0.77	0.77	0.71	**0.93**	0.78
ICO2	0.59	0.69	0.62	0.76	0.70	**0.91**	0.73
ICO3	0.60	0.72	0.66	0.78	0.71	**0.93**	0.74
ICR1	0.56	0.64	0.68	0.73	0.67	0.75	**0.87**
ICR2	0.54	0.63	0.64	0.62	0.57	0.69	**0.92**
ICR3	0.63	0.71	0.66	0.68	0.63	0.74	**0.91**

Table 8: Information Attributes - Composite Reliability (CR), Average Variance Extracted (AVE), and Squared Correlations (SrEnc: Yes, N=243)

			Information Attributes						
	CR	AVE	IR	ICU	IA	IU	IF	ICO	ICR
Relevance (IR)	0.96	0.89	1.00						
Currency (ICU)	0.96	0.88	0.44	1.00					
Accuracy (IA)	0.93	0.82	0.43	0.55	1.00				
Understandability (IU)	0.94	0.84	0.36	0.50	0.38	1.00			
Format (IF)	0.95	0.88	0.33	0.42	0.31	0.77	1.00		
Completeness (ICO)	0.95	0.86	0.43	0.63	0.54	0.70	0.58	1.00	
Credibility (ICR)	0.93	0.81	0.41	0.54	0.53	0.57	0.48	0.66	1.00

Table 9: System Attributes - Item Reliability (SrEnc: Yes, N=243)

	Ease Of Use (EOU)	Reliability (SyR)	Availability (SyA)	Response Time (SyT)	Flexibility (SyF)	Integration (SyI)	Security (SySc)
EOU1	**0.92**	0.73	0.70	0.64	0.68	0.58	0.51
EOU2	**0.92**	0.72	0.70	0.66	0.72	0.56	0.49
EOU3	**0.92**	0.74	0.72	0.68	0.70	0.60	0.53
SyR1	0.74	**0.91**	0.71	0.66	0.73	0.64	0.60
SyR2	0.75	**0.92**	0.76	0.68	0.70	0.65	0.59
SyR3	0.72	**0.89**	0.70	0.64	0.75	0.58	0.56
SyR4	0.69	**0.88**	0.67	0.63	0.76	0.55	0.47
SyA2	0.69	0.74	**0.92**	0.70	0.67	0.66	0.63
SyA3	0.63	0.66	**0.89**	0.63	0.59	0.55	0.55
SyA1	0.74	0.75	**0.91**	0.72	0.69	0.69	0.66
SyT1	0.67	0.69	0.75	**0.92**	0.65	0.77	0.62
SyT2	0.66	0.66	0.70	**0.95**	0.59	0.70	0.53
SyT3	0.68	0.69	0.69	**0.94**	0.62	0.71	0.51
SyF1	0.67	0.77	0.63	0.57	**0.92**	0.54	0.55
SyF2	0.62	0.78	0.62	0.56	**0.92**	0.54	0.55
SyF3	0.77	0.73	0.71	0.66	**0.89**	0.67	0.63
SyI1	0.61	0.66	0.68	0.75	0.63	**0.95**	0.68
SyI2	0.60	0.62	0.67	0.73	0.60	**0.93**	0.65
SyI3	0.57	0.63	0.66	0.73	0.59	**0.95**	0.69
SySc1	0.52	0.59	0.65	0.52	0.63	0.63	**0.94**
SySc2	0.51	0.56	0.60	0.55	0.57	0.69	**0.94**
SySc3	0.54	0.60	0.67	0.60	0.59	0.71	**0.95**

Table 10: System Attributes - Composite Reliability (CR), Average Variance Extracted (AVE), and Squared Correlations (SrEnc: Yes, N=243)

			System Attributes						
	CR	AVE	EOU	SyR	SyA	SyT	SyF	SyI	SySc
Ease Of Use (EOU)	0.95	0.85	1.00						
Reliability (SyR)	0.94	0.81	0.72	1.00					
Availability (SyA)	0.93	0.82	0.59	0.63	1.00				
Response Time (SyT)	0.96	0.88	0.51	0.52	0.58	1.00			
Flexibility (SyF)	0.94	0.83	0.57	0.76	0.52	0.44	1.00		
integration (SyI)	0.96	0.89	0.39	0.45	0.50	0.61	0.42	1.00	
Security (SySc)	0.96	0.89	0.31	0.38	0.46	0.35	0.41	0.51	1.00

Table 11: Service Attributes - Item Reliability (SrEnc: Yes, N=243)

	Reliability (SrR)	Responsiveness (SrRp)	Assurance (SrA)	Courtesy (SrC)	Security (SrSc)	Competence (SrCp)	Privacy (SrP)	Communication (SrCm)	Access (SrAc)	Empathy (SrE)	Tangibles (SrTa)
SrR1	**0.93**	0.83	0.84	0.62	0.65	0.72	0.69	0.72	0.72	0.63	0.63
SrR2	**0.92**	0.78	0.85	0.64	0.69	0.75	0.73	0.74	0.69	0.67	0.67
SrR3	**0.94**	0.86	0.91	0.63	0.64	0.72	0.71	0.72	0.70	0.67	0.65
SrRp1	0.82	**0.93**	0.83	0.52	0.53	0.62	0.60	0.61	0.68	0.61	0.57
SrRp2	0.81	**0.94**	0.81	0.56	0.56	0.61	0.64	0.61	0.70	0.59	0.60
SrRp3	0.84	**0.93**	0.83	0.52	0.58	0.65	0.63	0.65	0.70	0.62	0.60
SrRp4	0.84	**0.92**	0.85	0.59	0.62	0.68	0.65	0.68	0.68	0.63	0.61
SrA1	0.88	0.82	**0.94**	0.64	0.66	0.71	0.70	0.70	0.68	0.67	0.65
SrA2	0.89	0.85	**0.94**	0.63	0.66	0.73	0.73	0.72	0.70	0.69	0.64
SrA3	0.85	0.82	**0.94**	0.60	0.59	0.68	0.68	0.68	0.65	0.66	0.63
SrC1	0.65	0.55	0.63	**0.94**	0.79	0.81	0.83	0.77	0.62	0.75	0.72
SrC2	0.61	0.54	0.60	**0.94**	0.82	0.81	0.81	0.75	0.68	0.72	0.73
SrC3	0.66	0.58	0.66	**0.95**	0.78	0.83	0.82	0.79	0.71	0.81	0.75
SrSc1	0.62	0.55	0.60	0.78	**0.91**	0.80	0.77	0.69	0.60	0.61	0.65
SrSc2	0.67	0.59	0.64	0.76	**0.94**	0.85	0.84	0.77	0.63	0.69	0.69
SrSc3	0.67	0.58	0.63	0.79	**0.93**	0.84	0.81	0.73	0.62	0.67	0.69
SrCp1	0.69	0.60	0.68	0.78	0.85	**0.91**	0.83	0.75	0.64	0.70	0.71
SrCp2	0.65	0.55	0.62	0.73	0.85	**0.87**	0.78	0.68	0.64	0.67	0.69
SrCp3	0.72	0.66	0.70	0.79	0.77	**0.90**	0.84	0.85	0.69	0.77	0.72
SrCp4	0.72	0.64	0.69	0.77	0.74	**0.88**	0.80	0.83	0.67	0.71	0.69
SrP1	0.70	0.62	0.70	0.80	0.83	0.86	**0.93**	0.77	0.64	0.75	0.73
SrP2	0.73	0.63	0.69	0.81	0.79	0.83	**0.93**	0.90	0.67	0.73	0.74
SrCm1	0.75	0.68	0.73	0.77	0.75	0.84	0.84	**0.95**	0.69	0.75	0.71
SrCm2	0.70	0.61	0.66	0.76	0.69	0.78	0.82	**0.93**	0.62	0.73	0.69
SrCm3	0.74	0.63	0.70	0.76	0.76	0.83	0.84	**0.92**	0.67	0.73	0.69
SrAc1	0.72	0.72	0.68	0.70	0.65	0.71	0.68	0.69	**0.94**	0.73	0.77
SrAc2	0.73	0.74	0.72	0.65	0.61	0.70	0.66	0.66	**0.95**	0.71	0.78
SrAc3	0.65	0.62	0.61	0.64	0.60	0.67	0.64	0.63	**0.92**	0.69	0.77
SrE1	0.66	0.62	0.66	0.76	0.69	0.77	0.77	0.76	0.75	**0.92**	0.80
SrE2	0.67	0.61	0.68	0.76	0.67	0.75	0.74	0.74	0.70	**0.96**	0.76
SrE3	0.66	0.61	0.68	0.75	0.66	0.76	0.74	0.74	0.69	**0.94**	0.77
SrE4	0.66	0.63	0.67	0.76	0.65	0.73	0.74	0.72	0.72	**0.94**	0.80
SrTa1	0.64	0.59	0.63	0.68	0.68	0.73	0.72	0.69	0.73	0.77	**0.90**
SrTa2	0.64	0.56	0.57	0.65	0.62	0.69	0.69	0.70	0.78	0.72	**0.89**
SrTa3	0.67	0.61	0.66	0.68	0.66	0.73	0.73	0.73	0.74	0.77	**0.88**
SrTa4	0.68	0.62	0.66	0.68	0.70	0.75	0.75	0.70	0.75	0.74	**0.89**

SrTa5	0.61	0.57	0.60	0.71	0.67	0.68	0.69	0.61	0.71	0.72	**0.89**
SrTa6	0.56	0.50	0.55	0.70	0.61	0.66	0.66	0.59	0.70	0.71	**0.86**
SrTa7	0.51	0.48	0.50	0.66	0.55	0.60	0.59	0.55	0.72	0.71	**0.85**

Table 12: Service Attributes - Composite Reliability (CR), Average Variance Extracted (AVE), and Squared Correlations (SrEnc: Yes, N=243)

			Service Attributes										
	CR	AVE	SrR	SrRp	SrA	SrC	SrSc	SrCp	SrP	SrCm	SrAc	SrE	SrTa
Reliability	0.95	0.87	1.00										
Responsiveness	0.96	0.87	0.79	1.00									
Assurance	0.96	0.88	0.87	0.79	1.00								
Courtesy	0.96	0.89	0.46	0.34	0.44	1.00							
Security	0.95	0.86	0.50	0.38	0.46	0.70	1.00						
Competence	0.94	0.79	0.61	0.47	0.57	0.75	0.80	1.00					
Privacy	0.93	0.86	0.58	0.46	0.56	0.75	0.76	0.83	1.00				
Communication	0.95	0.87	0.61	0.47	0.56	0.67	0.62	0.76	0.80	1.00			
Access	0.95	0.87	0.57	0.55	0.52	0.50	0.44	0.55	0.50	0.50	1.00		
Empathy	0.97	0.88	0.50	0.43	0.51	0.65	0.50	0.63	0.63	0.62	0.58	1.00	
Tangibles	0.96	0.77	0.49	0.41	0.47	0.60	0.53	0.62	0.62	0.56	0.69	0.69	1.00

Table 13 presents the item reliability scores for latent variables measuring user satisfaction the PeopleSoft System as well as user satisfaction with information, system and service aspects of the PeopleSoft system. Satisfaction with key aspects of the IS was measured using six items for each aspect. All individual item reliability scores are higher than 0.85, which is well above the 0.7 cut off point. These statistics are indicators of good item reliability as well as construct convergent validity. Table 14 reports the composite reliability scores, average variance extracted and squared correlations among the constructs measuring user satisfaction with the PeopleSoft System as well as user satisfaction with key aspects of the PeopleSoft system (Information, System, and Service). All the composite reliability scores are well above the suggested 0.7 as well as all the AVE values indicating acceptable measurement reliability as

well as convergent validity. There are also no squared correlation values above or close to the

respective construct AVE value indicating good discriminant validity for measures.

Table 13: Information, System, and Service Satisfaction Item Reliability (Phase 1, SrEnc: Yes, N=243)

	Overall Satisfaction (OS)	Information Satisfaction (IS)	System Satisfaction (SyS)	Service Satisfaction (SrS)
OS1p1	**0.95**	0.77	0.78	0.65
OS2p1	**0.96**	0.76	0.77	0.65
OS3p1	**0.96**	0.76	0.76	0.66
OS4p1	**0.95**	0.75	0.78	0.67
OS5p1	**0.96**	0.76	0.79	0.69
OS6p1	**0.93**	0.72	0.77	0.67
OS7p1	**0.91**	0.76	0.77	0.68
IS1p1	0.69	**0.88**	0.66	0.59
IS2p1	0.72	**0.86**	0.69	0.64
IS3p1	0.74	**0.92**	0.70	0.57
IS4p1	0.69	**0.90**	0.63	0.56
IS5p1	0.71	**0.90**	0.72	0.65
IS6p1	0.71	**0.88**	0.72	0.60
SyS1p1	0.75	0.71	**0.92**	0.58
SyS2p1	0.76	0.69	**0.90**	0.64
SyS3p1	0.79	0.72	**0.94**	0.63
SyS4p1	0.76	0.74	**0.94**	0.64
SyS5p1	0.72	0.72	**0.94**	0.63
SyS6p1	0.76	0.73	**0.92**	0.68
SrS1p1	0.67	0.64	0.61	**0.92**
SrS2p1	0.67	0.64	0.62	**0.94**
SrS3p1	0.67	0.65	0.66	**0.96**
SrS4p1	0.67	0.65	0.65	**0.96**
SrS5p1	0.68	0.62	0.66	**0.96**
SrS6p1	0.67	0.65	0.68	**0.95**

Table 14: Overall Satisfaction and IS Key Aspects Satisfaction Composite Reliability, Average Variance Extracted, and Squared Correlations (Phase 1, SrEnc: Yes, N=243)

	CR	AVE	Overall Satisfaction	Information Satisfaction	System Satisfaction	Service Satisfaction
Overall Satisfaction	0.96	0.78	1.00			
Information Satisfaction	0.96	0.79	0.60	1.00		
System Satisfaction	0.97	0.86	0.69	0.60	1.00	
Service Satisfaction	0.98	0.90	0.42	0.46	0.47	1.00

Overall satisfaction was measured using 7 items. In order to examine convergent and determinant validity of overall satisfaction construct, we created a measurement model that also included information satisfaction, system satisfaction, and service satisfaction constructs. Individual item reliability scores for overall satisfaction construct were all above 0.85, which demonstrate high indicator reliability. Moreover, composite reliability score (0.97) and average variance extracted value (0.87) for this construct, as compared to the measures for the key IS aspect satisfaction constructs, demonstrated strong construct reliability as well as convergent and discriminant validity.

Phase 1 Structural Model

According to Chin (1998), path coefficients and variance explained (R-squared) can be used to examine the nomological validity of a model. Further, R-squared values for latent variables can be used to evaluate the predictive power of the model. The r-squared value is an indicator of the variance in a latent variable that is explained by its direct measures. It is important to note that R-squared values cannot be used in establishing causal relationships. The causal relationship has to be established using theoretical arguments in support of the model (Chin 1998). In PLS path coefficients are essentially the same as regression coefficients (standardized beta weights) and can be interpreted in the same way. Therefore, path coefficients can be used as indicators of causal relationship strengths (Chin 1998).

Based on the PLS Graph output, Information Satisfaction, System Satisfaction and Service Satisfaction accounted for 0.754 of the variance in overall students' satisfaction with the PeopleSoft system. Satisfaction with information attributes accounted for 0.564 of the variance in user satisfaction with the information aspect of the PeopleSoft System. System attribute

satisfaction explained 0.664 of the variance in user satisfaction with the system aspect, and

service attributes satisfaction accounted for 0.556 of the variance in user satisfaction with the

service aspect of the PeopleSoft system. Figures 32, 33, and 34 demonstrate the path coefficient

loadings for the respective attributes on Information Satisfaction, System Satisfaction and

Service Satisfaction. Figure 35 shows the path loadings for overall satisfaction.
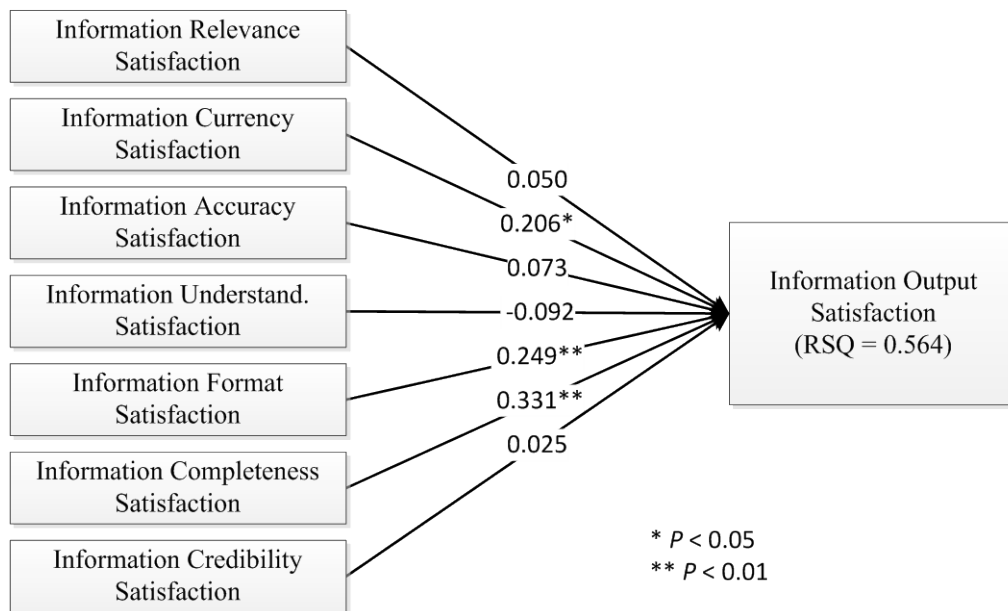
Figure 32: Information Attributes to Information Satisfaction Structural Model (SrEnc: Yes, N=243)
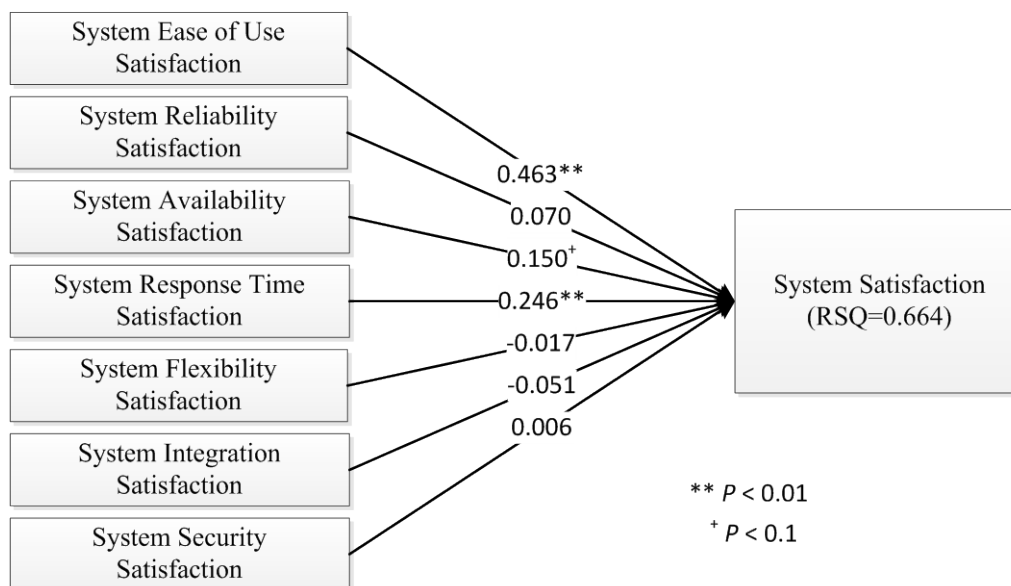
Figure 33: System Attributes to System Satisfaction Structural Model (SrEnc: Yes, N=243)
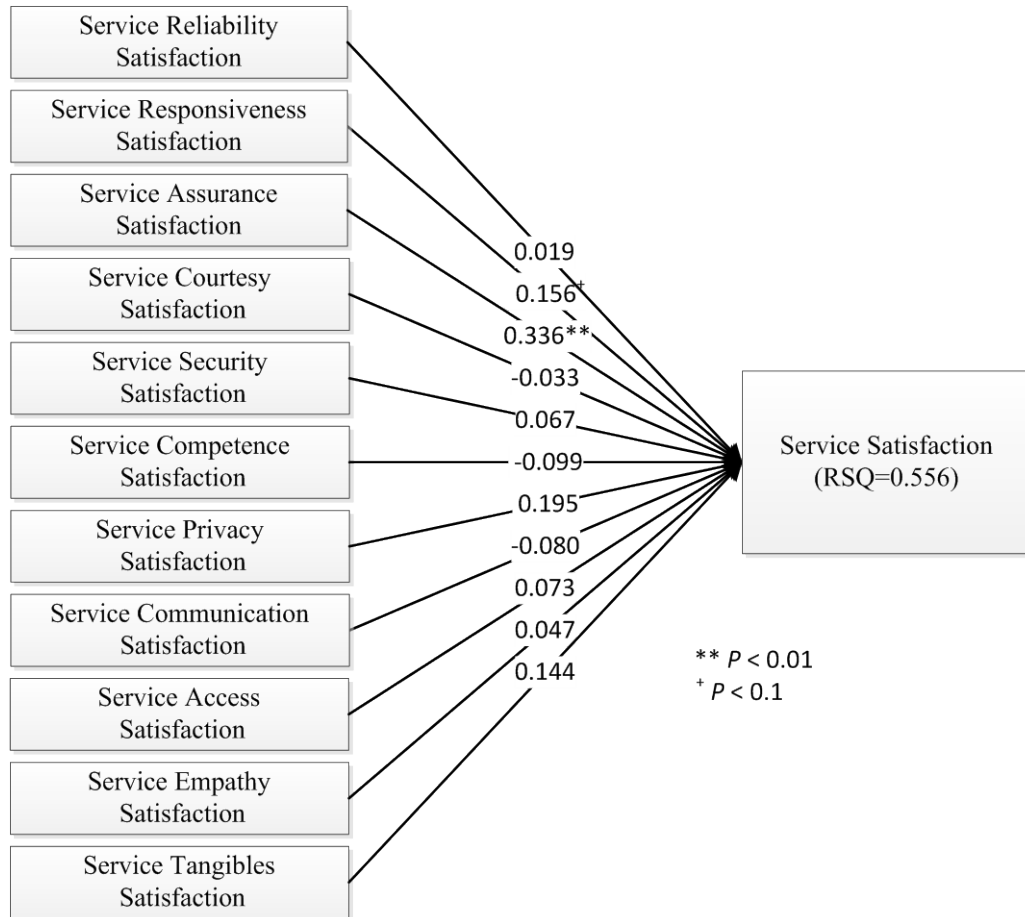
Figure 34: Service Attributes to Service Satisfaction Structural Model (SrEnc: Yes, N=243)
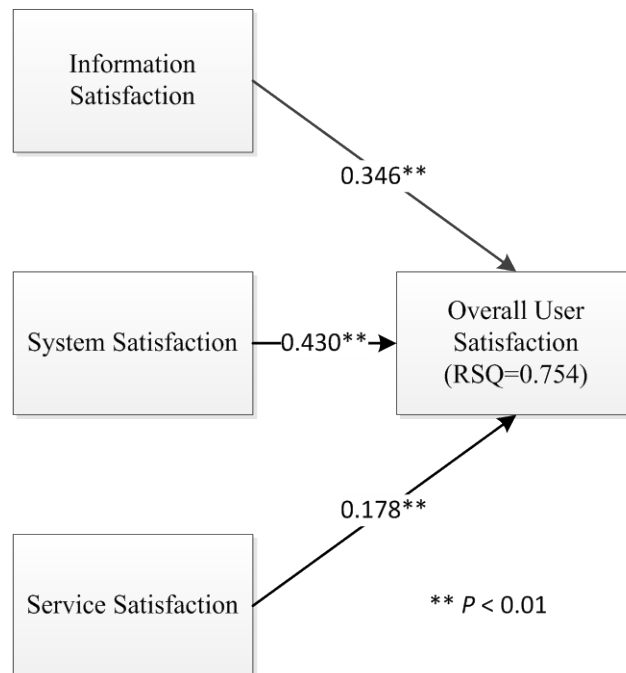
Figure 35: Satisfaction with Key IS Aspects to Overall Satisfaction (Phase 1, SrEnc: Yes, N=243)

Path statistical significance is assessed using a bootstrapping method of sampling with replacement using 1000 bootstrap runs. The bootstrapping results indicate that all path coefficients from the three aspects of the PeopleSoft system (i.e. information, system, service) to overall satisfaction are significant at the $p \leq 0.01$. However, not all the path coefficients from the individual attributes to the respective key IS aspects enjoy the same level of statistical significance.

Among the information attributes, information completeness (0.331) and information format (0.249) were significant at the $p \leq 0.01$ level while information currency (0.206) path coefficients were significant at $p \leq 0.05$ level. Information relevance, accuracy, understandability and credibility path coefficients were not significant. For system attributes, system ease of use (0.463) and system response time (0.246) path coefficients were statistically significant at $p \leq 0.01$ and system availability (0.090) was significant at $p \leq 0.1$. The remaining system attributes (reliability, flexibility, security and integration) demonstrated no statistical significance. In terms of service attributes, only the path coefficient for service assurance (0.336) was significant at $p \leq 0.01$. The path coefficient for service responsiveness (0.156) was also significant at $p \leq 0.1$. The rest of the service attributes were non-significant.

Phase 2 and 3

To examine the stability of our measures over time and support our causal arguments we collected data on user satisfaction with information, system, and service aspects of the PeopleSoft system as well as user overall satisfaction with the system was collected across two time periods after the first phase of data collection. Phase 2 data was collected approximately 2 weeks after Phase 1 and, Phase 3 data was collected about 6 weeks after the Phase 1 data collection; all three phases used the same student population. Phase 2 data was collected during

the time, based on the university enrolment and educational cycle, that students are expected to have the least amount of interaction with the system while Phase 3 data was collected in a time period closer to system high usage.

A total of 403 students completed the online survey in Phase 2 out of which 214 (53%) students indicated that they had service encounter in the past. For phase 3, 385 students completed the online survey out of which 214 (55%) students indicated that they had a have service encounter in the past. Students in Phase 1 provided a unique identifier, known only to them, that could be used in the second and third phases to match their responses across different phases and carry out further analysis. A total of 368 responses were matched across all three phases using the unique response identifier. The service encounter control data collected in Phase 1, 201, (54%) students indicated that they had have and IS service encounter experience.

Phase 2 and 3 Measurement Model

In Phases 2 and 3 only measures of overall user satisfaction with the IS along with user satisfaction with each of the key aspects of the IS namely Information, System and Service, were taken. Thus, the Phase 2 and Phase 3 models incorporate 4 latent variables each - 3 measuring satisfaction with each of the key aspects of the IS and 1 the overall user satisfaction. The same items as Phase 1 were used in Phases 2 and 3 to measure overall user satisfaction as well as measuring key aspects of the PeopleSoft system. Similar to Phase 1, composite reliability scores and average variance extracted values were used as measures of convergent validity. Discriminant validity of the constructs was established by comparing the AVE values with squared correlations among the latent variables. All the latent variables showed adequate convergent and discriminant validity in both Phases 2 and 3. Item reliability composite scores are

reported in Tables 15 and 17 for Phases 2 and 3. These scores demonstrate a very high level of

consistency in measuring the respective constructs.

Table 15: Overall Satisfaction and IS Key Aspects Satisfaction Item Reliability (Phase 2, SrEnc: Yes, N=214)

	Overall Satisfaction (OS)	Information Satisfaction (IS)	System Satisfaction (SyS)	Service Satisfaction (SrS)
OS1p2	**0.93**	0.70	0.71	0.63
OS2p2	**0.95**	0.73	0.73	0.64
OS3p2	**0.95**	0.75	0.77	0.66
OS4p2	**0.96**	0.77	0.77	0.73
OS5p2	**0.95**	0.75	0.75	0.72
OS6p2	**0.93**	0.77	0.80	0.71
OS7p2	**0.92**	0.78	0.77	0.71
IS1p2	0.74	**0.92**	0.79	0.68
IS2p2	0.64	**0.87**	0.73	0.65
IS3p2	0.76	**0.95**	0.74	0.73
IS4p2	0.76	**0.95**	0.72	0.71
IS5p2	0.78	**0.94**	0.74	0.71
IS6p2	0.75	**0.93**	0.72	0.71
SyS1p2	0.76	0.72	**0.91**	0.72
SyS2p2	0.69	0.76	**0.89**	0.66
SyS3p2	0.78	0.72	**0.95**	0.71
SyS4p2	0.77	0.72	**0.95**	0.74
SyS5p2	0.75	0.72	**0.93**	0.68
SyS6p2	0.74	0.71	**0.92**	0.71
SrS1p2	0.67	0.69	0.69	**0.93**
SrS2p2	0.67	0.70	0.70	**0.93**
SrS3p2	0.69	0.69	0.70	**0.96**
SrS4p2	0.69	0.74	0.74	**0.97**
SrS5p2	0.71	0.72	0.74	**0.94**
SrS6p2	0.69	0.72	0.72	**0.94**

Table 16: Overall Satisfaction and IS Key Aspects Satisfaction Composite Reliability, Average Variance Extracted, and Squared Correlations (Phase 2, SrEnc: Yes, N=214)

	CR	AVE	Overall Satisfaction	Information Satisfaction	System Satisfaction	Service Satisfaction
Overall Satisfaction	0.98	0.88	1.00			
Information Satisfaction	0.97	0.86	0.64	1.00		
System Satisfaction	0.97	0.86	0.65	0.76	1.00	
Service Satisfaction	0.98	0.89	0.53	0.57	0.57	1.00

Table 17: Overall Satisfaction and IS Key Aspects Satisfaction Item Reliability (Phase 3, SrEnc: Yes, N=214)

	Overall Satisfaction (OS)	Information Satisfaction (IS)	System Satisfaction (SyS)	Service Satisfaction (SrS)
OS1p3	**0.93**	0.73	0.74	0.74
OS2p3	**0.95**	0.74	0.76	0.72
OS3p3	**0.94**	0.75	0.75	0.70
OS4p3	**0.95**	0.76	0.76	0.71
OS5p3	**0.94**	0.77	0.77	0.70
OS6p3	**0.93**	0.77	0.77	0.71
OS7p3	**0.93**	0.75	0.76	0.74
IS1p3	0.75	**0.92**	0.79	0.71
IS2p3	0.75	**0.84**	0.75	0.75
IS3p3	0.77	**0.96**	0.77	0.73
IS4p3	0.74	**0.94**	0.74	0.71
IS5p3	0.76	**0.95**	0.72	0.72
IS6p3	0.75	**0.93**	0.74	0.74
SyS1p3	0.77	0.74	**0.94**	0.73
SyS2p3	0.77	0.73	**0.95**	0.75
SyS3p3	0.77	0.71	**0.95**	0.73
SyS4p3	0.76	0.72	**0.96**	0.75
SyS5p3	0.78	0.72	**0.95**	0.76
SyS6p3	0.73	0.77	**0.93**	0.73
SrS1p3	0.72	0.75	0.73	**0.93**
SrS2p3	0.72	0.75	0.75	**0.93**
SrS3p3	0.74	0.71	0.73	**0.95**
SrS4p3	0.72	0.72	0.75	**0.96**
SrS5p3	0.71	0.74	0.75	**0.94**
SrS6p3	0.74	0.72	0.74	**0.96**

Table 18: Overall Satisfaction and IS Key Aspects Satisfaction Composite Reliability, Average Variance Extracted, and Squared Correlations (Phase 3, SrEnc: Yes, N=214)

	CR	AVE	Overall Satisfaction	Information Satisfaction	System Satisfaction	Service Satisfaction
Overall Satisfaction	0.98	0.88	1.00			
Information Satisfaction	0.98	0.87	0.73	1.00		
System Satisfaction	0.98	0.89	0.74	0.79	1.00	
Service Satisfaction	0.98	0.90	0.64	0.68	0.70	1.00

Table 16 and 18 report the composite reliability scores, average variance extracted and squared correlations among constructs measuring user satisfaction with key aspects of the PeopleSoft system (Information, System, and Service) as well as overall user satisfaction for Phases 2 and 3. All the composite reliability scores are well above the suggested 0.7 as well as all the AVE values. There are also no squared correlation values above or close to the respective construct AVE values. Composite reliability values demonstrated very good construct reliability and convergent validity and AVE values indicated strong discriminant validity for these measures.

Phase 2 and 3 Structural Model

According to the PLS results Information Satisfaction, System Satisfaction, and Service Satisfaction accounted for 0.707 of the explained variance in user overall satisfaction with the PeopleSoft system in Phase 2 and 0.781 of the explained variance in Phase 3. Similar to Phase 1, path coefficient significance was assessed using the bootstrapping approach with 1000 resamples. Bootstrapping results suggests that path coefficients for information satisfaction and system satisfaction are significant at the $p \leq 0.01$ level and for system satisfaction at the $p \leq 0.05$ level for both Phase 2 and Phase 3. Figures 36 and 37 provide the path loadings from key IS satisfaction aspects to overall satisfaction for Phases 2 and 3 respectively.
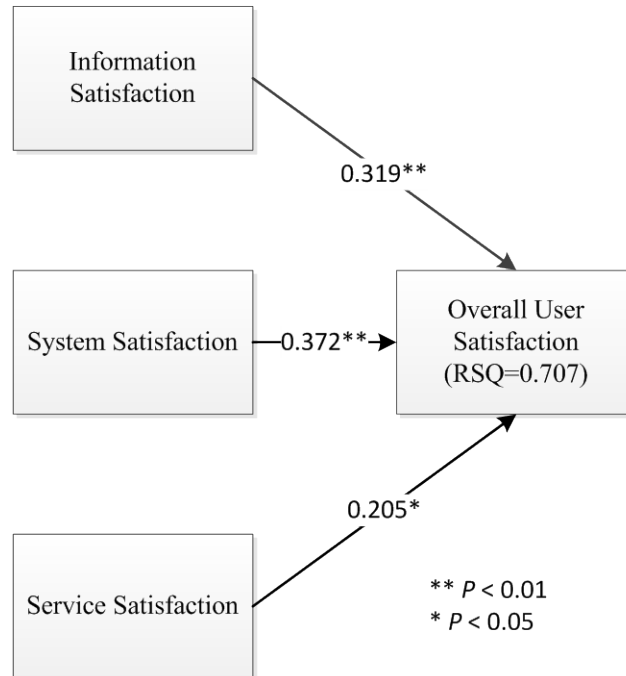
Figure 36: Satisfaction with Key IS Aspects to Overall Satisfaction (Phase 2, SrEnc: Yes, N=214)
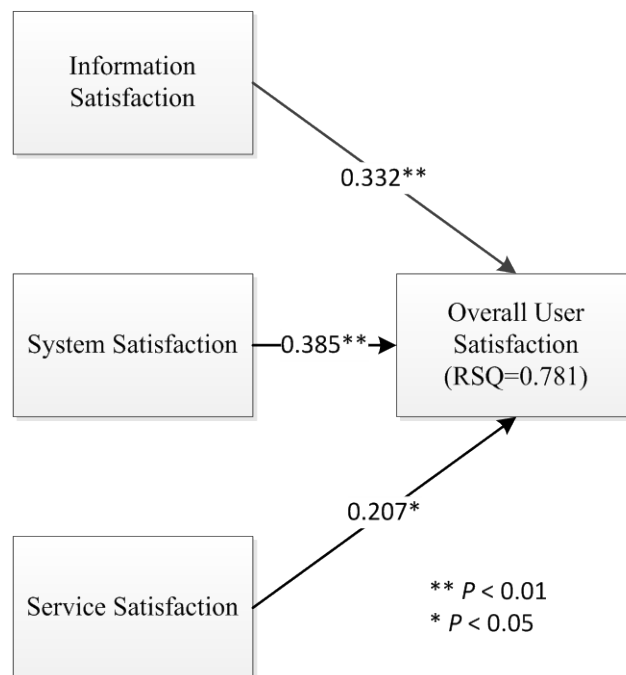
Figure 37: Satisfaction with Key IS Aspects to Overall Satisfaction (Phase 3, SrEnc: Yes, N=214)

Longitudinal Analysis

The longitudinal analysis of the attribute based satisfaction model is made possible by collecting data in three time-lagged phases. In this section, the collected data from across three phases is analyzed to determine the longitudinal stability of the measures and provide empirical support for a causal satisfaction model. User satisfaction with individual IS attributes (for each aspect of the IS (i.e. Information, System and Service) were assessed only in Phase 1, and in the next two phases, only measures of user satisfaction with each of the key system aspects as well as user satisfaction with the whole IS (Overall Satisfaction) were taken. This section reports the effects of satisfaction with different attributes on the measures of satisfaction taken in Phases 2 and 3 using the 201 (SrEnc: Yes) matched responses across all three phases of the study. PLS Graph Version 3.01 was used to analyze data across the phases. Models were generated in which satisfaction with attributes data is taken from the Phase 1 measures and satisfaction with key IS aspects and overall user satisfaction data is taken from the second and third phases, respectively.

Table 19: Information Attributes Satisfaction across all Phases (SrEnc: Yes, N=201)

	Phase 1	Phase 2	Phase 3
Information Relevance (P1)	0.090	0.020	0.011
Information Currency (P1)	0.190^+	0.122	0.061
Information Accuracy (P1)	0.033	-0.023	0.053
Information Understandability (P1)	-0.134	0.043	0.063
Information Format (P1)	0.278^*	0.304^*	0.248^*
Information Credibility (P1)	0.033	0.036	0.098
Information Completeness (P1)	0.344^{**}	0.194^*	0.239^*
R-squared (Information satisfaction)	*0.550*	*0.460*	*0.520*

$^{**} p < .01$
$^* p < .05$
$^+ p < .1$

Table 19 reports the effects of user satisfaction with information attributes across three phases of the study. Readers may notice a difference between Phase 1 results reported earlier in this chapter and the results demonstrated in Figure 32 for Phase 1. The difference is originating

from the difference in samples that are used for each analysis. The complete set of responses

(SrEnc: Yes) was used for Phase 1 analysis while only a subset of responses, that is those who

were present in all three phases (SrEnc: Yes), were used for the longitudinal analysis. In Phase 1

information currency, format and completeness demonstrated a statistically significant

relationship with user satisfaction with information. However, only information format and

completeness demonstrated the same strong relationship when they were assessed using data

collected in Phases 2 and Phase 3. Information currency demonstrated a weak significance in

Phase 1 but the significance or relationship strength did not carry over to Phase 2 and Phase 3.

Table 20: System Attributes Satisfaction across all Phases (SrEnc: Yes, N=201)

	Phase 1	Phase 2	Phase 3
System Ease Of Use (P1)	0.491^{**}	0.341^{**}	0.351^{**}
System Reliability (P1)	0.065	0.027	-0.075
System Availability (P1)	0.082	0.097	0.109
System Response Time (P1)	0.294^{**}	0.311^{**}	0.321^{**}
System Flexibility (P1)	-0.020	-0.006	-0.034
System integration (P1)	-0.067	0.012	0.062
System Security (P1)	0.013	0.014	-0.043
R-squared (System satisfaction)	*0.644*	*0.459*	*0.480*

$^{**}p < .01$
$^{*}p < .05$

Table 20 reports the effect of user satisfaction with system attributes across the three

phases of the study. User satisfaction with system ease of use and response time turned out to

have a strong and statistically significant relationship with user satisfaction with the system

across all phases. However, the strength of system ease of use declined with time while the

importance of system response time increased.

Table 21 reports the effect of user satisfaction with service attributes across all phases of

the study. User satisfaction with service responsiveness, assurance and privacy demonstrated a

statically significant relationship with user satisfaction with service in Phase 1. However, only service responsiveness demonstrated relatively the same significance and strength across Phase 2 and phase 3. Interestingly, user satisfaction with service access emerged to be a strong and significant contributor to user satisfaction with service in Phases 2 and 3, but the same results were not present for Phase 1. Although significant in Phase 1, assurance and privacy became non-significant in Phases 2 and 3.

Table 21: Service Attributes Satisfaction across all Phases (SrEnc: Yes, N=201)

	Phase 1	Phase 2	Phase 3
Service Reliability (P1)	0.047	0.077	0.082
Service Responsiveness (P1)	0.205^*	0.279^*	0.207^+
Service Assurance (P1)	0.242^+	0.033	0.044
Service Courtesy (P1)	-0.127	-0.074	-0.069
Service Security (P1)	0.034	0.203	-0.101
Service Competence (P1)	-0.065	-0.081	0.001
Service Privacy (P1)	0.283^+	0.002	0.095
Service Communication (P1)	-0.086	0.158	0.089
Service Access (P1)	0.024	0.291^*	0.338^{**}
Service Empathy (P1)	0.075	-0.028	-0.098
Service Tangibles (P1)	0.174	0.143	0.180
R-squared (Service satisfaction)	*0.547*	*0.515*	*0.522*

$^{**} p < .01$
$^{*} p < .05$
$^{+} p < .1$

Table 22 reports the path loadings between user satisfaction with key IS aspects and overall user satisfaction using only matched responses. The observed differences between reported values in Table 22 and the ones demonstrated in Figures 32, 33, and 34 originated from the difference in the analytical samples. Table 22 uses only a subsample of the total responses that were matched across the phases while previous reports uses the whole sample gathered for each specific phase. The results showed that satisfaction with all three aspects of the IS were consistent across the three phases of data collection.

Table 22: IS Key Aspects to Overall Satisfaction across all Phases (SrEnc: Yes, N=201)

	Phase 1	Phase 2	Phase 3
Information Satisfaction	0.337^{**}	0.323^{**}	0.364^{**}
System Satisfaction	0.484^{**}	0.444^{**}	0.415^{**}
Service Satisfaction	0.120^{*}	0.153^{*}	0.162^{*}
R-squared (Overall satisfaction)	*0.748*	*0.740*	*0.810*

** $p < .01$
* $p < .05$

Tables 23 and 24 present the results of the longitudinal analysis of effects of user satisfaction with key aspects of the PeopleSoft system on overall satisfaction. Table 23 shows the results of the analyses using measures of satisfaction with key aspects taken in Phase 1 on overall satisfaction in Phases 2 and 3. Table 24 reports the results of analysis using satisfaction with key aspects measures from Phase 2 on Phase 3 overall satisfaction.

Table 23: Impact of Phase 1 Satisfaction with Key Aspects measures on overall satisfaction for Phases 2 and 3 (SrEnc: Yes, N=201)

		Phase 2	Phase 3
Information Satisfaction (P1)	0.337^{**}	0.179^{*}	0.290^{**}
System Satisfaction (P1)	0.484^{**}	0.512^{**}	0.386^{**}
Service Satisfaction (P1)	0.120^{*}	0.108^{+}	0.166^{*}
R-squared (Overall satisfaction)	*0.748*	*0.550*	*0.587*

** $p < .01$
* $p < .05$
$^{+}$ $p < .1$

Table 24: Impact of Phase 2 Satisfaction with Key Aspects measures on overall satisfaction for Phase 3 (SrEnc: Yes, N=201)

	Phase 3
Information Satisfaction (P2)	0.321^{**}
System Satisfaction (P2)	0.207^{*}
Service Satisfaction (P2)	0.334^{**}
R-squared (Overall satisfaction)	*0.626*

** $p < .01$
* $p < .05$

Study Two

According to the results obtained from Study One, service attribute satisfaction measures and constructs failed to establish convergent and discriminant validity while displaying adequate item and construct reliability. A closer look at the cross-loadings and correlations among service attribute constructs revealed that some constructs and their items are correlating with each other more than others. Exploratory factor analysis revealed three major factors that closely associate with the way that constructs were grouped together at the time of data gathering. Further visual screening of responses identified similar patterns of responses for service attributes. To illustrate, there were serial answers of extremely dissatisfied (-3) for one group followed by serial answers of somewhat dissatisfied (-1) for the next group followed by quite satisfied (2) for the last group.

Considering that items measuring service satisfaction were the last items in the survey instrument, respondent fatigue could be expected (Chin et al. 2012). It is believed that the students (subjects) may have lost their patience towards the end of the survey and so paid less attention to questions. They just wanted to finish the survey in order to receive the promised extra credit. Thus, it is suspected that many of them started to serially complete the survey. This explanation seems to provide a plausible answer as to why the analyses failed to establish adequate convergent and discriminant validity while supporting strong reliability and consistency. Therefore, it was decided that the satisfaction with service attributes part of the model be re-examined using another set of respondents while taking measures to reduce the serial filler effects.

Two new measures were taken for the follow-on study – Study Two. First, the students were told that their response will be checked using an algorithm and if they fall under the serial filler category their responses will not be included in the final report and thus they will not

receive any extra-credit. Second, the starting and finishing time for each respondent were recorded. The psychological effect of the announcement regarding serial fillers coupled with controlling for response duration improved the quality of the gathered data. There were fewer visibly recognizable serially filled responses. Furthermore, responses were sorted based on their response duration and all the responses that were recorded in less than 10 minutes were eliminated from the analyses.

Study Two followed a cross-sectional design measuring user satisfaction with service attributes as well as user satisfaction with key aspects and overall user satisfaction with the PeopleSoft system was conducted. Since items and constructs measuring user satisfaction with the information and system aspects of the PeopleSoft system demonstrated satisfactory psychometric properties, they were excluded from the second study measurements and analyses. Similar to the main study, the same online survey hosting service (www.qualtrics.com) was used and data gathered 4 weeks after the start of following semester.

Undergraduate students enrolled in a core business class were asked to participate in the main study in return for 1 extra credit. A total of 487 completed responses were collected which puts the response rate at 70%. One of the problems observed in the first study was that students appeared to be answering the questions for service attribute satisfaction without reading them thoroughly. However, it was not possible to detect and eliminate all serially filled and inaccurate responses from the data set. However, in order to reduce the inaccurate data due to students serially answering the questions, all responses that took the respondents less time than a threshold time to respond were eliminated. The average response time was 26.5 minutes and the standard deviation was 17 minutes. After sorting the data based on the time taken to complete the survey and visually scanning the data it appeared that most of the serial responses took place

among those who took far less time than other to complete the survey. The threshold time was set at 10 minutes and all those responses that took the participants less than 10 minutes to complete the survey were eliminated from the analysis. This procedure reduced the usable responses to 432 of 487 completed in Study Two.

Out of 432 usable responses, 53% were male and 47% female. 80% of those who filled out the survey (total of 345) indicated that they have had a service encounter with the IS (either automated or through staff) in the past. Furthermore, in terms of duration of usage and system familiarity, 54% of the respondents indicated they have been using the system for more than 1 year, while 32% have been using the system for more than 6 months but less than a year. 25% of the students also indicated they use the system regularly for a few times a month, followed by and 16.5% for several times per week. The majority of respondents (92%) were active system users who used the system from a few times a month to a few times a day.

Study Two Measurement Model

For the service satisfaction items, majority of the item reliability scores exceed 0.8, which is well above the suggested cut off point (0.7). There was only 1 item measuring service tangibles for which the reliability score is less than 0.8 but still above the 0.7 cut off point. There are also no major cross-loadings across the constructs suggesting discriminant validity of constructs. Table 25 reports the items loading and cross-loadings for service satisfaction using data gathered in the second study.

Table 25: Study Two - Service Attributes - Item Reliability (SrEnc: Yes, N=345)

	Reliability (SrR)	Responsiveness (SrRp)	Assurance (SrA)	Courtesy (SrC)	Security (SrSc)	Competence (SrCp)	Privacy (SrP)	Communication (SrCm)	Access (SrAc)	Empathy (SrE)	Tangibles (SrTa)
SrR1	**0.91**	0.65	0.68	0.59	0.53	0.63	0.47	0.61	0.53	0.53	0.59
SrR2	**0.92**	0.66	0.67	0.56	0.49	0.61	0.42	0.58	0.48	0.49	0.54
SrR3	**0.89**	0.68	0.68	0.54	0.44	0.63	0.40	0.55	0.56	0.53	0.58
SrRp1	0.68	**0.90**	0.61	0.45	0.38	0.53	0.27	0.49	0.55	0.47	0.47
SrRp2	0.65	**0.91**	0.63	0.43	0.41	0.56	0.32	0.52	0.48	0.45	0.48
SrRp3	0.65	**0.91**	0.69	0.44	0.42	0.61	0.32	0.52	0.58	0.48	0.47
SrRp4	0.70	**0.93**	0.73	0.49	0.44	0.64	0.38	0.57	0.59	0.57	0.54
SrA1	0.71	0.68	**0.94**	0.54	0.45	0.70	0.39	0.60	0.50	0.56	0.54
SrA2	0.71	0.68	**0.93**	0.59	0.52	0.66	0.44	0.59	0.51	0.57	0.56
SrA3	0.67	0.69	**0.93**	0.54	0.44	0.71	0.40	0.59	0.50	0.59	0.54
SrC1	0.58	0.46	0.56	**0.97**	0.61	0.63	0.55	0.65	0.47	0.60	0.62
SrC2	0.59	0.48	0.56	**0.96**	0.65	0.66	0.56	0.67	0.49	0.63	0.62
SrC3	0.61	0.50	0.60	**0.94**	0.59	0.68	0.52	0.68	0.49	0.68	0.60
SrSc1	0.48	0.40	0.45	0.59	**0.93**	0.50	0.62	0.56	0.43	0.43	0.53
SrSc2	0.51	0.44	0.49	0.63	**0.97**	0.57	0.66	0.59	0.50	0.45	0.60
SrSc3	0.53	0.46	0.50	0.62	**0.96**	0.57	0.66	0.57	0.53	0.44	0.60
SrCp1	0.64	0.63	0.71	0.65	0.53	**0.91**	0.52	0.67	0.56	0.62	0.63
SrCp2	0.64	0.60	0.69	0.62	0.54	**0.94**	0.52	0.66	0.54	0.58	0.62
SrCp3	0.65	0.58	0.67	0.64	0.54	**0.93**	0.49	0.66	0.52	0.62	0.61
SrCp4	0.62	0.58	0.65	0.63	0.52	**0.92**	0.48	0.70	0.51	0.64	0.61
SrP1	0.46	0.35	0.41	0.55	0.65	0.54	**0.97**	0.56	0.42	0.44	0.61
SrP2	0.47	0.35	0.44	0.56	0.67	0.53	**0.98**	0.58	0.44	0.41	0.61
SrCm1	0.59	0.53	0.62	0.62	0.54	0.69	0.59	**0.91**	0.44	0.61	0.64
SrCm2	0.54	0.52	0.52	0.59	0.50	0.60	0.47	**0.91**	0.40	0.58	0.52
SrCm3	0.61	0.53	0.58	0.69	0.59	0.68	0.53	**0.91**	0.47	0.64	0.66
SrAc1	0.52	0.54	0.49	0.44	0.45	0.52	0.39	0.42	**0.93**	0.50	0.55
SrAc2	0.57	0.57	0.49	0.50	0.50	0.53	0.42	0.47	**0.95**	0.53	0.59
SrAc3	0.54	0.58	0.52	0.48	0.49	0.56	0.42	0.46	**0.92**	0.54	0.57
SrE1	0.57	0.53	0.58	0.62	0.46	0.68	0.45	0.64	0.61	**0.89**	0.65
SrE2	0.53	0.51	0.58	0.62	0.44	0.61	0.40	0.64	0.51	**0.96**	0.59
SrE3	0.52	0.49	0.57	0.63	0.42	0.59	0.38	0.61	0.49	**0.94**	0.60
SrE4	0.52	0.50	0.55	0.62	0.40	0.61	0.39	0.62	0.48	**0.94**	0.60
SrTa1	0.56	0.53	0.53	0.55	0.51	0.63	0.51	0.60	0.56	0.64	**0.84**
SrTa2	0.52	0.44	0.46	0.56	0.56	0.55	0.54	0.53	0.53	0.55	**0.84**
SrTa3	0.58	0.50	0.52	0.58	0.54	0.62	0.54	0.61	0.55	0.63	**0.87**
SrTa4	0.60	0.50	0.55	0.60	0.54	0.63	0.52	0.62	0.53	0.63	**0.86**

SrTa5	0.40	0.36	0.39	0.46	0.44	0.44	0.48	0.49	0.45	0.41	**0.80**
SrTa6	0.48	0.39	0.45	0.50	0.47	0.49	0.52	0.51	0.46	0.45	**0.80**
SrTa7	0.47	0.38	0.45	0.48	0.45	0.47	0.51	0.50	0.45	0.44	**0.78**

To further test construct reliability, convergent validity and discriminant validity, average variance extracted AVE, composite reliability scores (CR) and squared correlation among latent variables are also reported in table 26. All the reported composite reliability scores are above 0.8, which is greater than the suggested cutoff of 0.7 and indicate adequate construct convergent validity (Chin 1998). Moreover, all the reported average variance extracted values are above 0.8, which is higher than the suggested 0.5 value indicating adequate convergent validity for the latent variables. The results demonstrated adequate discriminant and convergent validity for service attributes.

Table 26: Study Two - Service Attributes - Composite Reliability (CR), Average Variance Extracted (AVE), and Squared Correlations (SrEnc: Yes, N=345)

	CR	AVE	SrR	SrRp	SrA	SrC	SrSc	SrCp	SrP	SrCm	SrAc	SrE	SrTa
Reliability	0.93	0.82	1.00										
Responsiveness	0.95	0.83	0.54	1.00									
Assurance	0.95	0.87	0.56	0.53	1.00								
Courtesy	0.97	0.91	0.39	0.25	0.36	1.00							
Security	0.97	0.91	0.29	0.20	0.26	0.42	1.00						
Competence	0.96	0.85	0.48	0.42	0.54	0.47	0.33	1.00					
Privacy	0.97	0.95	0.23	0.13	0.19	0.32	0.46	0.30	1.00				
Communication	0.93	0.83	0.41	0.33	0.40	0.49	0.36	0.53	0.34	1.00			
Access	0.95	0.87	0.34	0.36	0.29	0.26	0.26	0.33	0.20	0.23	1.00		
Empathy	0.96	0.87	0.33	0.29	0.37	0.44	0.21	0.45	0.19	0.45	0.31	1.00	
Tangibles	0.94	0.69	0.40	0.29	0.34	0.41	0.37	0.45	0.39	0.45	0.38	0.43	1.00

For satisfaction with the key aspects (information, system, and service) of the PeopleSoft and overall satisfaction, all item reliability scores exceed 0.8, which is well above the suggested

cut off point (0.7). There are also no major cross-loadings among the constructs suggesting discriminant validity of the constructs. Table 27 reports the item loadings and cross-loadings for user satisfaction with the key aspects of the IS and overall satisfaction measures using data gathered in supplemental study.

Table 28 reports construct composite reliability scores, average variance extracted scores and squared correlations among PeopleSoft key aspects and overall satisfaction. All the reported composite reliability scores are above 0.8, which is greater than the suggested cutoff of 0.7 and indicate adequate construct convergent validity (Chin 1998). Moreover, all the reported average variance extracted values are above 0.7, which is higher than the suggested 0.5 value indicating adequate convergent validity for the latent variables. AVE values for each construct are also higher than their squared correlations with other constructs for each of the Information System attributes, which suggest discriminant validity for these latent variables.

Study Two Structural Model

According to the PLS results user satisfaction with IS service attributes explains 0.703 of the variance in user satisfaction with the overall service. Path coefficient statistical significant was assessed through bootstrapping with 1000 resampling. The bootstrapping results indicated that service reliability, assurance, access, empathy and tangibles were significant at $p \leq 0.01$ level. Service responsiveness was also significant at $p \leq 0.05$ level. Service competence was found to be significant at $p \leq 0.1$ level. Service courtesy, security, privacy and communication turned out to be non-significant. Figure 38 demonstrates the service attributes structural model.

Table 27: Study Two - Overall Satisfaction and IS Key Aspects Satisfaction Item Reliability (SrEnc: Yes, N=345)

	Overall Satisfaction (OS)	Information Satisfaction (IS)	System Satisfaction (SyS)	Service Satisfaction (SrS)
OS1	**0.94**	0.72	0.77	0.71
OS2	**0.93**	0.73	0.76	0.71
OS3	**0.94**	0.73	0.75	0.73
OS4	**0.93**	0.74	0.74	0.72
OS5	**0.93**	0.75	0.74	0.75
OS6	**0.88**	0.75	0.70	0.71
OS7	**0.88**	0.73	0.71	0.72
IS1p2	0.74	**0.90**	0.67	0.60
IS2p2	0.65	**0.85**	0.61	0.55
IS3p2	0.75	**0.93**	0.70	0.67
IS4p2	0.75	**0.92**	0.70	0.67
IS5p2	0.71	**0.89**	0.66	0.65
IS6p2	0.72	**0.88**	0.68	0.66
SyS1p2	0.76	0.68	**0.92**	0.68
SyS2p2	0.75	0.67	**0.92**	0.71
SyS3p2	0.76	0.68	**0.94**	0.69
SyS4p2	0.74	0.70	**0.93**	0.69
SyS5p2	0.72	0.69	**0.90**	0.68
SyS6p2	0.70	0.69	**0.89**	0.69
SrS1p2	0.69	0.61	0.63	**0.85**
SrS2p2	0.69	0.63	0.66	**0.84**
SrS3p2	0.73	0.63	0.69	**0.91**
SrS4p2	0.71	0.66	0.69	**0.92**
SrS5p2	0.65	0.60	0.63	**0.87**
SrS6p2	0.65	0.61	0.63	**0.86**

Table 28: Study Two - Overall Satisfaction and IS Key Aspects Satisfaction Composite Reliability, Average Variance Extracted, and Squared Correlations (SrEnc: Yes, N=345)

	CR	AVE	Overall Satisfaction	Information Satisfaction	System Satisfaction	Service Satisfaction
Overall Satisfaction	0.97	0.84	1.00			
Information Satisfaction	0.96	0.80	0.64	1.00		
System Satisfaction	0.97	0.84	0.73	0.56	1.00	
Service Satisfaction	0.95	0.77	0.62	0.51	0.56	1.00

Figures 39 provides the path loadings from key IS satisfaction aspects to overall

satisfaction the second study. Information Satisfaction, System Satisfaction, and Service

Satisfaction account for 0.856 of the explained variance in user overall satisfaction with the

PeopleSoft system in the second study. Bootstrapping results suggests that all the path

coefficients are significant at the p < 0.01 level.
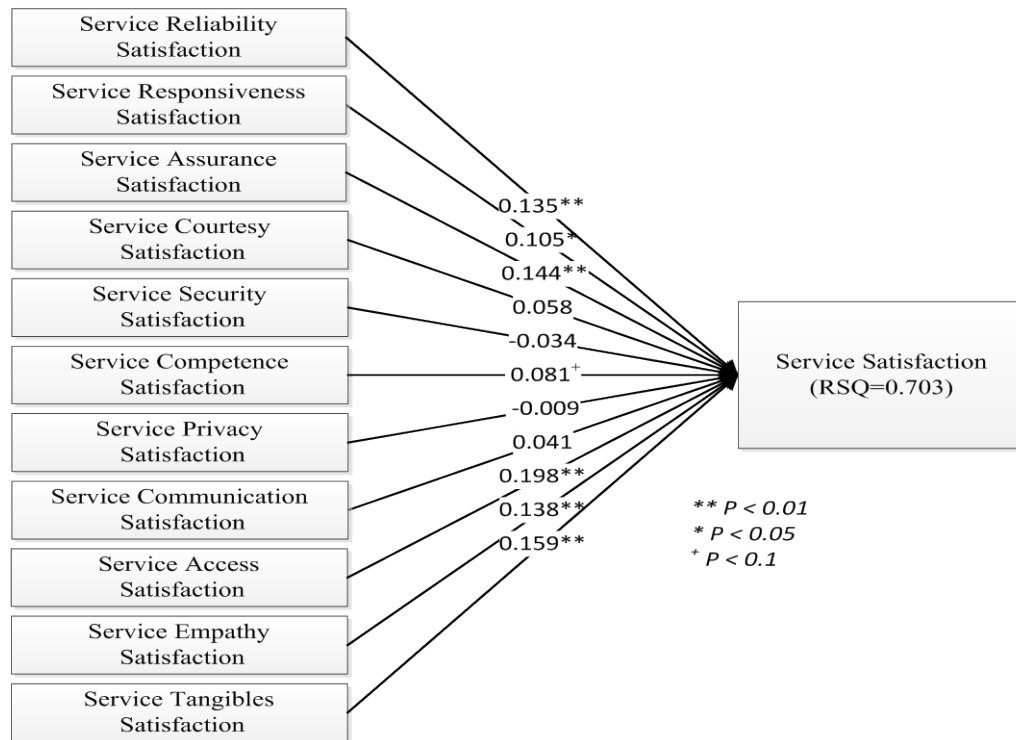
Figure 38: Study Two - Service Attributes to Service Satisfaction Structural Model (SrEnc: Yes, N=345)
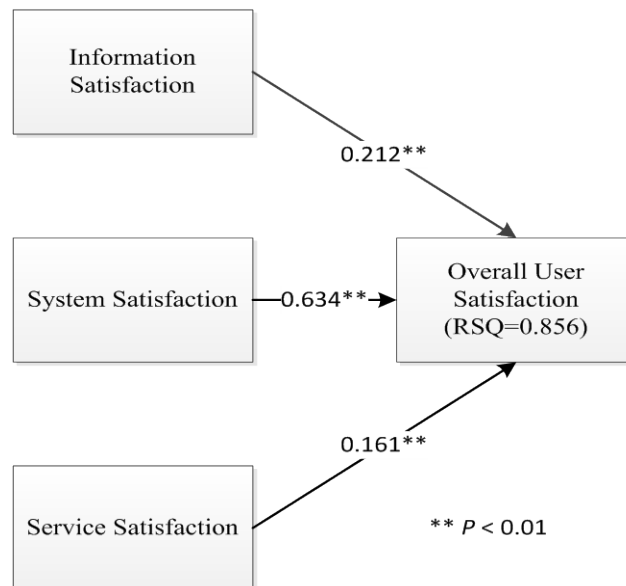
Figure 39: Study Two- Satisfaction with Key IS Aspects to Overall Satisfaction (SrEnc: Yes, N=345)

Common Method Variance Analysis

The existence of Common Method Variance (CMV) that is, the variance due to measurement error rather than the constructs that are being measured, is a critical issue in social and behavioral science research, especially for research that uses self-evaluative survey questionnaires as a means of collecting data (Bagozzi 2011; Podsakoff et al. 2003). CMV is considered as systematic measurement error. Systematic errors are important in measurement since they can provide an alternative explanation for the observed relationships in research models (Podsakoff et al. 2003).

To reduce method variance Podsakoff et al. (2003) proposed few procedural and statistical remedies. While procedural remedies mostly take place at the design phase of the study and survey instrument, statistical remedies are techniques that are applied to statistical analyses when data collection is completed. In order to better control for the method variance, both the first and second study employed procedural remedies suggested by Podsakoff et al. (2003). They suggested that temporal, proximal, psychological or methodological separation of criterion and predictor measurement would reduce the common method variance. The first study followed both temporal and methodological separation guidelines by measuring user satisfaction with overall IS and its key aspects in different time frames. Phase 1 of Study One measured the whole research model while Phase 2 and 3 only measured the key aspects of IS. The study design induces a temporal separation between measurements of different parts of the model. Furthermore, both Study One and Study Two methodologically separates different construct measurements. The data were collected using an online survey hosting service. The design of the online survey was such that each set of questions pertaining to measure satisfaction with IS and its key aspects (e.g. questions measuring overall satisfaction) had their own dedicated page;

once users submitted their answers to one set of questions they were taken to a new page and they could not look back on their old responses. Moreover, questions measuring key attributes of each aspect were grouped into three or four attributes per page and the items were randomized within the group. Each group had its own dedicated page as well. This methodological separation of construct measures enabled the more effective control of construct level bias. In order to control for item level method variance, study two employed a recently developed statistical methodology referred to as Measured Latent Marker Variable (MLMV).

To date, a variety of methods and techniques are suggested for detecting and controlling the CMV in statistical analyses including PLS analyses. However, most of them, including the most frequently used technique of unmeasured latent marker variable, have been shown to be incapable of fully detecting the CMV in PLS analyses (Chin et al. Forthcoming). In a more recent development, Chin et al. (2012) suggested that the measured latent marker variable technique if applied appropriately, is capable of controlling for up to 100% of the common method variance.

MLMV requires collecting multiple unrelated measures at the time of data collection for the primary research model. These items should not be related to any construct of interest within the primary research model. However, they should maintain the same format and scale that has been used in the survey. These items are intended to capture existing common method variance, if any, and can be collectively labeled as MLMV in PLS models. According to Chin et al. (2012) MLMV should contain at least 4 items in order to effectively detect and control for existing CMV. They demonstrated that using at least 4 items enables researchers to partial out 72 percent of variance due to CMV while using 12 items and more potentially can control for 100% of the variance due to CMV.

Following the Chin et al. (2012) recommendations, 16 items were used in the second study to capture the underlying common method variance. They were placed at the end of the survey in order to minimize the effects of respondents fatigue on the main study response pattern. The items also used the same 7-points Likert scale as the rest of the items in the questionnaire. The scales varied from 'strongly disagree' to 'strongly agree'. These items were designed to have the least possible logical correlation with constructs under measure. They were mostly concerned with everyday routine activities and trivia such as "music is important in my life", "I find rugby interesting" and "cats are smarter than dogs". For the full list of the latent marker variables used in this study please contact the author.

There are two approaches for applying the MLMV items in a PLS model. One uses construct level correction (CLC) and the other uses item level correction (ILC). This study only employed the item level correction since while it is more tedious to implement, it is the more accurate of the two approaches. In addition, the construct level method variance was addressed through survey design.

According to Chin et al. (2012) item level correction (ILM) approach employs MLMV items to remove the CMV effects at the measurement item level rather than the construct level. To conduct ILM, each measurement item needs to be regressed on the entire set of the MLMV items (i.e. with the measurement item as the dependent variable). The regression residuals (i.e. standardized residuals) are then saved. These residuals now represent the construct items with removed CMV effects. This process alters the original measurement variance in each item. In order to replace the extracted variance, an equal amount of random error (equal to extracted CMV) should be reintroduced to construct items. To do so, one needs to capture the r-square

resulting from each regression and construct corrected values according to the following formula.

$$\sqrt{1 - RSQ} * Standardized\ Residuals + \sqrt{RSQ} * Random\ Error$$

Random error is a number drawn from normal distribution with a mean of 0 and standard deviation of 1. This process is necessary in order to obtain correct assessment of item reliability used in the primary research model. The corrected values should then be used as item values in the PLS analysis in order to obtain results without CMV effects. Tables 29 and 30 report the results of item level CMV corrections as compared to original readings.

Table 29: Study Two- Service Attribute Satisfaction to Service Satisfaction - CMV Analysis (SrEnc: Yes, N=345)

	Original Data	Item Level Correction
Service Reliability	0.135^{**}	0.130^{**}
Service Responsiveness	0.105^{*}	0.129^{**}
Service Assurance	0.144^{**}	0.117^{*}
Service Courtesy	0.058	0.033
Service Security	-0.034	-0.004
Service Competence	0.081^{+}	0.067
Service Privacy	-0.009	-0.006
Service Communication	0.041	0.034
Service Access	0.198^{**}	0.202^{**}
Service Empathy	0.138^{**}	0.140^{**}
Service Tangibles	0.159^{**}	0.176^{**}
R-squared (Service satisfaction)	*0.703*	*0.640*

$^{**}\ p < .01$
$^{*}\ p < .05$
$^{+}\ p < .1$

Table 30: Key Aspects Satisfaction to Overall Satisfaction - CMV Analysis (SrEnc: Yes, N=345)

	Original Data	Item Level Correction
Information Satisfaction	0.212^{**}	0.228^{**}
System Satisfaction	0.634^{**}	0.593^{**}
Service Satisfaction	0.161^{**}	0.180^{**}
R-squared (Overall satisfaction)	*0.856*	*0.807*

$^{**}\ p < .01$

CHAPTER 5: DISCUSSION AND CONCLUSION

Studying user satisfaction with Information Systems has been a key subject of research in MIS for a long time. However, IT use and the IS function has changed much in recent years due to the evolving nature of Information Technology (DeLone and McLean 2003). Early models of user satisfaction in Information Systems were mostly concerned with performance of the technical system and the quality of delivered information in determining the user satisfaction with an IS (e.g. Doll and Torkzadeh 1988; Ives et al. 1983; McKinney et al. 2002). With the IT department in organizations becoming more of a service provider for other departments, research on user satisfaction expanded its focus on system performance and information quality to include service quality provided by the IT department (e.g. Kettinger and Lee 1994; Pitt et al. 1995; Van Dyke et al. 1997). DeLone and McLean (2003) documented this expanded focus in their seminal work and proposed that user satisfaction with Information Systems is an aggregation of user perception of information quality, system quality (performance) and service quality. To date however, no research study has integrated these three aspects into one comprehensive model trying to predict overall user satisfaction with an Information System by examining the impact of user satisfaction with key IS aspects (information, system, and service) on overall satisfaction. Further, no studies have taken this a step further to predict user satisfaction with key IS aspects user satisfaction with their respective attributes. While there are studies that have integrated two of the three IS aspects into their research models using quality and performance measures as predictors of satisfaction (e.g. Doll and Torkzadeh 1988; Ives et al. 1983; McKinney et al. 2002;

Nelson et al. 2005; Wixom and Todd 2005), these do not consider satisfaction with the associated attributes. Furthermore, for the most part many studies tend to focus on only one aspect of IS (e.g. Kettinger and Lee 1994; Pitt et al. 1995; Pitt et al. 1997; Van Dyke et al. 1997; Van Riel et al. 2001), or fail to measure overall user satisfaction (Nelson et al. 2005; Wixom and Todd 2005) or user satisfaction with attributes of IS aspects (Chiu et al. 2007).

This research is aimed at providing a comprehensive model of user satisfaction that incorporates the key aspects of an IS and their respective attributes as suggested by Delone and McLean (2003). It is aimed at providing researchers and practitioners with a reliable yet parsimonious model and instrument for measuring user satisfaction with an IS at different levels of satisfaction. Starting with the measurement of user satisfaction with attributes of the key IS aspects, this study also incorporates direct measures of user satisfaction with the key IS aspects, and measures of overall user satisfaction, and demonstrates the aggregation and assessment of user satisfaction across three levels of abstraction. The purpose of this study is to develop a comprehensive model of user satisfaction that is capable of reliably capturing user satisfaction with different attributes and aspects of an Information System while providing useful and in-depth diagnostic information to researchers and practitioners.

This chapter discusses how successful this research was in attaining its initial objectives. It focuses on further interpreting the results that were obtained through statistical analyses to provide readers with a better understanding of the research model implications for research and practice. It explains the findings from the perspective of general research model as well as contextual perspective. The chapter concludes with a discussion of the study limitations and suggestions for future research and further discussion of the principal findings and contributions of this research to theory and practice.

Research Model Findings and Implications

The research model suggests that overall user satisfaction with an Information Systems is an aggregation of user satisfaction with different aspects of an Information System and their corresponding attributes. To test the model a survey instrument was carefully crafted and implemented using an online survey hosting service. The results of data analysis can be explained from different perspectives. One is the general research model perspective and the other is the contextual perspective. The general model perspective discusses how successful the study efforts were in creating an instrument to comprehensively measure user satisfaction with an Information System and its different aspects at three levels of detail. The contextual perspective discusses the obtained results and their implications in light of the specific context and participants of this study. The next section focuses on the general model findings and its implications.

Overall Satisfaction and Key IS Aspects Satisfaction

The cumulative results obtained from Study One and Study Two support the convergent and discriminant validity of the constructs that were used to measure overall user satisfaction and user satisfaction with key IS aspects. The results from measurement models that were constructed for Phase 1, 2, and 3 of Study One and the measurement model of Study Two establish the convergent and discriminant validity for measures of overall satisfaction and satisfaction with key IS aspects. Item reliability scores for overall satisfaction, information satisfaction, system satisfaction and service satisfaction across the different phases of Study One as well as the scores for Study Two indicate a high item reliability (Tables 7, 9, and 11, chapter 4). Item reliabilities in all cases are well above the cutoff point of 0.7 and they all load highly and closely on their respective constructs (Chin 1998). There is also no item that loads higher on

a construct other than its own. These results suggest good item reliability and discriminant validity for constructs measuring user overall satisfaction and key IS aspects satisfaction.

Construct composite reliability scores and average variance extracted (AVE) for each construct can also be used as indicators construct convergent and discriminant validity. Results of Study One and Study Two analyses indicate good convergent validity for constructs measuring overall satisfaction, information satisfaction, system satisfaction, and service satisfaction. Composite reliability scores for all the constructs in all phases and studies are above 0.90. This value is well higher than the suggested 0.70 value, which indicate a strong convergent validity these the constructs. In addition, average variance extracted values are also above 0.75 in all cases which are higher than the suggested cut-off point of 0.50. The AVE values provide additional support in terms of constructs convergent validity (Chin 1998).

Discriminant validity of construct measures can be established through comparing the AVE value with squared correlation values among constructs. In most cases the difference between AVE and associated squared correlations are higher than 15% with the closest one at 11% (Study Two, overall satisfaction and system satisfaction) and the AVE for each construct being greater than the construct squared correlation with others. These results are indicators of adequate discriminant validity for the constructs measuring overall satisfaction with an IS and its key aspects.

To summarize, the analytical results for overall satisfaction and satisfaction with key IS aspects demonstrated good convergent and discriminant validity for the constructs across the four different measurement models used through the study. The results provided strong support

that the survey instrument did accomplish its objective in reliably and accurately measuring user satisfaction with an IS and its key aspects namely information, system and service.

Attribute Satisfaction

This section focuses on discussing the results obtained from the statistical analysis regarding the reliability and validity of the constructs measuring specific attributes of an Information System. The data used in related analyses was partly gathered and Phase 1 of Study One and Study Two. Phase 1 of Study One provided the data for information attributes, system attributes and service attributes while Study Two provided additional data for service attributes.

Information attributes

Seven attributes were defined for the Information aspect of an Information System that is reliability, currency, accuracy, understandability, format, completeness and credibility. User satisfaction with each of information attributes was measured only once in this study at Phase 1 of Study One. Measurement model analyses results (Tables 9 and 10) indicate a very good item and construct reliability in measuring user satisfaction with all of the information attributes. All the item reliability scores, except one, are above 0.90 that is higher than the suggested 0.70. The only item that loads slightly less than 0.90 is among those measuring user satisfaction with information credibility, which is 0.87 but is still higher than the recommended threshold of 0.70 (Chin 1998). There are no major cross-loadings across items of different constructs and all the items load very highly on their respective constructs. These analyses suggest good item reliability as well as constructs convergent and discriminant validity.

Furthermore, construct composite reliability scores (all above 0.90) together with average variance extracted scores for each construct (all above 0.80) implies adequate convergent

validity for latent variables measuring user satisfaction with different information attributes. In addition, there is no construct squared correlation score higher than its respective average variance extracted score, which indicates good discriminant validity for constructs involved in measuring information attributes satisfaction. In short, the results provide strong support that constructs measuring user satisfaction with different attributes of information provided by an Information System are reliably and consistently measuring their intended concepts. These items can be reused in future survey instruments that are aiming to measure the same constructs.

System attributes

Another set of seven attributes were also considered for the system aspect of Information Systems namely, system ease of use, reliability, availability, response time, flexibility, integration, and security. Similar to user satisfaction with information attributes, user satisfaction with each of system attributes was measured only once at Phase 1 of the Study One. Measurement model analyses results (Tables 9 and 10) indicate a very good item and construct reliability in measuring user satisfaction with all of the system attributes. Most of item reliability scores are above 0.90 and the rest are all above 0.85 indicating good consistency in measurement. Also, all the items load higher on their respective construct than other constructs and there are no cross-loadings higher than 0.78. This indicates adequate convergent and discriminant validity for the constructs.

Moreover, construct composite reliability scores (all above 0.90) along with average variance extracted scores for each construct (all above 0.80) indicate good convergent validity for constructs measuring user satisfaction with various system attributes. In addition, there is no construct squared correlation score higher than its respective average variance extracted score indicating good discriminant validity for constructs involved in measuring system attributes

satisfaction. To summarize, the results provide strong support that constructs measuring user satisfaction with different attributes of system are reliably and consistently measuring their intended concepts. These items can be reused in feature survey instruments that are aiming to measure user satisfaction with similar constructs.

Contrary to past IS studies (e.g. Nelson et al. 2005; Wixom and Todd 2005), this research included system ease of use as an attribute of technical system in charge of IS basic operations. For example, Wixom and Todd (2005) posit ease of use as a user perception that is impacted by user perception of system quality and satisfaction with the system. By contrast, this research posits ease of use as a system attribute and consequently user satisfaction with ease of use as a contributing factor to user satisfaction with the system. The measures for user satisfaction with system ease of use demonstrated good construct reliability and validity. This research also introduced system security as a key attribute of the system aspect of IS and developed reliable items to measure user satisfaction with system security.

Service attributes

Eleven attributes were defined for the service aspect of Information Systems namely, service reliability, responsiveness, assurance, courtesy, security, competence, privacy, communication, access, empathy, and tangibles. Unlike information and system attributes, user satisfaction with service attributes was measured twice in this study. First in Phase 1 of Study One as part of the whole model and second in Study Two. Tables 11 and 12 report the measurement model results for service attribute from Study One. Unlike the other two aspects, it is not possible to establish an acceptable level of construct reliability as well as convergent and discriminant validity using the results obtained in Phase 1. Even though all the items are highly loaded on their respective construct with the most of the loadings being higher than 0.90 and a

few loadings higher than 0.8, there are many strong cross-loadings among items of different

constructs which threatens the discriminant validity of the constructs. For example, item 3 of

service reliability has a loading of 0.94 on its own construct and cross-loadings of 0.86 and 0.91

on service responsiveness and service assurance. In another instance, item 2 of service privacy

has a loading of 0.93 on its own construct with cross-loadings on service communication at 0.90,

on service security at 0.83 and on service courtesy at 0.81.

The same situation arises while examining construct convergent and discriminant

validities through composite reliability scores and average variance extracted values (Table 12).

Even though all the composite reliability scores of service attribute constructs are above 0.90 and

all AVE values are above 0.75 indicating strong measurement reliability, there are many

instances of construct squared correlations being very close to AVE values. Closeness of squared

correlations to associated AVE values is an indicator of shared variance and measurement error

among the constructs of interest. This makes it difficult to establish discriminant validity of

constructs that are being compared. There is also one case where the squared correlation among

constructs is more than the AVE of the associated construct. The average variance extracted

value for service competence is 0.79 while its squared correlation with service security is 0.80.

Tables 25 and 26 report the measurement model result for service attribute from Study

Two. These results indicate very good item and construct reliability in measuring user

satisfaction with all of the service attributes. Most the item reliability scores are at 0.89 and

above which is higher than the suggested 0.70 except for items measuring service tangibles.

Although service tangibles items do not enjoy the same level of reliability as the other items,

they are still above the 0.70 cut-off point. There are no major cross-loadings among items for

different constructs and all the items load very highly on their respective constructs. These data confirm item reliability as well as construct convergent and discriminant validity.

Furthermore, construct composite reliability scores (all above 0.90) together with average variance extracted scores for each construct (all above 0.80 except tangibles) implies adequate convergent validity for latent variables measuring user satisfaction with different service attributes. In addition, all the squared correlations are much less than the average variance extracted values indicating good discriminant validity for constructs involved in measuring service attributes satisfaction. In short, the results provide strong support that constructs measuring user satisfaction with different attributes of service provided by an Information System are reliably and consistently measuring their intended concepts. These items can be reused in future survey instruments that are aiming to measure the same constructs. However, one should note that items measuring service tangibles did not demonstrate the same level of reliability and validity as others. These findings are similar to that of prior research in IT service quality that could not establish service tangibles as an important contributing factor in users perception of service quality (e.g. Halawi et al. 2007; Kettinger and Lee 1994; Pitt et al. 1997).

Summary

According to the obtained results and analyses, this research could meet its goal of developing a reliable and valid instrument to comprehensively measure user satisfaction with various aspects of IS at different levels. All the constructs and items turned out to be adequately reliable and valid in measuring what they were intended to measure. Furthermore, the proposed causality of the model linkages were put in the test by using temporal design for the data gathering process. The longitudinal analysis (tables 19 through 24) demonstrated validity of the causal arguments over time through demonstrating significant path loadings across three phases.

The temporal separation of empirical tests of different levels of a model minimize the likelihood of alternative explanations due to the response bias and strengthen the theoretical causal argument behind the model (Podsakoff et al. 2003).

The response bias was not a major contributor to the structural findings of this study. The study design and implications followed procedural remedies suggested by Podsakoff (2003) in order to minimize the response bias effects. The response bias in Study One is estimated to be around 10% according to the decrease in the variance explained in second and third phases while using the attribute satisfaction data gathered in Phase 1. In Study Two, the response bias is estimated to be around 5% according to the results of the measured latent marker variable analyses (Chin et al. 2012). The reason that the estimated response bias turned out to be smaller in Study Two than in Study One could be associated with the psychological effect that announcement of serial filler detection may have on students as well as the eliminating of quick responses. The announcement would have encouraged students to pay more attention to each question and put more thought in answering the questions.

Contextual Findings Discussion

After establishing the reliability and validity of the measurement model, this section focuses on explaining the obtained results in light of the empirical context that the model was tested in. The research model and the survey instrument were developed without having any specific IS context in mind. In order for the model and the survey instrument to be comprehensive, they were developed according to a general understanding of the IS function in organizations. The test bed or context of the study was chosen afterwards based on the feasibility and availability of resources. The model was tested using undergraduate business students'

(users) satisfaction with an Information System (PeopleSoft System) currently in use at the University of Houston.

Students use this system for a variety of tasks. They use it to enroll for classes, drop classes, check their weekly class schedule, pay their tuition, apply for graduation, track their financial aid status, request academic transcripts, request academic status verifications, make appointments with their academic advisers, etc. The PeopleSoft system is an ideal IS instance to be used for testing the proposed model. The PeopleSoft system users can directly experience all three key aspects of IS. They use the information provided by the PeopleSoft in their daily academic activities and in making decision for future academic activities such as classes to select for the next semester or to apply for graduation. They also rely on the PeopleSoft system functionality in carrying out their academic tasks and use supporting services provided by the system when they need it. They can either use the automated help function available on the top right of the system screen to resolve their issues while they are online or they can go to staff that are designated to provide additional support to students. For example if they have a problem paying their tuition they can either try to resolve it online through the "get help" part of the service or they can go to the student financial services and have staff members assist them in accomplishing their tasks.

Overall Satisfaction and Key IS Aspects Satisfaction

Students overall satisfaction and satisfaction with key aspects of the PeopleSoft system were measured four times in this research. Three times in Study One and once in Study Two. In the first study, satisfaction with key IS aspects could explain up to 0.78 of variance in user overall satisfaction (varying from 0.707 in Phase 2 and 0.781 in Phase 3). The variance explained increased to 85.6% in the second study. However, it decreased to 0.807 after exclusion of

common method variance. Using the matched data, key IS aspect satisfaction measures obtained in Phase 1 explained 0.55 and 0.59 of the variance in students overall satisfaction in Phase 2 and Phase 3. The decrease in the amount of explained variance in overall satisfaction from Phase 1 to Phase 3 while using measures obtained in Phase 1 can be attributed to the existence of common method variance in Phase 1 as well as the PeopleSoft use cycle. The system is usually used the most in the first few weeks of each semester followed by the last couple of weeks. The least amount of system use is expected in the middle of semester (Phase 2). This change in system usage patterns is evident in the variance explained and path coefficients as variance explained and path coefficients for Phases 1 and 3 are closer to each other in their values.

For the first and second studies, student satisfaction with the system turned out to be strongest predictor of their overall satisfaction with the PeopleSoft system followed by student satisfaction with information and with service. However, the path strength slightly varied from one phase to another and from the first study to the second one with Phase 1 of the first study being the most similar to results obtained from the second study. The general pattern of results suggest that satisfaction with the core functionality of the PeopleSoft system is the most important contributor to user overall satisfaction with the system under study.

Attribute Satisfaction

This section explains the statistically significant and non-significant path coefficients obtained through PLS analyses in light of the students' usage of the PeopleSoft system using both cross-sectional and longitudinal analyses.

Information attributes

Among the information attributes only students' satisfaction with information currency, format and completeness turned out to be statistically significant with completeness having the highest path loading. Information completeness refers to the extent to which the information contains all the necessary parts. While using the PeopleSoft in many cases users need to make few clicks to obtain all information they need regarding an issue. For example, when it comes to paying tuition there is usually a lump sum amount displayed comprised of tuition and fees altogether for a specific academic semester but users usually need to know the itemized charges before they make a payment. Users then need to click on a lump sum charge in order to obtain more detail about the charge and even when they receive the detailed list of charges they can find items that are not descriptive enough of the charges incurred. They then need to request more detail if it is provided by the system or make an appointment with support services to get all the information they need regarding the chargers. Thus, information completeness becomes an important factor affecting user satisfaction with the information provided through the system.

Information format refers to the extent to which information is well presented on the screen. The way that information is organized and presented by the PeopleSoft system is not very intuitive. Finding your way around the system and locating the information you need requires a little bit of effort and it does have a learning curve. Referring to the last example, users need to find their way to more detailed information. While this type of formatting and presenting the information might be appealing to some users due to its neatness, it can also be annoying to others in that each time they need to make an extra effort to find something important to them.

Information currency refers to the extent to which information is current and up-to-date. While the information on the system is usually current but on some occasions it takes the system

a little while to update the information after a transaction and this may cause varied satisfaction among users. For example, when a payment is made, the system does not update the charges due right after the payment. In some cases, it may take couple of minutes and few page refreshes for the changes to appear. This problem also appears when students want to register for a class or to drop one. The class modifications made by users are not immediately updated on the system. This can be interpreted as a cause of variation in user responses to their satisfaction toward information currency. One may argue that the root of this problem goes to the system functionality and the time the system takes to update its database and reflect the updates on the information output. The analyses results provide support for the alternative explanation as well. Looking at the system attributes one can see that system response time (i.e. the extent to which the PeopleSoft system carries out requests for actions in a timely manner) also turned out to be an important predictor of user satisfaction with the system itself.

While users are expected to have different experiences and thus varied perceptions in this context toward information completeness, format and currency, they can be indifferent or have no opinion about other attributes. For example, the information provided regarding a financial transaction may be viewed as always relevant to its purpose and important for students to make decisions. Furthermore, the information provided by the PeopleSoft has always been error free. There would be few if any instances of error in the information provided by the system for students for them to have a meaningful reference regarding bogus information that may impact their satisfaction judgment. The same logic applies to understandability and credibility. The information provided by the system is always clear in meaning and students can trust it for making decisions.

It appears, from the data analysis, that students care most about the way information is organized and presented (format) on the screen, that they receive all the information they need from the system, and the up-to date-ness of information they receive. They tend not to care about the other attributes maybe because they have not had any experiences violating their default assumption that the information they receive is relevant to their goal, error-free, easy to understand, and trustworthy.

Information format and completeness also turned out to be strong predictors of user information satisfaction in the longitudinal analysis when matched data across the three phases was combined with attribute satisfaction measures taken in Phase 1. Information currency was weakly significant in Phase 1 using the subset of matched data but showed no significance in Phase 2 and 3. The weak significance observed in Phase 1 may be attributed to the variance through common method bias.

System attributes

Among the system attributes only user satisfaction with system ease of use and user satisfaction with system response time turned out to be important predictors of user satisfaction with the system. System availability also turned out to be weakly significant and thus predicting user satisfaction with system but not at the same level of other two attributes. It also did not demonstrate the same level of satisfaction when using matched data in longitudinal analyses suggesting the common method variance as a contributing factor in making it weakly significant.

The PeopleSoft system is not the easiest and most user-friendly system available. It sometimes takes users a little bit of trial and error in order to locate the piece of information they need or to get the system to do what they want. For example, when it comes to registering for

next semester classes the system does not automatically assume the class is for the next semester when students choose to add classes. Instead, the system will give users an error indicating that they are not allowed to add any classes because it is after the due date for the current semester. Students then need to go back and manually select the next semester, find the class once again and add it. Finding classes is not easy either and it involves a few steps. The system does have a learning curve and it would take a while for students to learn how the system works. Also as elaborated under the information currency, it takes the system a little while to update the information after each transaction. It also sometimes takes the system few seconds to carry out user requested functions during its peak use times. For example, sometimes when users click on a new page, or try to add and drop the class, the system may not immediately process the request. The system thinking/functioning logo appears on the screen and during a peak time, it is common for users to experience longer than usual waits for their requested task to be completed. This problem also impacts users trying to connect to the system from off campus. Sometimes system overloads result in temporary and minor system unavailabilities or longer response times for off campus users.

Similar to information attributes, users may not have had a point of reference of varying experience to form varied satisfaction judgments toward system reliability, flexibility, integration, and security. System reliability refers to the extent to which the system functions dependably; except for some minor system unavailability or longer response time, when the system works, it works dependably and gets the job done. Students also could not judge the system ability in adapting to changing requirements, as they were basically unaware of any changed requirements; if there were any changes in requirements students could only know about them after the system would have been fully adapted to the new requirements. The same

situation exists for system integration and system security. Students are generally not exposed to system integrity problems if there are/were any. They would also not have worked with a legacy system that needed to be integrated into the current system. All their data and information existed on the current system from the first day they entered the school. They also could not assess system security features to form a meaningful satisfaction judgment toward the system security. There were no known security breaches during the time of data collection and no history of security incidents for the system that students could have been aware of. They also had no information about any failed security threats to the system if there were any. Therefore, it is likely that the only system attributes that mattered to them are system ease of use and system response time and system availability to a lesser extent.

System ease of use and system response time also turned out to be strong predictor of user system satisfaction in the longitudinal analysis when matched data were used across three phases while using attribute satisfaction measures taken in Phase 1. These analyses further supports the causal direction suggested in the research model.

Service attributes

Students' satisfaction with service attributes were measured in both Study One and Study Two. However, the statistical analyses failed to establish the reliability and validity of service attribute measures in the first study due to the low quality of data collected for service attributes in Study One. According to the Study One analysis only user satisfaction with service assurance turned out to be a significant and yet strong predictor of service satisfaction followed by service responsiveness at a much weaker level. However, Study Two results could establish measurement reliability and validity and provides more in-depth insights.

User experience with supporting services is expected to vary more extensively compared with their experience with information and system aspects. For information and system related attributes, users are generally exposed to the same treatments or outcomes as these are inbuilt functions of the technical system. However, the same level of consistency in service delivery and treatment that users receive (Kettinger and Lee 1994; Parasuraman et al. 1985) is less likely, especially when it comes to services delivered through staff. Therefore, it is expected that there will be more variation in the measures that result in more constructs with lower path coefficients predicting user satisfaction with service.

According to Study Two results, students' satisfaction with service access, tangibles, empathy, assurance, reliability, responsiveness, and competence (to a weaker extent) were major determinants of their satisfaction with the support services they encountered. User satisfaction with service access turned out to be most important predictor of service satisfaction. It refers to accessibility and availability of support services. Except the online help function the rest of the support services are only available and accessible during the normal university business hours. Thus, if students have questions that cannot be resolved through the online resources they need to make an appointment with appropriate service staff (e.g. financial services, registrar office) and sometimes wait until the next business day (if it is after-hours) to have their issues resolved. After accessibility issue, students cared most about the appearance of the service staff. However, the analysis indicating the importance of tangibles is not as reliable and valid as the results indicating the importance of service access, since the service tangible measures showed weaker measurement reliability and validity.

Service empathy, assurance and reliability path coefficients turned out to be very close to each other indicating similar contributions toward the user satisfaction with service. They

respectively refer to personalized attention and caring that is conveyed by the support service,

the ability of support services to inspire trust and confidence in users, and consistency and

dependability of service performance. Service responsiveness and competence had weaker

effects on user satisfaction with support service as they refer to the support services ability to

provide fast service and their proficiency in providing the service.

At the same time, it seems that either users could not form decisive satisfaction

judgments toward service privacy and security because of lack of varied experience or they were

not concerned about these attributes when forming a satisfaction judgment on the service aspect

of the PeopleSoft system. Service privacy refers to the degree to which the service encounters are

kept confidential and the service security refers to the degree to which service encounters

provide a safe and risk free environment. The same reasoning noted for service privacy and

security may likewise apply to service courtesy and communication, which respectively refer to

the politeness of the support services staff and, their ability to communicate clearly.

Summary

The proposed research model is an integrated and comprehensive model that is designed

to measure user satisfaction with any given IS. Thus, not all attributes are expected to be present

in all testing contexts or even to possess nomological validity in all Information Systems under

study. The model is capable also of providing detailed diagnostic measures and shedding light on

how users form satisfaction judgment in different contexts.

The contextual results of this research imply that overall students' satisfaction with the

PeopleSoft system is derived from their satisfaction with how the system works, the information

provided by the system, and the support services associated with the system. Further, satisfaction

with the system itself and how it works is the most important factor in their final judgment, followed by information and service satisfaction. Thus, it is wise to put more resources into improving or maintaining the system functionality followed by quality of information and service provided to maintain or improve students' satisfaction with the PeopleSoft System.

To maintain or improve student's satisfaction with the functionality of the system the university needs to pay special attention to system ease of use and response time. Factors affecting user satisfaction with information output of the system are information completeness and information format. Thus, system developers need to pay more attention to the above named information attributes instead of others that turned out to be non-significant in this context. To improve students satisfaction with the provided services, service managers need to work on students access to support services followed by support service appearance (tangibles), empathy, assurance, reliability, responsiveness and competence of their staff.

The results of the study suggest that the measurement model results and the goodness of measures can be generalized and extended to other contextual settings or test beds. However, the structural results of this study are only applicable to and interpretable according to the current context. They may also loosely extend to other similar contexts such as other universities' student satisfaction with the computerized systems aiding them in similar tasks. At the same time, the results of the study may also have varied extensively if a different group of users was used. For example, if the study subjects were university staff and faculty instead of students then different attributes may turn out to be significant with varying importance and path loadings than the ones found in this study. Thus, to have a more comprehensive understanding of user satisfaction with an Information System all user groups associated with the system must be included in the assessment efforts.

Study Limitations

No research study is prefect and without limitations, and this study is no exemption. There are several limitations worthy of note that may have affected the results of this dissertation that are discussed in this section.

First, as mentioned previously, not all the user groups were included in this study. Of all the users of the PeopleSoft system (faculty, university staff, and students), only students were included in this study. Thus, the interpretation of the results is limited to student use of the system. The study is therefore not able to shed light on important aspects and attributes of the system under study for other user groups. Other groups tend to use the system in different ways and with different purposes than students and thus may have different priorities and concerns than students. If the other groups were included, the general results may have been different. Thus, a more comprehensive analysis would have been to include separate analyses and results for each user group as well as a set of total group analyses so managers and developers can have a better and more precise understanding of how various user groups evaluate different attributes of an IS.

Second, using students as subjects in research studies has its own pros and cons. For one, students are considered a convenient sample that can provide initial and somehow generalizable results. However, a major concern for taking advantage of student samples is their carelessness and lack of attention to the purpose of the study. This problem is most evident for studies that utilize survey questionnaires that students can fill out at their convenience. They may tend to not read the questions carefully or answer questions carelessly especially toward the end of the questionnaire in longer surveys as observed in Phase 1 of the first study. One way to control for this effect is to record the time that each respondent took to complete the survey and then

eliminate those answers that were recorded in far less time than expected (or is reasonable). The cutoff point for completion should vary from one instrument to another and from one subject population to another and may be decided based on the average completion time and standard deviation (as with the current study).

Third, common method variance can become a strong alternative explanation for obtained results if it exists in large amounts (Podsakoff et al. 2003). The common method variance was effectively controlled for in the second study using the measured latent marker variable (MLMV) method (Chin et al. 2012). However, the first study lacks such a measure. Even though in the first study, the longitudinal design controlled for common method variance to some extent, it would have been beneficial in interpreting the results if MLMV measures were in place in Study One as well. Fourth, due to the data gathering period limitations, Study Two could not adopt the same longitudinal design as data Study One for their results to become directly comparable with those of Study One.

Future Research

This research developed and tested a comprehensive user satisfaction model that can be used as a whole or in part in future studies. In order to improve explanatory and diagnostic power of the model future research should include an attribute ranking mechanism in the survey instrument. This study found many non-significant paths loadings and the logical interpretation was that either the attributes were not important to users or that users could not form a satisfaction judgment for those specific attributes either due to the lack of attribute variability or lack of user experience and reference points. Having a ranking mechanism in which users had to rank the importance of each attribute to their purpose could help us in better interpreting the observed effects.

To further establish the reliability and validity of the measurement model and instrument developed in this study, the model should to be further tested using different contexts and various user groups. For example, measuring user satisfaction with emerging technologies such as cloud computing can give researchers many insights into important aspects of emerging technologies and help practitioners to improve user satisfaction with their products and reap the benefits that comes with satisfied users such as consumer loyalty and increase in sales (Oliver 2010; Yi 1989). The model can also be applied to various settings and industries such as measuring user satisfaction with a healthcare Information System using various user groups including physicians, nurses, administrative staff, and even patients that may interact with the system. Each group can provide unique insights into how users form satisfaction judgments toward an IS and programs can be designed to improve user satisfaction with the IS for each group.

The service satisfaction aspect is fairly new to user satisfaction studies and requires more rigorous academic attention. Our understanding of user satisfaction with service is not as good and comprehensive as our understanding of user satisfaction with other key aspects of IS and their respective attributes. More research and scholarly work is needed to further advance our understanding of service in IS and IT. The model, specifically the service aspect of the model should be tested in contexts of a service being delivered completely through an IT artifact. For example, customers of web hosting usually initiate the service request through IT means and they only receive it through IT artifact as well.

Future research should also explore the possible relationships among the key IS aspects and attributes presented in this research. It should explore if there is any specific system or information attribute that may trigger a service request among users. For example, it is reasonable to argue that issues in system use, such as response time or information presentation

and completeness may cause users to seek support services to resolve these issues. This examination can be accomplished through including more specific control variables in the survey instrument, adding open-ended questions, or interviewing respondents. Since user satisfaction with the system turned out to be the strongest predictor of overall user satisfaction, it is feasible to argue that system satisfaction can be used as predictor of information and service satisfaction. More theoretical and empirical scholarly research is needed to examine similar possibilities and provide more insights into user satisfaction process.

One of the underlying assumptions in developing this research model was that attribute satisfaction is a better predictor of overall satisfaction than attribute quality or performance measures. Past user satisfaction research has mostly employed user perception of attribute quality and performance as predictors of user satisfaction (e.g. Doll and Torkzadeh 1988; McKinney et al. 2002; Wixom and Todd 2005). However, this assumption was not put to the test in this dissertation. Future research should gather perceptions of quality and performance of different attributes while measuring user satisfaction with the same attributes and linking them to overall satisfaction to investigate which set of measures are a better predictor of overall satisfaction.

Finally, this research provides scholars with an overall measure of user satisfaction that can be used in combination with key IS aspects and attribute satisfaction in researching consequences of user satisfaction such as adoption intentions, attitude, and continued use. For example, researchers may try to find out whether overall user satisfaction predicts user intention to continue using an Information System better than direct measures of satisfaction with key aspects of the IS. They can also find out which aspect or attribute contributes the most to satisfaction consequences such as continued use.

Concluding Remarks

This research developed and tested a comprehensive model of user satisfaction that measures satisfaction with various aspects and attributes of an IS at three different levels. At the most basic level it measures user satisfaction with detailed attributes and features of IS as elaborated in the past research. At a more abstract level it measures user satisfaction with key aspects (information, system, and service) of IS as proposed by DeLone and McLean (2003). At the most abstract level the model measures users' overall satisfaction with IS.

The results contribute to research and practice through integrating service satisfaction into user satisfaction models and providing reliable and valid measurement instruments for the attributes of the three aspects (i.e. information, system and service). It also provides a comprehensive yet parsimonious model that is capable of measuring user satisfaction in various settings and contexts. It introduces a powerful diagnostic instrument that can be used in improving user experience with IS at different levels. Managers can use it to gauge user satisfaction with their organizational IS as well as their IT product and services. Developers can use it to gain insights and feedback that can be used in improving their IT product whether it is a simple software application or an enterprise-wide system. The model enables researchers to understand IS aspects and attributes that are important in user satisfaction with a computerized system and then think of creative research designs to uncover the underlying causes of satisfaction or dissatisfaction with a specific aspect or attribute of a software application or an enterprise Information System.

APPENDIX A: COMPREHENSIVE LITERATURE REVIEW MODEL

This appendix aims to describe a procedure, which leads to finding possibly all relevant literature on a subject matter. A comprehensive literature review is an essential part of rigorous academic work. It ensures that scholars have taken into account all the past progress on the subject matter and have a thorough understanding of the issues related to the phenomenon under study. This appendix will discuss the types of scholarly works that need to be considered and the method of searching for them. It will also explain a comprehensive procedure which leads to including all relevant literature on a subject matter given the assumption that there is no time or budget constraints.

What

The first step in a literature review process starts with addressing the very basic question that needs to be answered before starting any type of research: what are we going to study? What exactly is the research problem? What is the subject matter? These are important questions for two reasons. First, rushing into search procedures for relevant literature without having a clear understanding of the subject matter can mean that we waste a great deal of time searching for things that are not directly bound to the subject matter (White et al. 1992). Second, the question helps us to pay direct attention to the definition of the subject matter and build a closely related search statement. A search statement consists of the subject description, which is usually divided into two or more components and their characteristics. For example, if we are looking for related literature on "IT Service Satisfaction", IT, service and satisfaction are three components of the

subject matter. Each word possesses its own definition and properties and puts restrictions on the others. Thus, we need to have a clear understanding of each component and its properties plus the collective meaning that these three components will create together. In this example, we are looking for 'satisfaction', but whose satisfaction are we concerned with? It should be the satisfaction of the subject of the "IT service" that we would like to investigate. The facet "IT" will also restrict the term "service" to only a handful of services that can be identified as IT services. In addition to a better understanding of the concepts under study, decomposing the search statement will help us to identify further, appropriate knowledge areas. We need to identify the **contributing disciplines**. In other words, we need to know which academic fields we should focus to look for the past contributions to the subject matter. The most efficient and effective method to address the proposed concerns is to brainstorm and hold discussion sessions among the research team members until all members have a clear understanding of the knowledge areas and concepts involved in the literature search. We should also seek out expert advice on the appropriate knowledge areas and alternative words that may exist to define the subject matter to ensure a comprehensive search.

Where and How

The next step in this process is to identify the **source of information** that would contribute to our understanding of the subject matter. To do so, we need to answer the question of where and how to find related scholarly works. The primary source of literature for academic works is past journal articles followed by dissertations, books, conference proceedings, microfilms, and working papers. Expert knowledge is yet another valuable source that should be considered. The second step is to identify how we can access and search these resources. For journal papers, dissertations and conference proceedings, in addition to the exhaustive search of

a journal or proceedings, we can always utilize electronic databases and search engines such as Google Scholar. For books, we have Google Books search and the Library of Congress Index at our disposal plus the interuniversity library search. For expert knowledge, we should use the community of scholars to identify individuals working in our domain of interest and contact them for advice about the appropriate pieces of scholarly work or related knowledge.

Now depending on the subject matter and referent disciplines we need to decide on the specific electronic databases. For example if we are trying to study the temperamental behavior of a specific metallic compound, it would be a waste of time to utilize electronic databases that index the social sciences and vice versa. Therefore, we need to identify all closely related disciplines and their associated databases for our purpose. According to the list of contributing disciplines that we prepared at the beginning of this process, we should choose electronic databases that would contain indexes of journal articles, dissertations, conference proceedings and perhaps microfilms aligned with our interest.

Knowledge Indicators

In searching for appropriate knowledge, we need to define its **indicators**. We need to have a clear understanding of what concepts and words are closely related to the components of our search statement. We need to identify all alternative terms that may describe the concepts that are included in our subject matter. For example, when we are looking for a gold mine, we first need to look for **placers** to lead us to a gold repository. Thus, we need to define the placers for related knowledge in advance, in order to find appropriate knowledge. The next step is to decide on appropriate keywords (indicators) that lead us to the desired knowledge. Seeking expert knowledge and brainstorming are appropriate ways to choose initial keywords. However, we should remember that the keywords can always get adjusted as we gain more knowledge

about the subject through initial screening of already acquired literature. We should use the set of initial keywords to conduct a search of the list of electronic databases to find journal articles, dissertations, and conference proceedings. We should also use the same keywords on the Google Book search, the Library of Congress, and interuniversity library system in order to find relevant books.

Search and Order

Using the keywords on different electronic databases and book search engines should results in thousands of scholarly works. A team of research assistants will have to go through the results and eliminate redundant outputs that occur due to database overlaps. This process results in a purified and unique list of scholarly works (Journal articles, books, dissertations, etc.). In this stage, we need to clean up the list and differentiate between related and not related works. However, there are always scholarly works that may not completely fit in any of the related or non-related groups. We suggest grouping the list of articles into three categories of relevant, uncertain, and non-relevant. Two well-trained research assistants should be placed in charge of assigning each scholarly work into the suggested groups separately. When there is disagreement the issue must be addressed by one of the members of the research team who has a better domain knowledge and can be a better judge. At the end of the categorization process, another member of the research team should take look at all the articles on the uncertain category to assign them either to the relevant or non-relevant groups and conclude the initial keywords search.

Complementary Techniques

Next, we use different complementary techniques to increase the comprehensiveness of the search. In addition to our initial keywords search, we will employ *Footnote Chasing* and *Citation Chasing* strategies as described in White et al. (1992). Furthermore, we need to rank order authors to identify productive scholars who may have working papers in the area we are interested in. Initial screening of the literature would also give us a better understanding of the subject matter and may lead to modification of keywords, which may in turn lead to the modification of our related disciplines and search engines resulting in a new stack of scholarly works. This new stack has to be sorted and categorized as described earlier in this appendix.

Footnote Chasing

Footnote chasing is one of the more popular searching strategies among many scholars, according to White et al. (1992). Researchers start with a particular work in their domain of interest and follow up the works, which contributed to the source and are cited in the references, and then trace the new resource links to older literature and so on. However, because we start with a keyword search at the beginning, we should have tens of references if not hundreds already collected. The most comprehensive strategy is to check all footnotes, endnotes, and bibliographical citations for each collected scholarly work. Even though, this process increases the comprehensiveness of the gathered literature, it may require lots of time and effort depending on the initial list of related works. We need to be selective if we are facing time constraints. In our initial pool of related work we should be able to find some resources that require more attention due to their nature and comprehensiveness. We need to pay specific attention to two types of scholarly works. One is review or meta-analysis works and the other is seminal works. Review articles are supposed to consolidate the past research in order to advance the subject

matter (Schwarz et al. 2007). Thus they are considered a good resource to lead us to relevant scholarly works that we might have missed in our initial keywords search. It is possible to miss out many relevant works due to the incomprehensiveness of electronic databases and search engines that we utilize. By employing a **footnote-chasing strategy**, we intend to increase the comprehensiveness of our search for relevant works, through finding references that had not already been accounted for in our keywords search.

For the footnote-tracing technique, we would trace back all subject relevant cited papers and make sure that we have accounted for them in our search. We will have research assistants start with review papers and meta-analysis papers because these papers supposedly contain a comprehensive review of the past literature on the subject matter. Then we follow the chain of citations from one paper to another until we reach the point that we are no longer able to find a new relevant scholarly work. We follow the same procedure for categorizing papers into three groups of relevant, uncertain, and non-relevant. Intervention from a research team member is required when there is disagreement between the two research assistants to place the scholarly work in the right group. At the end another member of research team double check the uncertain group to place the works either in the relevant or non-relevant category.

Citation Searching

Citation searching is an inverted version of footnote chasing. It is the process of chasing forward instead of backward in time. In citation searching we start with seminal works and try to find later pieces that referred to our starting works (White et al. 1992). Using ISI web of science and Google Scholar we can identify the most cited (seminal) scholarly works in the area, using the pool of related scholarly works acquired through keywords search and footnote chase. With utilizing ISI Web of Science and Google Scholar we can trace forward and find out which papers

actually cited these seminal works. Once again, we use the same sorting methodology that we employed in keywords search and footnote chasing to categorize scholarly works that resulted from tracing forward process into relevant and non-relevant groups.

Modification

Modification in what, where, how and knowledge indicators may result from the initial or more in-depth screening of the literature. The survey of literature may lead us to develop new concepts or may introduce us to new constructs that require modification of what, how and where answers and in turn modification of search keywords as knowledge indicators. In the case of having to modify keywords or referent disciplines/search tools, we need to start from the keywords search on electronic databases stage and go through all the phases again to make sure that we have covered and found all the related material that exist.

Evaluation

It is very difficult to evaluate the success of a literature search for two reasons. To evaluate the success of an effort we need a measure or a standard to be able to evaluate our work against it. For example if we know that there are 1000 related scholarly works for a subject matter and, we found all 1000 that exist we would claim that we conducted a comprehensive literature search and we found all that exist. However, the vast number of scholarly work related to a subject matter is mostly unknown, even to the experts. Thus, it is not possible to compare the number of found items to a reference number and make claims about the comprehensiveness of the literature review. Even if there was a number available and we could reach that number in our search for literature, we still could not claim that we have done a comprehensive literature review and found all materials related to our subject matter.

There are two types of errors associated with the literature search (White et al. 1992). They are errors of inclusion and errors of exclusion. Error of inclusion refers to counting a work, which should not be included because it is not relevant to our subject matter. Error of exclusion refers to excluding what should have been included in the list of literature we prepared. Compared to error of inclusion, an error of exclusion could be a bigger threat to the results of a literature search process, which will be used later to form theoretical foundation of scholarly works. Errors of inclusion will only demand more time and effort and, will be filtered out of the search results by the time researchers have completed an in-depth review of the found literature. However, the exclusion of related literature can seriously threaten the validity of theoretical conclusions that are based on the past scientific progress. Therefore, we designed a mechanism that aimed to reduce errors of exclusion through using different raters and having an expert judge to rule out uncertainties. Nevertheless, this mechanism is only partially useful for two reasons. First, we are using human judgment in assessing the relevance of the works that we could find through a combination of searching techniques and strategies; however, human judgment is often prone to errors. Second, despite all our efforts in using a combination of techniques to find all the relevant literature, there may still exist some scholarly works related to our subject matter that we could not find through employing different searching strategies.

However, we need to define a stopping point in our search for the relevant literature. We should conclude the search for published scholarly works when no new concept or construct is coming out of survey of the literature and we are not able to find any scholarly work that we have not already accounted for. This is when we have reached the point where no additional modifications are required to the answers of the what, where and how questions and no new keywords are introduced to the list of search words. Furthermore, the search can be concluded

when we are not able to find any new scholarly works through footnote chasing and citation searching. Thus, we can conclude our search for published materials.

Nonetheless, there might still be unpublished works related to our subject matter. At this stage we need to turn our attention to working papers and unpublished materials. Because there is not a database to index working papers, it is extremely difficult to find such scholarly works. We accomplish this job by ranking the authors of materials that we have already found based on how many times their names appeared as either the author or co-author in our list. Then we will contact scholars whose names appeared more than others in our database. We will leave the cutoff point to be decided by the research team members based on how important it is for them to find all unpublished works. One researcher may choose five appearances as their cutoff point, the other may choose three appearances based on the nature of their study. After choosing the cutoff point we need to find the contact information for the authors whose names appeared more than the cutoff point in our list. Then, we will contact the authors asking them if they have any working paper on the subject matter that can potentially contribute to our study or if they are aware of any unpublished work related to the subject matter. The result of this procedure should conclude the search for unpublished works and would act as the final stopping point for our literature search. The following figure (Figure 40) provides a schematic representation of the procedures described in this appendix.

```
┌──────────────────────┐                              ┌──────────────────────┐
│  What is the subject │                              │ Concluding the Search│
│      matter?         │                              └──────────────────────┘
└──────────────────────┘                                        ▲
            │                                                    │
            ▼                                        ┌──────────────────────┐
┌──────────────────────┐                             │  Soliciting work in  │
│ What are the relevant│                             │      progress        │
│     disciplines?     │                             └──────────────────────┘
│                      │                                        ▲
│  • Brain Storming    │                             ┌──────────────────────┐
│  • Individual Experts│                             │ Productive scholars  │
└──────────────────────┘                             │    identification    │
            │                                        └──────────────────────┘
            ▼                                                    ▲
┌──────────────────────┐                             ┌──────────────────────┐
│Where to find knowledge?│                           │ Categorizing the results│
│                      │                             └──────────────────────┘
│  • Journal articles  │                                        ▲
│  • Books             │                             ┌──────────────────────┐
│  • Dissertations     │                             │  Footnote Chasing and│
│  • Proceedings       │                             │  Citation Searching  │
│  • Working paper     │                             └──────────────────────┘
│  • Micro films       │                                        ▲
│  • Individual Experts│                             ┌──────────────────────┐
└──────────────────────┘                             │ Literature Screening │
            │                                        └──────────────────────┘
            ▼                                                    ▲
┌──────────────────────┐                             ┌──────────────────────┐
│ How to find knowledge?│                            │Categorizing the results│
│                      │                             │                      │
│  • Electronic databases│                           │  • Three initial categories│
│  • Google Books      │                             │  •    Relevant       │
│  • Google Scholar    │                             │  •    Gray           │
│  • Library of congress│                            │  •    Non-relevant   │
│  • Asking Experts    │                             │  • Two final categories of│
│  • Interlibrary search│                            │  •    Relevant       │
└──────────────────────┘                             │  •    Non-relevant   │
```

What are the relevant disciplines?

- Brain Storming
- Individual Experts

Where to find knowledge?

- Journal articles
- Books
- Dissertations
- Proceedings
- Working paper
- Micro films
- Individual Experts

How to find knowledge?

- Electronic databases
- Google Books
- Google Scholar
- Library of congress
- Asking Experts
- Interlibrary search

Keywords?

- Brain Storming
- Survey of literature

Searching by Keywords. → **Eliminating redundant results** → **Categorizing the results**

- Three initial categories
- Relevant
- Gray
- Non-relevant
- Two final categories of
- Relevant
- Non-relevant

Figure 40: Literature Search Process

APPENDIX B: PILOT SURVEY QUESTIONNAIRE

Overall Satisfaction

For all the questions below, the term **"<u>Information Systems</u>"** refers to information output, the technology that delivers it and supporting services.

1. Are you satisfied with the Information System?

Extremely Dissatisfied	Quite Dissatisfied	Slightly Dissatisfied	Neither Satisfied nor Dissatisfied	Slightly Satisfied	Quite Satisfied	Extremely Satisfied
-3	-2	-1	0	+1	+2	+3

2. How would you rate your satisfaction with the Information System?

Very Dissatisfied	Quite Dissatisfied	Slightly Dissatisfied	Neither Satisfied nor Dissatisfied	Slightly Satisfied	Quite Satisfied	Very Satisfied
-3	-2	-1	0	+1	+2	+3

3. All things considered, I am _____ with the Information System.

Very Dissatisfied	Quite Dissatisfied	Slightly Dissatisfied	Neither Satisfied nor Dissatisfied	Slightly Satisfied	Quite Satisfied	Very Satisfied
-3	-2	-1	0	+1	+2	+3

4. Overall, regarding my experience with all aspects related to the Information System, I am _____

Very Dissatisfied			Neither			Very Satisfied
-3	-2	-1	0	+1	+2	+3

Very Displeased			Neither			Very Pleased
-3	-2	-1	0	+1	+2	+3

Very Frustrated			Neither			Very Contented
-3	-2	-1	0	+1	+2	+3

Very Disappointed			Neither			Very Delighted
-3	-2	-1	0	+1	+2	+3

Information Satisfaction

For all the questions below, the term "**<u>information</u>**" refers to the information output that you receive from the Information System that you are using.

5. I am satisfied with the information I get from the system.

Strongly Disagree	Quite Disagree	Slightly Disagree	Neither agree nor Disagree	Slightly Agree	Quite Agree	Strongly Agree
-3	-2	-1	0	+1	+2	+3

6. I am very satisfied with the information I receive from the system.

Strongly Disagree	Quite Disagree	Slightly Disagree	Neither agree nor Disagree	Slightly Agree	Quite Agree	Strongly Agree
-3	-2	-1	0	+1	+2	+3

7. Overall, I am _____ with the information output I receive from the system

Very Dissatisfied			Neither			Very Satisfied
-3	-2	-1	0	+1	+2	+3

Very Displeased			Neither			Very Pleased
-3	-2	-1	0	+1	+2	+3

Very Frustrated			Neither			Very Contented
-3	-2	-1	0	+1	+2	+3

Very Disappointed			Neither			Very Delighted
-3	-2	-1	0	+1	+2	+3

System Satisfaction

For all the questions below, the term "**system**" refers to the technology that delivers the information output. Please stay focused on the technology that facilitates the Information System you are using.

8. I am satisfied with how the system works.

Strongly Disagree	Quite Disagree	Slightly Disagree	Neither agree nor Disagree	Slightly Agree	Quite Agree	Strongly Agree
-3	-2	-1	0	+1	+2	+3

9. I am very satisfied with the functioning of the system.

Strongly Disagree	Quite Disagree	Slightly Disagree	Neither agree nor Disagree	Slightly Agree	Quite Agree	Strongly Agree
-3	-2	-1	0	+1	+2	+3

10. Overall, I am _____ with how the system operates.

Very Dissatisfied			Neither			Very Satisfied
-3	-2	-1	0	+1	+2	+3

Very Displeased			Neither			Very Pleased
-3	-2	-1	0	+1	+2	+3

Very Frustrated			Neither			Very Contented
-3	-2	-1	0	+1	+2	+3

Very Disappointed			Neither			Very Delighted
-3	-2	-1	0	+1	+2	+3

Service Satisfaction

For all the questions below, the term **"service"** refers to the supporting services that help, support, and facilitate the operation and use of the Information System. Please stay focused on the supporting services of the Information System you are using.

11. I am satisfied with the services that support the system.

Strongly Disagree	Quite Disagree	Slightly Disagree	Neither agree nor Disagree	Slightly Agree	Quite Agree	Strongly Agree
-3	-2	-1	0	+1	+2	+3

12. I am very satisfied with the services that facilitate the functioning of the system.

Strongly Disagree	Quite Disagree	Slightly Disagree	Neither agree nor Disagree	Slightly Agree	Quite Agree	Strongly Agree
-3	-2	-1	0	+1	+2	+3

13. Overall, I am _____ with the supporting services associated with the system.

Very Dissatisfied			Neither			Very Satisfied
-3	-2	-1	0	+1	+2	+3

Very Displeased			Neither			Very Pleased
-3	-2	-1	0	+1	+2	+3

Very Frustrated			Neither			Very Contented
-3	-2	-1	0	+1	+2	+3

Very Disappointed			Neither			Very Delighted
-3	-2	-1	0	+1	+2	+3

Satisfaction with Information Attributes

The following set of questions relate to your satisfaction with different attributes of the information output provided by the system. For all the questions below, the term "**information**" refers to information output. Please mark your answers according to the scale provided below.

Very Dissatisfied	Quite Dissatisfied	Slightly Dissatisfied	Neither Satisfied nor Dissatisfied	Slightly Satisfied	Quite Satisfied	Very Satisfied
-3	-2	-1	0	+1	+2	+3

Overall, how satisfied or dissatisfied are you with the extent to which the information provided by the system…

		Very Dissatisfied	Quite Dissatisfied	Slightly Dissatisfied	Neither	Slightly Satisfied	Quite Satisfied	Very Satisfied
14	…is relevant to your job	-3	-2	-1	0	+1	+2	+3
15	…is applicable to your work.	-3	-2	-1	0	+1	+2	+3
16	…is pertinent to your job.	-3	-2	-1	0	+1	+2	+3
17	…is salient to your work.	-3	-2	-1	0	+1	+2	+3
18	…is useful for your job.	-3	-2	-1	0	+1	+2	+3

Overall, how satisfied or dissatisfied are you with the extent to which the information provided by the system…

		Very Dissatisfied	Quite Dissatisfied	Slightly Dissatisfied	Neither	Slightly Satisfied	Quite Satisfied	Very Satisfied
19	…is current.	-3	-2	-1	0	+1	+2	+3
20	…is up-to-date.	-3	-2	-1	0	+1	+2	+3
21	…reflects what is going on right now.	-3	-2	-1	0	+1	+2	+3
22	…reflects the latest situation.	-3	-2	-1	0	+1	+2	+3

Overall, how satisfied or dissatisfied are you with the extent to which the information provided by the system…

		Very Dissatisfied	Quite Dissatisfied	Slightly Dissatisfied	Neither	Slightly Satisfied	Quite Satisfied	Very Satisfied
23	…is exact.	-3	-2	-1	0	+1	+2	+3
24	…is error free.	-3	-2	-1	0	+1	+2	+3
25	…is accurate.	-3	-2	-1	0	+1	+2	+3
26	…is free from mistakes.	-3	-2	-1	0	+1	+2	+3
27	…is precise.	-3	-2	-1	0	+1	+2	+3

Overall, how satisfied or dissatisfied are you with the extent to which the information provided by the system…

		Very Dissatisfied	Quite Dissatisfied	Slightly Dissatisfied	Neither	Slightly Satisfied	Quite Satisfied	Very Satisfied
28	…is understandable.	-3	-2	-1	0	+1	+2	+3
29	…is comprehendible.	-3	-2	-1	0	+1	+2	+3
30	…is clear.	-3	-2	-1	0	+1	+2	+3
31	…is straight forward.	-3	-2	-1	0	+1	+2	+3
32	…is coherent.	-3	-2	-1	0	+1	+2	+3

Overall, how satisfied or dissatisfied are you with the extent to which the information provided by the system…

		Very Dissatisfied	Quite Dissatisfied	Slightly Dissatisfied	Neither	Slightly Satisfied	Quite Satisfied	Very Satisfied
33	…is well organized.	-3	-2	-1	0	+1	+2	+3
34	…is clearly presented.	-3	-2	-1	0	+1	+2	+3
35	…is well presented.	-3	-2	-1	0	+1	+2	+3
36	…is arranged well.	-3	-2	-1	0	+1	+2	+3

Overall, how satisfied or dissatisfied are you with the extent to which the information provided by the system…

		Very Dissatisfied	Quite Dissatisfied	Slightly Dissatisfied	Neither	Slightly Satisfied	Quite Satisfied	Very Satisfied
37	…is complete.	-3	-2	-1	0	+1	+2	+3
38	…is comprehensive.	-3	-2	-1	0	+1	+2	+3
39	…is all that is needed.	-3	-2	-1	0	+1	+2	+3
40	…contains all the necessary parts.	-3	-2	-1	0	+1	+2	+3
41	…includes all the essential elements.	-3	-2	-1	0	+1	+2	+3

Overall, how satisfied or dissatisfied are you with the extent to which the information provided by the system…

		Very Dissatisfied	Quite Dissatisfied	Slightly Dissatisfied	Neither	Slightly Satisfied	Quite Satisfied	Very Satisfied
42	…is reliable.	-3	-2	-1	0	+1	+2	+3
43	…is dependable.	-3	-2	-1	0	+1	+2	+3
44	…is trustworthy.	-3	-2	-1	0	+1	+2	+3
45	…is credible.	-3	-2	-1	0	+1	+2	+3

Satisfaction with System Attributes

The following questions relate to your satisfaction with the functioning (i.e. operation and use) of the system itself. For all the questions below, the term "**system**" refers to the technology that delivers the information output. Please stay focused on the technology that facilitates the Information System you are using. Please mark your answers according to the scale provided below.

Very Dissatisfied	Quite Dissatisfied	Slightly Dissatisfied	Neither Satisfied nor Dissatisfied	Slightly Satisfied	Quite Satisfied	Very Satisfied
-3	-2	-1	0	+1	+2	+3

Overall, how satisfied are you with the extent to which …

		Very Dissatisfied	Quite Dissatisfied	Slightly Dissatisfied	Neither	Slightly Satisfied	Quite Satisfied	Very Satisfied
46	…the system is easy to use.	-3	-2	-1	0	+1	+2	+3
47	…the system is easy to operate.	-3	-2	-1	0	+1	+2	+3
48	…working with the system is effort free.	-3	-2	-1	0	+1	+2	+3
49	…it is easy to get the system to do what you want it to do.	-3	-2	-1	0	+1	+2	+3

Overall, how satisfied are you with the extent to which …

		Very Dissatisfied	Quite Dissatisfied	Slightly Dissatisfied	Neither	Slightly Satisfied	Quite Satisfied	Very Satisfied
50	…the system operation is dependable.	-3	-2	-1	0	+1	+2	+3
51	…the system operation is reliable.	-3	-2	-1	0	+1	+2	+3
52	…the system operates properly.	-3	-2	-1	0	+1	+2	+3
53	…the system functions at all times.	-3	-2	-1	0	+1	+2	+3
54	…the system operates at all times.	-3	-2	-1	0	+1	+2	+3
55	…the system is failure free.	-3	-2	-1	0	+1	+2	+3

Overall, how satisfied are you with the extent to which …

		Very Dissatisfied	Quite Dissatisfied	Slightly Dissatisfied	Neither	Slightly Satisfied	Quite Satisfied	Very Satisfied
56	…the system is available to use at all times.	-3	-2	-1	0	+1	+2	+3
57	…the system is accessible at all times.	-3	-2	-1	0	+1	+2	+3
58	…the system is ready to be used.	-3	-2	-1	0	+1	+2	+3

Overall, how satisfied are you with the extent to which …

		Very Dissatisfied	Quite Dissatisfied	Slightly Dissatisfied	Neither	Slightly Satisfied	Quite Satisfied	Very Satisfied
59	…the system is responsive to your requests.	-3	-2	-1	0	+1	+2	+3
60	…the system responds quickly to your requests.	-3	-2	-1	0	+1	+2	+3
61	…the system is prompt in carrying out your requests.	-3	-2	-1	0	+1	+2	+3
62	…the system caries out your requests in a timely manner.	-3	-2	-1	0	+1	+2	+3
63	…the system is prompt in executing your requests.	-3	-2	-1	0	+1	+2	+3
64	…the system is fast in performing your requests	-3	-2	-1	0	+1	+2	+3

Overall, how satisfied are you with the extent to which …

		Very Dissatisfied	Quite Dissatisfied	Slightly Dissatisfied	Neither	Slightly Satisfied	Quite Satisfied	Very Satisfied
65	…the system can be adapted to changing requirements.	-3	-2	-1	0	+1	+2	+3
66	…the system can be changed to meet other requirements.	-3	-2	-1	0	+1	+2	+3
67	…the system can be adjusted to different needs.	-3	-2	-1	0	+1	+2	+3
68	…the system is flexible in meeting various demands.	-3	-2	-1	0	+1	+2	+3

Overall, how satisfied are you with the extent to which …

		Very Dissatisfied	Quite Dissatisfied	Slightly Dissatisfied	Neither	Slightly Satisfied	Quite Satisfied	Very Satisfied
69	…the system pulls together information from different sources.	-3	-2	-1	0	+1	+2	+3
70	…the system combines information from various locations.	-3	-2	-1	0	+1	+2	+3
71	…the system integrates information from different places.	-3	-2	-1	0	+1	+2	+3
72	…the system brings together information from various sources.	-3	-2	-1	0	+1	+2	+3

Overall, how satisfied are you with the extent to which …

		Very Dissatisfied	Quite Dissatisfied	Slightly Dissatisfied	Neither	Slightly Satisfied	Quite Satisfied	Very Satisfied
73	…the system keeps information safe.	-3	-2	-1	0	+1	+2	+3
74	…information is kept secure by the system.	-3	-2	-1	0	+1	+2	+3
75	…the system protects information.	-3	-2	-1	0	+1	+2	+3

Satisfaction with Service Attributes

The following set of questions relate to your satisfaction with the **services** that support the operations and use of the Information System. Please mark your answers according to the scale provided below.

Very Dissatisfied	Quite Dissatisfied	Slightly Dissatisfied	Neither Satisfied nor Dissatisfied	Slightly Satisfied	Quite Satisfied	Very Satisfied
-3	-2	-1	0	+1	+2	+3

Overall, how satisfied or dissatisfied are you with …

		Very Dissatisfied	**Quite Dissatisfied**	**Slightly Dissatisfied**	**Neither**	**Slightly Satisfied**	**Quite Satisfied**	**Very Satisfied**
76	…the reliability of the support services.	-3	-2	-1	0	+1	+2	+3
77	…how properly the support services are performed.	-3	-2	-1	0	+1	+2	+3
78	…the consistency of support services you receive.	-3	-2	-1	0	+1	+2	+3
79	…the dependability of the support services in place.	-3	-2	-1	0	+1	+2	+3

Overall, how satisfied or dissatisfied are you with …

		Very Dissatisfied	**Quite Dissatisfied**	**Slightly Dissatisfied**	**Neither**	**Slightly Satisfied**	**Quite Satisfied**	**Very Satisfied**
80	…how fast support services are delivered.	-3	-2	-1	0	+1	+2	+3
81	…the speed of service provided.	-3	-2	-1	0	+1	+2	+3
82	…the timeliness of service.	-3	-2	-1	0	+1	+2	+3
83	…how quickly the support services respond to you requests.	-3	-2	-1	0	+1	+2	+3
84	…how soon support services are able to help you.	-3	-2	-1	0	+1	+2	+3
84	…the promptness of the support services that you receive.	-3	-2	-1	0	+1	+2	+3
86	…the responsiveness of the support services that are provided.	-3	-2	-1	0	+1	+2	+3

Overall, how satisfied or dissatisfied are you with …

		Very Dissatisfied	**Quite Dissatisfied**	**Slightly Dissatisfied**	**Neither**	**Slightly Satisfied**	**Quite Satisfied**	**Very Satisfied**
87	…how support services make you feel confident that your concerns will be addressed	-3	-2	-1	0	+1	+2	+3
88	…how support services provide assurance that your requests will be attended to	-3	-2	-1	0	+1	+2	+3
89	…how support services make you feel you can trust them to resolve your issues	-3	-2	-1	0	+1	+2	+3

Overall, how satisfied or dissatisfied are you with …

		Very Dissatisfied	Quite Dissatisfied	Slightly Dissatisfied	Neither	Slightly Satisfied	Quite Satisfied	Very Satisfied
90	…how polite the support services are to you.	-3	-2	-1	0	+1	+2	+3
91	…how respectful the support services are to you.	-3	-2	-1	0	+1	+2	+3
92	…how considerate support services are to you.	-3	-2	-1	0	+1	+2	+3

Overall, how satisfied or dissatisfied are you with …

		Very Dissatisfied	Quite Dissatisfied	Slightly Dissatisfied	Neither	Slightly Satisfied	Quite Satisfied	Very Satisfied
93	…how support services make you feel safe from harm during your interactions with them.	-3	-2	-1	0	+1	+2	+3
94	…how support services provide a safe and sound interacting environment.	-3	-2	-1	0	+1	+2	+3
95	…how support services provide you with a safe and secure service encounter.	-3	-2	-1	0	+1	+2	+3

Overall, how satisfied or dissatisfied are you with …

		Very Dissatisfied	Quite Dissatisfied	Slightly Dissatisfied	Neither	Slightly Satisfied	Quite Satisfied	Very Satisfied
96	…how support services make you feel that your interactions with them are private.	-3	-2	-1	0	+1	+2	+3
97	…how support services make you feel that your interactions with them are confidential.	-3	-2	-1	0	+1	+2	+3

Overall, how satisfied or dissatisfied are you with …

		Very Dissatisfied	Quite Dissatisfied	Slightly Dissatisfied	Neither	Slightly Satisfied	Quite Satisfied	Very Satisfied
98	…how support services explain things during service delivery.	-3	-2	-1	0	+1	+2	+3
99	…how clear and understandable your interactions are with support services during a service call.	-3	-2	-1	0	+1	+2	+3
100	…how support services communicates with you during a service encounter.	-3	-2	-1	0	+1	+2	+3

Overall, how satisfied or dissatisfied are you with …

		Very Dissatisfied	**Quite Dissatisfied**	**Slightly Dissatisfied**	**Neither**	**Slightly Satisfied**	**Quite Satisfied**	**Very Satisfied**
101	…how well the support services perform their tasks.	-3	-2	-1	0	+1	+2	+3
102	…how skillful the support services are in addressing your issues.	-3	-2	-1	0	+1	+2	+3
103	…how knowledgeable support services are in addressing your concerns.	-3	-2	-1	0	+1	+2	+3
104	…the level competence of the support services.	-3	-2	-1	0	+1	+2	+3
105	…the capabilities of the support services.	-3	-2	-1	0	+1	+2	+3
106	…the level of experience of the support services.	-3	-2	-1	0	+1	+2	+3

Overall, how satisfied or dissatisfied are you with …

		Very Dissatisfied	**Quite Dissatisfied**	**Slightly Dissatisfied**	**Neither**	**Slightly Satisfied**	**Quite Satisfied**	**Very Satisfied**
107	…how easy it is to acquire support services.	-3	-2	-1	0	+1	+2	+3
108	…the accessibility of support services.	-3	-2	-1	0	+1	+2	+3
109	…the availability of support services.	-3	-2	-1	0	+1	+2	+3
110	…how convenient it is to access support services.	-3	-2	-1	0	+1	+2	+3

Overall, how satisfied or dissatisfied are you with …

		Very Dissatisfied	**Quite Dissatisfied**	**Slightly Dissatisfied**	**Neither**	**Slightly Satisfied**	**Quite Satisfied**	**Very Satisfied**
111	…how concerned the support services are about your issues.	-3	-2	-1	0	+1	+2	+3
112	…how understanding the support services are about your needs.	-3	-2	-1	0	+1	+2	+3
113	…how sympathetic the support services are with your situation.	-3	-2	-1	0	+1	+2	+3
114	…how much empathy is provided by the support services.	-3	-2	-1	0	+1	+2	+3
115	…how much sympathy is provided by the support services.	-3	-2	-1	0	+1	+2	+3
116	…the level of understanding that is provided by the support services.	-3	-2	-1	0	+1	+2	+3

Overall, how satisfied or dissatisfied are you with …

		Very Dissatisfied	Quite Dissatisfied	Slightly Dissatisfied	Neither	Slightly Satisfied	Quite Satisfied	Very Satisfied
117	…the support materials used by support services.	-3	-2	-1	0	+1	+2	+3
118	…with the equipment used by support services.	-3	-2	-1	0	+1	+2	+3
119	…with the software and hardware used by support services.	-3	-2	-1	0	+1	+2	+3
120	…the communication channels used for service support.	-3	-2	-1	0	+1	+2	+3
121	…the resources used by support services.	-3	-2	-1	0	+1	+2	+3
122	…the tools used by the support services.	-3	-2	-1	0	+1	+2	+3
123	…how support staff are neat appearing.	-3	-2	-1	0	+1	+2	+3
124	…professional appearance of support staff.	-3	-2	-1	0	+1	+2	+3
125	…business like appearance of support staff.	-3	-2	-1	0	+1	+2	+3

Demographics

Please answer the following demographic questions.

126. Gender ☐ Male ☐ Female

127. What is your *age* group?

☐ 18-24   ☐ 25-34   ☐ 35-44   ☐ 45-54   ☐ 55+

128. What is your highest level of educational achievement?

☐ High School Diploma

☐ Some Undergraduate experience

☐ Undergraduate Degree

☐ Postgraduate Degree

129. Have you had any service encounter (either automated or with service staff)?

☐ Yes   ☐ No

130. How long have you been using this Information System?

☐ less than 6 months   ☐ 6 months to less than 1 year   ☐ 1 year to less than 5 years   ☐ 5 years or more

131. On average, how frequently do you use the Information System?

☐ Less than once a month

☐ Once a month

☐ A few times a month

☐ Once a week
☐ A few times a week
☐ About once a day
☐ Several times a day

132. How long have you been in this job?

☐ less than 6 months   ☐ 6 months to less than 1 year   ☐ 1 year to less than 5 years   ☐ 5 years or more

133. On average, how frequently do you use the Information System?

Extremely Infrequent	Very Infrequent	Somewhat Infrequent	Neither Frequent nor Infrequent	Somewhat Frequent	Very Frequent	Extremely Frequent
-3	-2	-1	0	+1	+2	+3

APPENDIX C: MAIN SURVEY QUESTIONNAIRE

Overall Satisfaction

For all the questions below, the term **"<u>PeopleSoft systems</u>"** refers to information output, the technology that delivers it and supporting services.

1. Are you satisfied with the PeopleSoft system?

Extremely Dissatisfied	Quite Dissatisfied	Slightly Dissatisfied	Neither Satisfied nor Dissatisfied	Slightly Satisfied	Quite Satisfied	Extremely Satisfied
-3	-2	-1	0	1	2	3

2. How would you rate your satisfaction with the PeopleSoft system?

Very Dissatisfied	Quite Dissatisfied	Slightly Dissatisfied	Neither Satisfied nor Dissatisfied	Slightly Satisfied	Quite Satisfied	Very Satisfied
-3	-2	-1	0	1	2	3

3. All things considered, I am _____ with the PeopleSoft system.

Very Dissatisfied	Quite Dissatisfied	Slightly Dissatisfied	Neither Satisfied nor Dissatisfied	Slightly Satisfied	Quite Satisfied	Very Satisfied
-3	-2	-1	0	1	2	3

4. Overall, regarding my experience with all aspects related to the PeopleSoft system, I am _____

Very Dissatisfied			Neither			Very Satisfied
-3	-2	-1	0	1	2	3

Very Displeased			Neither			Very Pleased
-3	-2	-1	0	1	2	3

Very Frustrated			Neither			Very Contented
-3	-2	-1	0	1	2	3

Very Disappointed			Neither			Very Delighted
-3	-2	-1	0	1	2	3

Information Satisfaction

For all the questions below, the term "**information"** refers to the information output that you receive from the Information System that you are using.

14. I am satisfied with the information I get from the PeopleSoft system.

Strongly Disagree	Quite Disagree	Slightly Disagree	Neither Satisfied nor Dissatisfied	Slightly Agree	Quite Agree	Strongly Agree
-3	-2	-1	0	1	2	3

15. I am very satisfied with the information I receive from the PeopleSoft system.

Strongly Disagree	Quite Disagree	Slightly Disagree	Neither Satisfied nor Dissatisfied	Slightly Agree	Quite Agree	Strongly Agree
-3	-2	-1	0	1	2	3

16. Overall, I am _____ with the information output I receive from the PeopleSoft system

Very Dissatisfied			Neither			Very Satisfied
-3	-2	-1	0	1	2	3
Very Displeased			Neither			Very Pleased
-3	-2	-1	0	1	2	3
Very Frustrated			Neither			Very Contented
-3	-2	-1	0	1	2	3
Very Disappointed			Neither			Very Delighted
-3	-2	-1	0	1	2	3

System Satisfaction

For all the questions below, the term "**system**" refers to the technology that delivers the information output. Please stay focused on the technology that facilitates the Information System you are using.

17. I am satisfied with how the PeopleSoft *system* works.

Strongly Disagree	Quite Disagree	Slightly Disagree	Neither Satisfied nor Dissatisfied	Slightly Agree	Quite Agree	Strongly Agree
-3	-2	-1	0	1	2	3

18. I am very satisfied with the functioning of the PeopleSoft *system*.

Strongly Disagree	Quite Disagree	Slightly Disagree	Neither Satisfied nor Dissatisfied	Slightly Agree	Quite Agree	Strongly Agree
-3	-2	-1	0	1	2	3

19. Overall, I am _____ with how the PeopleSoft *system* operates.

Very Dissatisfied			Neither			Very Satisfied
-3	-2	-1	0	1	2	3

Very Displeased			Neither			Very Pleased
-3	-2	-1	0	1	2	3

Very Frustrated			Neither			Very Contented
-3	-2	-1	0	1	2	3

Very Disappointed			Neither			Very Delighted
-3	-2	-1	0	1	2	3

Service Satisfaction

For all the questions below, the term **"service"** refers to the supporting services you receive that help, support, and facilitate the operation and use of the Information System. Please stay focused on the supporting services of the Information System you are using.

20. I am satisfied with the services that support the PeopleSoft system.

Strongly Disagree	Quite Disagree	Slightly Disagree	Neither Satisfied nor Dissatisfied	Slightly Agree	Quite Agree	Strongly Agree
-3	-2	-1	0	1	2	3

21. I am very satisfied with the services that facilitate the functioning of the PeopleSoft system.

Strongly Disagree	Quite Disagree	Slightly Disagree	Neither Satisfied nor Dissatisfied	Slightly Agree	Quite Agree	Strongly Agree
-3	-2	-1	0	1	2	3

22. Overall, I am _____ with the supporting services associated with the PeopleSoft system.

Very Dissatisfied			Neither			Very Satisfied
-3	-2	-1	0	1	2	3

Very Displeased			Neither			Very Pleased
-3	-2	-1	0	1	2	3

Very Frustrated			Neither			Very Contented
-3	-2	-1	0	1	2	3

Very Disappointed			Neither			Very Delighted
-3	-2	-1	0	1	2	3

Satisfaction with Information Attributes

The following set of questions relate to your satisfaction with different attributes of the information output provided by the system. For all the questions below, the term "**information"** refers to information output. Please mark your answers according to the scale provided below.

Very Dissatisfied	Quite Dissatisfied	Slightly Dissatisfied	Neither Satisfied nor Dissatisfied	Slightly Satisfied	Quite Satisfied	Very Satisfied
-3	-2	-1	0	1	2	3

Overall, how satisfied or dissatisfied are you with the extent to which the information provided by the PeopleSoft system…

		Very Dissatisfied	Quite Dissatisfied	Slightly Dissatisfied	Neither	Slightly Satisfied	Quite Satisfied	Very Satisfied
14	…is relevant to your job	-3	-2	-1	0	1	2	3
15	…is pertinent to your job.	-3	-2	-1	0	1	2	3
16	…is useful for your job.	-3	-2	-1	0	1	2	3

Overall, how satisfied or dissatisfied are you with the extent to which the information provided by the PeopleSoft system…

		Very Dissatisfied	Quite Dissatisfied	Slightly Dissatisfied	Neither	Slightly Satisfied	Quite Satisfied	Very Satisfied
17	…is current.	-3	-2	-1	0	1	2	3
18	…is up-to-date.	-3	-2	-1	0	1	2	3
19	…reflects the latest situation.	-3	-2	-1	0	1	2	3

Overall, how satisfied or dissatisfied are you with the extent to which the information provided by the PeopleSoft system…

		Very Dissatisfied	Quite Dissatisfied	Slightly Dissatisfied	Neither	Slightly Satisfied	Quite Satisfied	Very Satisfied
20	…is error free.	-3	-2	-1	0	1	2	3
21	…is accurate.	-3	-2	-1	0	1	2	3
22	…is free from mistakes.	-3	-2	-1	0	1	2	3

Overall, how satisfied or dissatisfied are you with the extent to which the information provided by the PeopleSoft system…

		Very Dissatisfied	Quite Dissatisfied	Slightly Dissatisfied	Neither	Slightly Satisfied	Quite Satisfied	Very Satisfied
23	…is understandable.	-3	-2	-1	0	1	2	3
24	…is straight forward.	-3	-2	-1	0	1	2	3
25	…is coherent.	-3	-2	-1	0	1	2	3

Overall, how satisfied or dissatisfied are you with the extent to which the information provided by the PeopleSoft system…

		Very Dissatisfied	Quite Dissatisfied	Slightly Dissatisfied	Neither	Slightly Satisfied	Quite Satisfied	Very Satisfied
26	…is well organized.	-3	-2	-1	0	1	2	3
27	…is clearly presented.	-3	-2	-1	0	1	2	3
28	…is well presented.	-3	-2	-1	0	1	2	3

Overall, how satisfied or dissatisfied are you with the extent to which the information provided by the PeopleSoft system…

		Very Dissatisfied	Quite Dissatisfied	Slightly Dissatisfied	Neither	Slightly Satisfied	Quite Satisfied	Very Satisfied
29	…is complete.	-3	-2	-1	0	1	2	3
30	…contains all the necessary parts.	-3	-2	-1	0	1	2	3
31	…includes all the essential elements.	-3	-2	-1	0	1	2	3

Overall, how satisfied or dissatisfied are you with the extent to which the information provided by the PeopleSoft system…

		Very Dissatisfied	Quite Dissatisfied	Slightly Dissatisfied	Neither	Slightly Satisfied	Quite Satisfied	Very Satisfied
32	…is reliable.	-3	-2	-1	0	1	2	3
33	…is trustworthy.	-3	-2	-1	0	1	2	3
34	…is credible.	-3	-2	-1	0	1	2	3

Satisfaction with System Attributes

The following questions relate to your satisfaction with the functioning (i.e. operation and use) of the system itself. For all the questions below, the term "**system"** refers to the technology that delivers the information output. Please stay focused on the technology that facilitates the Information System you are using. Please mark your answers according to the scale provided below.

Very Dissatisfied -3	Quite Dissatisfied -2	Slightly Dissatisfied -1	Neither Satisfied nor Dissatisfied 0	Slightly Satisfied 1	Quite Satisfied 2	Very Satisfied 3

Overall, how satisfied are you with the extent to which …

		Very Dissatisfied	Quite Dissatisfied	Slightly Dissatisfied	Neither	Slightly Satisfied	Quite Satisfied	Very Satisfied
35	…the PeopleSoft system is easy to use.	-3	-2	-1	0	1	2	3
36	…working with the PeopleSoft system is effort free.	-3	-2	-1	0	1	2	3
37	…it is easy to get the PeopleSoft system to do what you want it to do.	-3	-2	-1	0	1	2	3

Overall, how satisfied are you with the extent to which …

		Very Dissatisfied	Quite Dissatisfied	Slightly Dissatisfied	Neither	Slightly Satisfied	Quite Satisfied	Very Satisfied
38	…the PeopleSoft system operation is dependable.	-3	-2	-1	0	1	2	3
39	…the PeopleSoft system operation is reliable.	-3	-2	-1	0	1	2	3
40	…the PeopleSoft system operates properly.	-3	-2	-1	0	1	2	3
41	…the PeopleSoft system is failure free.	-3	-2	-1	0	1	2	3

Overall, how satisfied are you with the extent to which …

		Very Dissatisfied	Quite Dissatisfied	Slightly Dissatisfied	Neither	Slightly Satisfied	Quite Satisfied	Very Satisfied
42	…the PeopleSoft system is available to use at all times.	-3	-2	-1	0	1	2	3
43	…the PeopleSoft system is accessible at all times.	-3	-2	-1	0	1	2	3
44	…the PeopleSoft system is ready to be used.	-3	-2	-1	0	1	2	3

Overall, how satisfied are you with the extent to which …

		Very Dissatisfied	Quite Dissatisfied	Slightly Dissatisfied	Neither	Slightly Satisfied	Quite Satisfied	Very Satisfied
45	…the PeopleSoft system is responsive to your requests.	-3	-2	-1	0	1	2	3
46	…the PeopleSoft system caries out your requests in a timely manner.	-3	-2	-1	0	1	2	3
47	…the PeopleSoft system is fast in performing your requests	-3	-2	-1	0	1	2	3

Overall, how satisfied are you with the extent to which …

		Very Dissatisfied	Quite Dissatisfied	Slightly Dissatisfied	Neither	Slightly Satisfied	Quite Satisfied	Very Satisfied
48	…the PeopleSoft system can be adapted to changing requirements.	-3	-2	-1	0	1	2	3
49	…the PeopleSoft system can be changed to meet other requirements.	-3	-2	-1	0	1	2	3
50	…the PeopleSoft system can be adjusted to different needs.	-3	-2	-1	0	1	2	3

Overall, how satisfied are you with the extent to which …

		Very Dissatisfied	Quite Dissatisfied	Slightly Dissatisfied	Neither	Slightly Satisfied	Quite Satisfied	Very Satisfied
51	…the PeopleSoft system pulls together information from different sources.	-3	-2	-1	0	1	2	3
52	…the PeopleSoft system integrates information from different places.	-3	-2	-1	0	1	2	3
53	…the PeopleSoft system brings together information from various sources.	-3	-2	-1	0	1	2	3

Overall, how satisfied are you with the extent to which …

		Very Dissatisfied	Quite Dissatisfied	Slightly Dissatisfied	Neither	Slightly Satisfied	Quite Satisfied	Very Satisfied
54	…the PeopleSoft system keeps information safe.	-3	-2	-1	0	1	2	3
55	…information is kept secure by the PeopleSoft system.	-3	-2	-1	0	1	2	3
56	…the PeopleSoft system protects information.	-3	-2	-1	0	1	2	3

Satisfaction with Service Attributes

The following set of questions relate to your satisfaction with the **services** that support the operations and use of the PeopleSoft system. Please mark your answers according to the scale provided below.

Very Dissatisfied	Quite Dissatisfied	Slightly Dissatisfied	Neither Satisfied nor Dissatisfied	Slightly Satisfied	Quite Satisfied	Very Satisfied
-3	-2	-1	0	1	2	3

Overall, how satisfied or dissatisfied are you with …

		Very Dissatisfied	Quite Dissatisfied	Slightly Dissatisfied	Neither	Slightly Satisfied	Quite Satisfied	Very Satisfied
57	…how properly the support services are performed.	-3	-2	-1	0	1	2	3
58	…the consistency of support services you receive.	-3	-2	-1	0	1	2	3
59	…the dependability of the support services in place.	-3	-2	-1	0	1	2	3

Overall, how satisfied or dissatisfied are you with …

		Very Dissatisfied	Quite Dissatisfied	Slightly Dissatisfied	Neither	Slightly Satisfied	Quite Satisfied	Very Satisfied
60	…how fast support services are delivered.	-3	-2	-1	0	1	2	3
61	…the timeliness of service.	-3	-2	-1	0	1	2	3
62	…how soon support services are able to help you.	-3	-2	-1	0	1	2	3
63	…the promptness of the support services that you receive.	-3	-2	-1	0	1	2	3

Overall, how satisfied or dissatisfied are you with …

		Very Dissatisfied	Quite Dissatisfied	Slightly Dissatisfied	Neither	Slightly Satisfied	Quite Satisfied	Very Satisfied
64	…how support services make you feel confident that your concerns will be addressed	-3	-2	-1	0	1	2	3
65	…how support services provide assurance that your requests will be attended to	-3	-2	-1	0	1	2	3
66	…how support services make you feel you can trust them to resolve your issues	-3	-2	-1	0	1	2	3

Overall, how satisfied or dissatisfied are you with …

		Very Dissatisfied	Quite Dissatisfied	Slightly Dissatisfied	Neither	Slightly Satisfied	Quite Satisfied	Very Satisfied
67	…how polite the support services are to you.	-3	-2	-1	0	1	2	3
68	…how respectful the support services are to you.	-3	-2	-1	0	1	2	3
69	…how considerate support services are to you.	-3	-2	-1	0	1	2	3

Overall, how satisfied or dissatisfied are you with …

		Very Dissatisfied	Quite Dissatisfied	Slightly Dissatisfied	Neither	Slightly Satisfied	Quite Satisfied	Very Satisfied
70	…how support services make you feel safe from harm during your interactions with them.	-3	-2	-1	0	1	2	3
71	…how support services provide a safe and sound interacting environment.	-3	-2	-1	0	1	2	3
72	…how support services provide you with a safe and secure service encounter.	-3	-2	-1	0	1	2	3

Overall, how satisfied or dissatisfied are you with …

		Very Dissatisfied	Quite Dissatisfied	Slightly Dissatisfied	Neither	Slightly Satisfied	Quite Satisfied	Very Satisfied
73	…how support services make you feel that your interactions with them are private.	-3	-2	-1	0	1	2	3
74	…how support services make you feel that your interactions with them are confidential.	-3	-2	-1	0	1	2	3

Overall, how satisfied or dissatisfied are you with …

		Very Dissatisfied	Quite Dissatisfied	Slightly Dissatisfied	Neither	Slightly Satisfied	Quite Satisfied	Very Satisfied
75	…how support services explain things during service delivery.	-3	-2	-1	0	1	2	3
76	…how clear and understandable your interactions are with support services during a service call.	-3	-2	-1	0	1	2	3
77	…how support services communicates with you during a service encounter.	-3	-2	-1	0	1	2	3

Overall, how satisfied or dissatisfied are you with …

		Very Dissatisfied	Quite Dissatisfied	Slightly Dissatisfied	Neither	Slightly Satisfied	Quite Satisfied	Very Satisfied
78	…how well the support services perform their tasks.	-3	-2	-1	0	1	2	3
79	…how skillful the support services are in addressing your issues.	-3	-2	-1	0	1	2	3
80	…how knowledgeable support services are in addressing your concerns.	-3	-2	-1	0	1	2	3
81	…the level competence of the support services.	-3	-2	-1	0	1	2	3

Overall, how satisfied or dissatisfied are you with …

		Very Dissatisfied	Quite Dissatisfied	Slightly Dissatisfied	Neither	Slightly Satisfied	Quite Satisfied	Very Satisfied
82	…how easy it is to acquire support services.	-3	-2	-1	0	1	2	3
83	…the accessibility of support services.	-3	-2	-1	0	1	2	3
84	…the availability of support services.	-3	-2	-1	0	1	2	3

Overall, how satisfied or dissatisfied are you with …

		Very Dissatisfied	Quite Dissatisfied	Slightly Dissatisfied	Neither	Slightly Satisfied	Quite Satisfied	Very Satisfied
85	…how understanding the support services are about your needs.	-3	-2	-1	0	1	2	3
86	…how sympathetic the support services are with your situation.	-3	-2	-1	0	1	2	3
87	…how much empathy is provided by the support services.	-3	-2	-1	0	1	2	3
88	…how much sympathy is provided by the support services.	-3	-2	-1	0	1	2	3

Overall, how satisfied or dissatisfied are you with …

		Very Dissatisfied	Quite Dissatisfied	Slightly Dissatisfied	Neither	Slightly Satisfied	Quite Satisfied	Very Satisfied
89	…the support materials used by support services.	-3	-2	-1	0	1	2	3
90	…with the equipment used by support services.	-3	-2	-1	0	1	2	3
91	…the resources used by support services.	-3	-2	-1	0	1	2	3
92	…the tools used by the support services.	-3	-2	-1	0	1	2	3
93	…how support staff are neat appearing.	-3	-2	-1	0	1	2	3
94	…professional appearance of support staff.	-3	-2	-1	0	1	2	3
95	…business like appearance of support staff.	-3	-2	-1	0	1	2	3

Demographics

Please answer the following demographic questions.

96.   Gender   ☐ Male   ☐ Female

97.   What is your *age* group?

☐ 18-24   ☐ 25-34   ☐ 35-44   ☐ 45-54   ☐ 55+

98.   Have you had any service encounter (either automated or with service staff)?

☐ Yes   ☐ No

99.   What is your highest level of educational achievement?

☐ High School Diploma

☐ Some Undergraduate experience

☐ Undergraduate Degree

☐ Postgraduate Degree

100.   How long have you been using this Information System?

☐ less than 6 months	☐ 6 months to less than 1 year	☐ 1 year to less than 5 years	☐ 5 years or more

101.   On average, how frequently do you use the Information System?

☐ Less than once a month

☐ Once a month

☐ A few times a month

☐ Once a week
☐ A few times a week
☐ About once a day
☐ Several times a day

102.   How long have you been in this job?

☐ less than 6 months	☐ 6 months to less than 1 year	☐ 1 year to less than 5 years	☐ 5 years or more

103.   On average, how frequently do you use the PeopleSoft system?

Extremely Infrequent	Very Infrequent	Somewhat Infrequent	Neither Frequent nor Infrequent	Somewhat Frequent	Very Frequent	Extremely Frequent
-3	-2	-1	0	1	2	3

104.   Please enter the last 4 digits of your cell phone followed by the last 2 digits of your Social Security Number or any numbers of your choice if you don't have SSN. In order to carry out the required analysis for the research study, we need this number so we can link your answers across different phases of data collection. (*We cannot use your PeopleSoft number for this purpose since it will be recorded in a different database and can only be used to process your extra credit.*)

APPENDIX D: STATISTICAL ANALYSIS AND RESULTS FOR TOTAL POPULATION

Table 31: Information Attributes - Item Reliability (SrEnc: Yes & No, N=450)

	Relevance (IR)	Currency (ICU)	Accuracy (IA)	Understandability (IU)	Format (IF)	Completeness (ICO)	Credibility (ICR)
IR1	**0.95**	0.62	0.59	0.56	0.54	0.59	0.59
IR2	**0.94**	0.62	0.63	0.57	0.53	0.60	0.60
IR3	**0.94**	0.58	0.58	0.53	0.51	0.59	0.58
ICU1	0.57	**0.94**	0.71	0.65	0.60	0.73	0.68
ICU2	0.60	**0.94**	0.71	0.65	0.61	0.71	0.65
ICU3	0.62	**0.93**	0.71	0.63	0.60	0.71	0.67
IA1	0.56	0.64	**0.91**	0.53	0.51	0.61	0.63
IA2	0.58	0.78	**0.87**	0.59	0.52	0.67	0.70
IA3	0.57	0.61	**0.90**	0.51	0.48	0.60	0.60
IU1	0.55	0.61	0.53	**0.92**	0.80	0.74	0.68
IU2	0.53	0.62	0.53	**0.92**	0.82	0.76	0.68
IU3	0.54	0.67	0.62	**0.92**	0.78	0.79	0.71
IF1	0.52	0.58	0.53	0.80	**0.93**	0.70	0.63
IF2	0.54	0.62	0.55	0.86	**0.94**	0.75	0.66
IF3	0.50	0.59	0.51	0.76	**0.92**	0.69	0.65
ICO1	0.61	0.76	0.73	0.78	0.72	**0.93**	0.79
ICO2	0.56	0.66	0.60	0.74	0.70	**0.90**	0.72
ICO3	0.58	0.70	0.63	0.78	0.71	**0.93**	0.75
ICR1	0.55	0.62	0.65	0.72	0.67	0.74	**0.88**
ICR2	0.55	0.64	0.66	0.64	0.59	0.71	**0.93**
ICR3	0.61	0.69	0.66	0.70	0.64	0.77	**0.92**

Table 32: Information Attributes - Composite Reliability (CR), Average Variance Extracted (AVE), and Squared Correlations (SrEnc: Yes & No, N=450)

	CR	AVE	Information Attributes						
			IR	ICU	IA	IU	IF	ICO	ICR
Relevance (IR)	0.96	0.89	1						
Currency (ICU)	0.95	0.87	0.41	1					
Accuracy (IA)	0.92	0.80	0.40	0.58	1				
Understandability (IU)	0.94	0.84	0.34	0.47	0.37	1			
Format (IF)	0.95	0.86	0.32	0.41	0.32	0.76	1		
Completeness (ICO)	0.94	0.85	0.40	0.59	0.50	0.69	0.59	1	
Credibility (ICR)	0.93	0.83	0.40	0.51	0.52	0.57	0.49	0.67	1

Table 33: System Attributes - Item Reliability (SrEnc: Yes & No, N=450)

	Ease Of Use (EOU)	Reliability (SyR)	Availability (SyA)	Response Time (SyT)	Flexibility (SyF)	Integration (SyI)	Security (SySc)
EOU1	**0.92**	0.74	0.66	0.65	0.68	0.59	0.57
EOU2	**0.91**	0.79	0.69	0.67	0.71	0.62	0.53
EOU3	**0.92**	0.76	0.67	0.68	0.71	0.61	0.51
SyR1	0.76	**0.91**	0.70	0.64	0.81	0.65	0.62
SyR2	0.77	**0.92**	0.73	0.64	0.79	0.63	0.60
SyR3	0.75	**0.89**	0.69	0.62	0.76	0.59	0.58
SyR4	0.69	**0.87**	0.68	0.62	0.75	0.60	0.52
SyA2	0.67	0.73	**0.93**	0.70	0.67	0.68	0.64
SyA3	0.63	0.66	**0.89**	0.66	0.60	0.61	0.57
SyA1	0.69	0.73	**0.92**	0.72	0.66	0.72	0.67
SyT1	0.68	0.67	0.74	**0.90**	0.62	0.77	0.63
SyT2	0.68	0.66	0.71	**0.92**	0.61	0.72	0.56
SyT3	0.68	0.65	0.71	**0.89**	0.59	0.74	0.54
SyF1	0.66	0.76	0.63	0.56	**0.93**	0.55	0.51
SyF2	0.64	0.78	0.61	0.55	**0.94**	0.55	0.52
SyF3	0.76	0.83	0.70	0.64	**0.94**	0.66	0.64
SyI1	0.63	0.66	0.71	0.76	0.63	**0.94**	0.69
SyI2	0.62	0.64	0.69	0.74	0.61	**0.93**	0.64
SyI3	0.61	0.65	0.70	0.74	0.60	**0.95**	0.68
SySc1	0.56	0.62	0.67	0.57	0.60	0.66	**0.94**
SySc2	0.53	0.61	0.64	0.58	0.57	0.68	**0.94**
SySc3	0.56	0.61	0.66	0.59	0.58	0.68	**0.94**

Table 34: System Attributes - Composite Reliability (CR), Average Variance Extracted (AVE), and Squared Correlations (SrEnc: Yes & No, N=450)

	CR	AVE	System Attributes						
			EOU	SyR	SyA	SyT	SyF	SyI	SySc
Ease Of Use (EOU)	0.94	0.85	1						
Reliability (SyR)	0.94	0.80	0.69	1					
Availability (SyA)	0.94	0.83	0.57	0.75	1				
Response Time (SyT)	0.93	0.82	0.54	0.61	0.50	1			
Flexibility (SyF)	0.96	0.88	0.52	0.49	0.41	0.59	1		
integration (SyI)	0.96	0.88	0.44	0.48	0.42	0.56	0.63	1	
Security (SySc)	0.96	0.88	0.34	0.42	0.38	0.48	0.38	0.51	1

Table 35: Service Attributes - Item Reliability (SrEnc: Yes & No, N=450)

	Reliability (SrR)	Responsiveness (SrRp)	Assurance (SrA)	Courtesy (SrC)	Security (SrSc)	Competence (SrCp)	Privacy (SrP)	Communication (SrCm)	Access (SrAc)	Empathy (SrE)	Tangibles (SrTa)
SrR1	**0.94**	0.86	0.86	0.69	0.72	0.76	0.74	0.76	0.75	0.68	0.70
SrR2	**0.93**	0.80	0.86	0.68	0.72	0.76	0.76	0.76	0.72	0.69	0.70
SrR3	**0.94**	0.86	0.90	0.68	0.69	0.75	0.74	0.76	0.74	0.71	0.70
SrRp1	0.83	**0.94**	0.85	0.61	0.62	0.69	0.66	0.68	0.72	0.67	0.66
SrRp2	0.83	**0.94**	0.83	0.63	0.63	0.67	0.69	0.68	0.73	0.65	0.66
SrRp3	0.83	**0.94**	0.85	0.61	0.66	0.71	0.67	0.71	0.72	0.68	0.68
SrRp4	0.86	**0.93**	0.87	0.66	0.70	0.73	0.70	0.74	0.72	0.68	0.68
SrA1	0.88	0.85	**0.94**	0.70	0.72	0.75	0.74	0.75	0.73	0.71	0.70
SrA2	0.89	0.86	**0.95**	0.70	0.73	0.77	0.76	0.75	0.72	0.72	0.70
SrA3	0.87	0.85	**0.94**	0.67	0.68	0.73	0.72	0.73	0.71	0.71	0.69
SrC1	0.69	0.63	0.69	**0.94**	0.82	0.83	0.84	0.80	0.68	0.77	0.75
SrC2	0.67	0.63	0.68	**0.95**	0.85	0.84	0.82	0.79	0.72	0.75	0.78
SrC3	0.70	0.64	0.71	**0.94**	0.81	0.84	0.83	0.80	0.73	0.80	0.76
SrSc1	0.68	0.64	0.69	0.83	**0.92**	0.84	0.80	0.76	0.68	0.69	0.74
SrSc2	0.72	0.66	0.72	0.81	**0.94**	0.86	0.85	0.81	0.70	0.73	0.73
SrSc3	0.71	0.65	0.70	0.82	**0.94**	0.87	0.83	0.78	0.69	0.72	0.75
SrCp1	0.72	0.66	0.72	0.82	0.87	**0.92**	0.85	0.79	0.70	0.74	0.77
SrCp2	0.70	0.63	0.69	0.77	0.87	**0.89**	0.83	0.76	0.70	0.71	0.75
SrCp3	0.76	0.72	0.75	0.82	0.82	**0.92**	0.86	0.87	0.74	0.81	0.78
SrCp4	0.74	0.69	0.73	0.80	0.78	**0.89**	0.81	0.83	0.70	0.74	0.73
SrP1	0.74	0.69	0.75	0.82	0.86	0.88	**0.94**	0.82	0.72	0.78	0.78
SrP2	0.76	0.68	0.73	0.83	0.82	0.86	**0.94**	0.89	0.72	0.76	0.76

SrCm1	0.78	0.73	0.77	0.79	0.80	0.86	0.86	**0.95**	0.75	0.79	0.77
SrCm2	0.75	0.69	0.72	0.80	0.77	0.83	0.86	**0.94**	0.71	0.78	0.76
SrCm3	0.77	0.69	0.74	0.78	0.81	0.84	0.84	**0.93**	0.72	0.76	0.75
SrAc1	0.75	0.74	0.73	0.73	0.70	0.74	0.72	0.74	**0.94**	0.77	0.80
SrAc2	0.75	0.74	0.74	0.70	0.69	0.73	0.71	0.71	**0.94**	0.75	0.81
SrAc3	0.70	0.68	0.68	0.68	0.68	0.72	0.72	0.71	**0.92**	0.75	0.80
SrE1	0.70	0.68	0.71	0.78	0.74	0.79	0.79	0.79	0.78	**0.93**	0.83
SrE2	0.70	0.67	0.72	0.77	0.72	0.78	0.77	0.77	0.75	**0.95**	0.80
SrE3	0.70	0.67	0.72	0.77	0.71	0.79	0.76	0.78	0.75	**0.94**	0.81
SrE4	0.69	0.68	0.71	0.77	0.70	0.76	0.76	0.76	0.76	**0.94**	0.82
SrTa1	0.68	0.65	0.68	0.72	0.73	0.76	0.75	0.74	0.77	0.79	**0.90**
SrTa2	0.69	0.65	0.66	0.71	0.70	0.75	0.75	0.76	0.81	0.77	**0.91**
SrTa3	0.69	0.67	0.70	0.73	0.73	0.78	0.76	0.78	0.78	0.80	**0.90**
SrTa4	0.72	0.68	0.71	0.72	0.75	0.79	0.78	0.77	0.79	0.78	**0.90**
SrTa5	0.65	0.63	0.66	0.73	0.72	0.72	0.72	0.68	0.74	0.75	**0.89**
SrTa6	0.62	0.60	0.62	0.74	0.69	0.73	0.72	0.67	0.73	0.75	**0.88**
SrTa7	0.59	0.60	0.60	0.71	0.65	0.69	0.67	0.65	0.76	0.76	**0.89**

Table 36: Service Attributes - Composite Reliability (CR), Average Variance Extracted (AVE), and Squared Correlations (SrEnc: Yes & No, N=450)

			Service Attributes										
	CR	AVE	SrR	SrRp	SrA	SrC	SrSc	SrCp	SrP	SrCm	SrAc	SrE	SrTa
Reliability	0.96	0.88	1.00										
Responsiveness	0.97	0.87	0.80	1.00									
Assurance	0.96	0.88	0.87	0.82	1.00								
Courtesy	0.96	0.89	0.53	0.45	0.54	1.00							
Security	0.95	0.87	0.57	0.49	0.57	0.77	1.00						
Competence	0.95	0.82	0.65	0.56	0.64	0.79	0.85	1.00					
Privacy	0.94	0.88	0.63	0.53	0.62	0.77	0.79	0.86	1.00				
Communication	0.96	0.89	0.66	0.56	0.63	0.71	0.71	0.81	0.82	1.00			
Access	0.95	0.87	0.62	0.59	0.59	0.57	0.55	0.61	0.59	0.59	1.00		
Empathy	0.97	0.89	0.55	0.51	0.58	0.67	0.58	0.69	0.67	0.68	0.65	1.00	
Tangibles	0.97	0.80	0.55	0.51	0.55	0.65	0.64	0.70	0.67	0.65	0.74	0.75	1.00

Table 37: Information, System, and Service Satisfaction Item Reliability (Phase 1, SrEnc: Yes & No, N=450)

	Overall Satisfaction (OS)	Information Satisfaction (IS)	System Satisfaction (SyS)	Service Satisfaction (SrS)
OS1p1	**0.95**	0.73	0.79	0.67
OS2p1	**0.96**	0.74	0.79	0.68
OS3p1	**0.96**	0.74	0.79	0.69
OS4p1	**0.95**	0.71	0.79	0.69
OS5p1	**0.95**	0.74	0.80	0.71
OS6p1	**0.92**	0.70	0.78	0.69
OS7p1	**0.92**	0.73	0.78	0.70
IS1p1	0.66	**0.88**	0.65	0.59
IS2p1	0.69	**0.87**	0.66	0.65
IS3p1	0.70	**0.92**	0.67	0.59
IS4p1	0.69	**0.91**	0.67	0.61
IS5p1	0.71	**0.91**	0.72	0.65
IS6p1	0.71	**0.90**	0.71	0.63
SyS1p1	0.78	0.69	**0.93**	0.62
SyS2p1	0.76	0.66	**0.90**	0.64
SyS3p1	0.79	0.70	**0.94**	0.65
SyS4p1	0.79	0.73	**0.94**	0.68
SyS5p1	0.76	0.70	**0.94**	0.66
SyS6p1	0.78	0.73	**0.92**	0.71
SrS1p1	0.68	0.66	0.64	**0.91**
SrS2p1	0.70	0.66	0.66	**0.94**
SrS3p1	0.69	0.64	0.68	**0.96**
SrS4p1	0.69	0.66	0.68	**0.96**
SrS5p1	0.69	0.63	0.67	**0.95**
SrS6p1	0.69	0.66	0.69	**0.94**

Table 38: Information, System, and Service Satisfaction Composite Reliability, Average Variance Extracted, and Squared Correlations (Phase 1, SrEnc: Yes & No, N=450)

	CR	AVE	Overall Satisfaction	Information Satisfaction	System Satisfaction	Service Satisfaction
Overall Satisfaction	0.97	0.82	1.00			
Information Satisfaction	0.96	0.81	0.59	1.00		
System Satisfaction	0.97	0.86	0.70	0.57	1.00	
Service Satisfaction	0.98	0.89	0.45	0.48	0.51	1.00
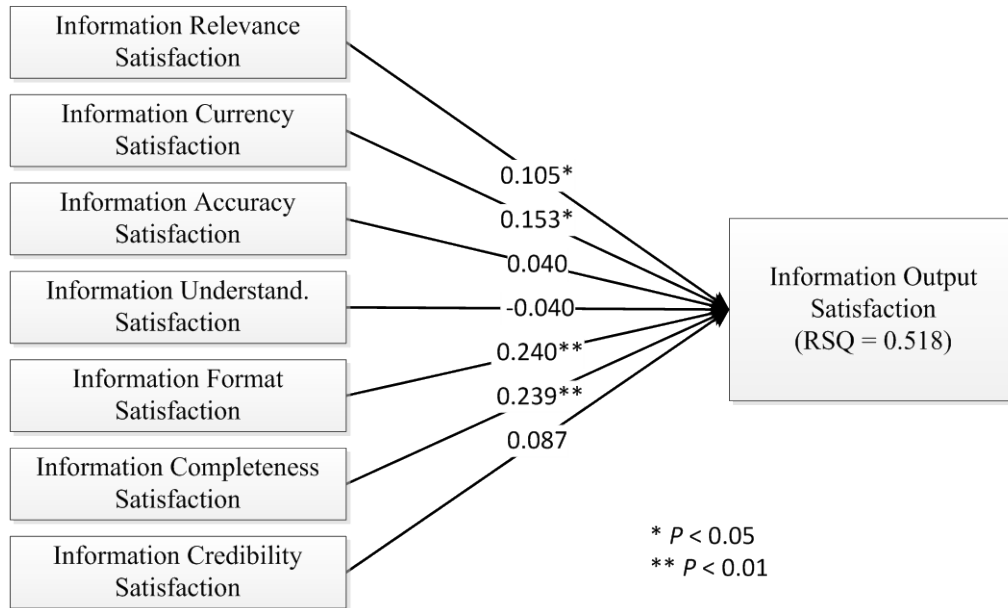
Figure 41: Information Attributes to Information Satisfaction Structural Model (SrEnc: Yes & No, N=450)
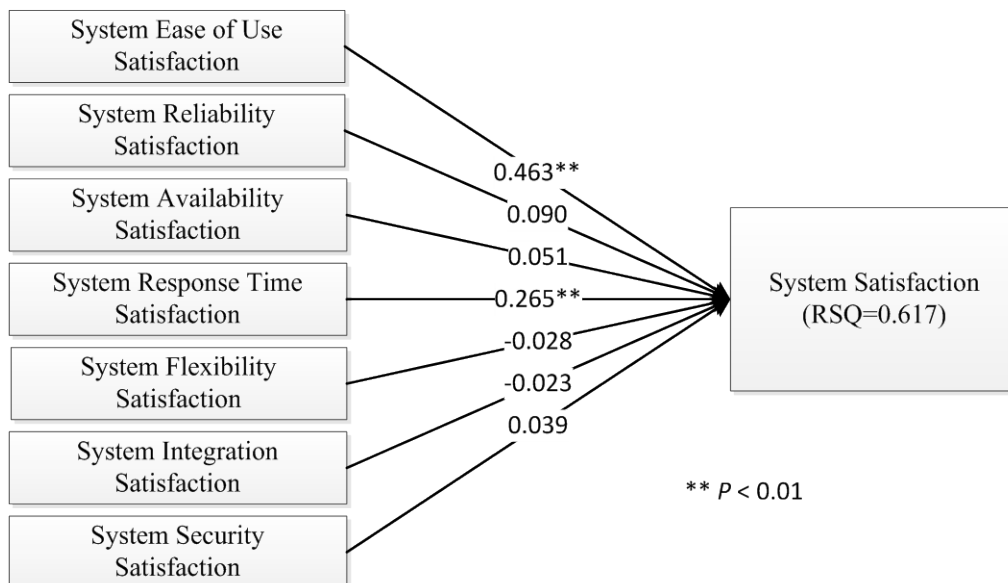
Figure 42: System Attributes to System Satisfaction Structural Model (SrEnc: Yes & No, N=450)
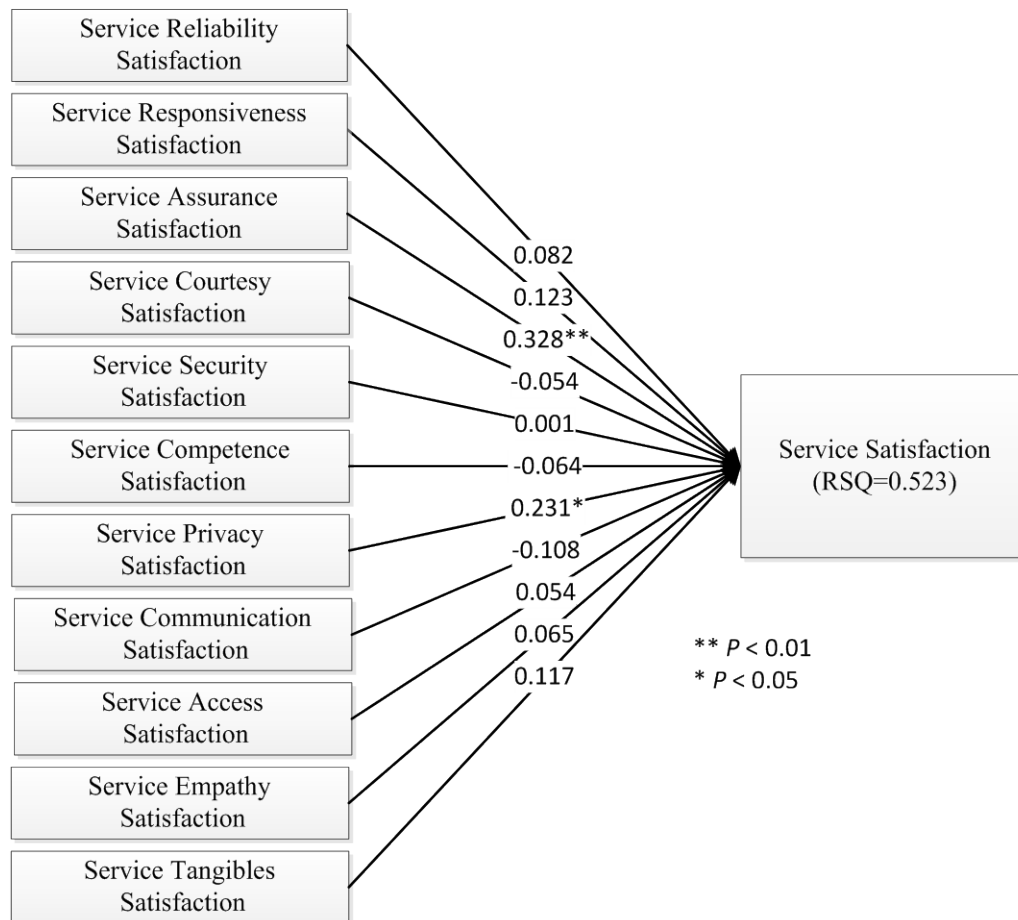
Figure 43: Service Attributes to Service Satisfaction Structural Model (Phase 1, SrEnc: Yes & No, N=450)
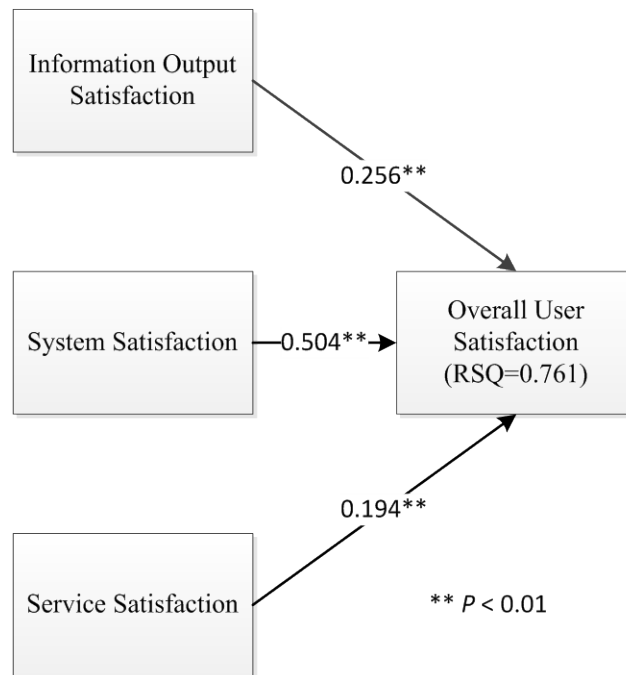
Figure 44: Satisfaction with Key IS Aspects to Overall Satisfaction (Phase 1, SrEnc: Yes & No, N=450)

Table 39: Overall Satisfaction and IS Key Aspects Satisfaction Item Reliability (Phase 2, SrEnc: Yes & No, N=403)

	Overall Satisfaction (OS)	Information Satisfaction (IS)	System Satisfaction (SyS)	Service Satisfaction (SrS)
OS1p2	**0.92**	0.71	0.72	0.63
OS2p2	**0.93**	0.74	0.75	0.64
OS3p2	**0.93**	0.74	0.77	0.67
OS4p2	**0.94**	0.75	0.76	0.70
OS5p2	**0.94**	0.75	0.76	0.72
OS6p2	**0.92**	0.75	0.79	0.67
OS7p2	**0.90**	0.77	0.76	0.70
IS1p2	0.74	**0.90**	0.76	0.64
IS2p2	0.65	**0.86**	0.69	0.62
IS3p2	0.76	**0.94**	0.80	0.70
IS4p2	0.75	**0.94**	0.80	0.69
IS5p2	0.77	**0.93**	0.81	0.69
IS6p2	0.75	**0.92**	0.82	0.70
SyS1p2	0.77	0.79	**0.91**	0.67
SyS2p2	0.73	0.75	**0.90**	0.64
SyS3p2	0.76	0.79	**0.93**	0.68
SyS4p2	0.76	0.81	**0.94**	0.70
SyS5p2	0.76	0.81	**0.93**	0.69
SyS6p2	0.75	0.81	**0.92**	0.73
SrS1p2	0.68	0.69	0.69	**0.93**
SrS2p2	0.69	0.70	0.70	**0.92**
SrS3p2	0.68	0.67	0.68	**0.95**
SrS4p2	0.70	0.71	0.71	**0.96**
SrS5p2	0.70	0.70	0.71	**0.94**
SrS6p2	0.68	0.69	0.69	**0.94**

Table 40: Overall Satisfaction and IS Key Aspects Satisfaction Composite Reliability, Average Variance Extracted, and Squared Correlations (Phase 2, SrEnc: Yes & No, N=403)

	CR	AVE	Overall Satisfaction	Information Satisfaction	System Satisfaction	Service Satisfaction
Overall Satisfaction	0.98	0.85	1.00			
Information Satisfaction	0.97	0.84	0.65	1.00		
System Satisfaction	0.97	0.85	0.67	0.73	1.00	
Service Satisfaction	0.98	0.88	0.54	0.54	0.55	1.00

Table 41: Overall Satisfaction and IS Key Aspects Satisfaction Item Reliability (Phase 3, SrEnc: Yes & No, N=385)

	Overall Satisfaction (OS)	Information Satisfaction (IS)	System Satisfaction (SyS)	Service Satisfaction (SrS)
OS1p3	**0.92**	0.80	0.82	0.73
OS2p3	**0.94**	0.81	0.84	0.77
OS3p3	**0.94**	0.83	0.83	0.76
OS4p3	**0.94**	0.83	0.85	0.75
OS5p3	**0.94**	0.83	0.84	0.74
OS6p3	**0.93**	0.83	0.84	0.76
OS7p3	**0.91**	0.83	0.84	0.76
IS1p3	0.83	**0.92**	0.82	0.75
IS2p3	0.76	**0.88**	0.78	0.73
IS3p3	0.85	**0.96**	0.87	0.78
IS4p3	0.82	**0.94**	0.82	0.76
IS5p3	0.84	**0.95**	0.86	0.77
IS6p3	0.82	**0.93**	0.86	0.79
SyS1p3	0.85	0.86	**0.94**	0.76
SyS2p3	0.85	0.85	**0.94**	0.77
SyS3p3	0.85	0.84	**0.94**	0.76
SyS4p3	0.84	0.84	**0.94**	0.76
SyS5p3	0.85	0.85	**0.94**	0.80
SyS6p3	0.82	0.81	**0.92**	0.77
SrS1p3	0.77	0.79	0.78	**0.92**
SrS2p3	0.76	0.78	0.77	**0.93**
SrS3p3	0.74	0.77	0.77	**0.95**
SrS4p3	0.77	0.77	0.78	**0.96**
SrS5p3	0.76	0.77	0.77	**0.94**
SrS6p3	0.76	0.77	0.77	**0.95**

Table 42: Overall Satisfaction and IS Key Aspects Satisfaction Composite Reliability, Average Variance Extracted, and Squared Correlations (Phase 3, SrEnc: Yes & No, N=385)

	CR	AVE	Overall Satisfaction	Information Satisfaction	System Satisfaction	Service Satisfaction
Overall Satisfaction	0.98	0.87	1.00			
Information Satisfaction	0.97	0.86	0.78	1.00		
System Satisfaction	0.98	0.88	0.81	0.81	1.00	
Service Satisfaction	0.98	0.89	0.65	0.68	0.67	1.00
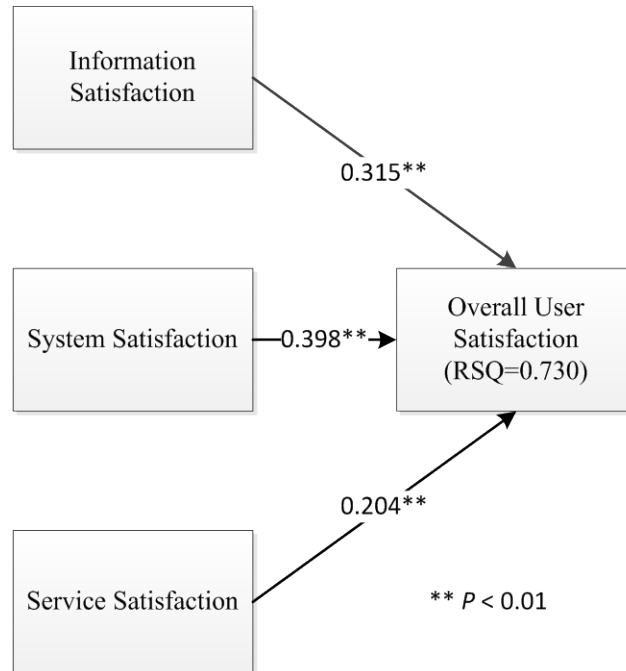
Figure 45: Satisfaction with Key IS Aspects to Overall Satisfaction (Phase 2, SrEnc: Yes & No, N=403)
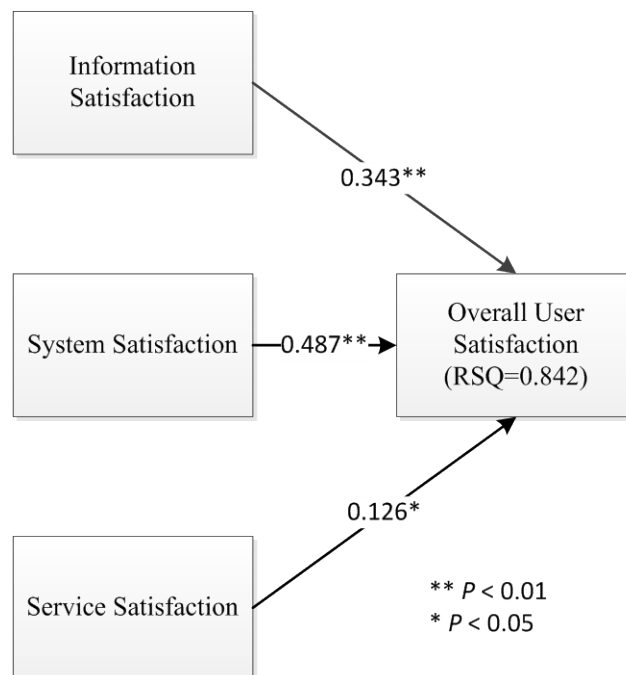
Figure 46: Satisfaction with Key IS Aspects to Overall Satisfaction (Phase 3, SrEnc: Yes & No, N=385)

Table 43: Information Attributes Satisfaction across all Phases (SrEnc: Yes & No, N=368)

	Phase 1	Phase 2	Phase 3
Information Relevance	0.117^+	0.004	-0.016
Information Currency	0.182^*	0.118	0.057
Information Accuracy	0.008	-0.018	0.120^*
Information Understandability	-0.102	0.062	0.105
Information Format	0.265^{**}	0.318^{**}	0.269^*
Information Credibility	0.110	0.028	0.060
Information Completeness	0.252^*	0.171^*	0.135^+
R-squared (Information satisfaction)	*0.533*	*0.405*	*0.421*

$^{**}p < .01$
$^*p < .05$
$^+p < .1$

Table 44: System Attributes Satisfaction across all Phases (SrEnc: Yes & No, N=368)

	Phase 1	Phase 2	Phase 3
System Ease Of Use	0.500^{**}	0.319^{**}	0.381^{**}
System Reliability	0.039	0.056	-0.089
System Availability	0.030	-0.052	0.046
System Response Time	0.296^{**}	0.340^{**}	0.390^{**}
System Flexibility	-0.005	-0.016	-0.013
System integration	-0.007	0.075	-0.050
System Security	0.017	-0.023	0.023
R-squared (System satisfaction)	*0.648*	*0.425*	*0.422*

$^{**}p < .01$
$^*p < .05$

Table 45: Service Attributes Satisfaction across all Phases (SrEnc: Yes & No, N=368)

	Phase 1	Phase 2	Phase 3
Service Reliability	0.122	0.094	0.045
Service Responsiveness	0.160^*	0.191^*	0.148^+
Service Assurance	0.240^*	0.027	-0.013
Service Courtesy	-0.129	-0.050	-0.080
Service Security	-0.032	0.086	-0.009
Service Competence	-0.012	-0.009	0.111
Service Privacy	0.315^*	0.124	0.161
Service Communication	-0.135	0.082	0.041
Service Access	0.022	0.313^*	0.295^{**}
Service Empathy	0.033	-0.024	-0.059
Service Tangibles	0.180	0.053	0.068
R-squared (Service satisfaction)	*0.520*	*0.437*	*0.430*

$^{**}p < .01$
$^*p < .05$
$^+p < .1$

Table 46: IS Key Aspects to Overall Satisfaction across all Phases (SrEnc: Yes & No, N=368)

	Phase 1	Phase 2	Phase 3
Information Satisfaction	0.263^{**}	0.358^{**}	0.332^{**}
System Satisfaction	0.553^{**}	0.437^{**}	0.497^{**}
Service Satisfaction	0.128^{*}	0.137^{*}	0.125^{*}
R-squared (Overall satisfaction)	*0.761*	*0.771*	*0.842*

$^{**} p < .01$
$^{*} p < .05$

Table 47: Impact of Phase 1 Satisfaction with Key Aspects measures on overall satisfaction for Phases 2 and 3 (SrEnc: Yes & No, N=368)

	Phase 2	Phase 3
Information Satisfaction (P1)	0.144^{*}	0.109^{+}
System Satisfaction (P1)	0.562^{**}	0.460^{**}
Service Satisfaction (P1)	0.054	0.203^{**}
R-squared (Overall satisfaction)	*0.517*	*0.506*

$^{**} p < .01$
$^{*} p < .05$
$^{+} p < .1$

Table 48: Impact of Phase 2 Satisfaction with Key Aspects measures on overall satisfaction for Phase 3 (SrEnc: Yes & No, N=368)

	Phase 3
Information Satisfaction (P2)	0.304^{**}
System Satisfaction (P2)	0.217^{**}
Service Satisfaction (P2)	0.293^{**}
R-squared (Overall satisfaction)	*0.567*

$^{**} p < .01$
$^{*} p < .05$

Table 49: Study Two - Service Attributes - Item Reliability (SrEnc: Yes & No, N=432)

	Reliability (SrR)	Responsiveness (SrRp)	Assurance (SrA)	Courtesy (SrC)	Security (SrSc)	Competence (SrCp)	Privacy (SrP)	Communication (SrCm)	Access (SrAc)	Empathy (SrE)	Tangibles (SrTa)
SrR1	**0.89**	0.64	0.65	0.54	0.47	0.60	0.39	0.57	0.48	0.53	0.53
SrR2	**0.90**	0.63	0.63	0.51	0.42	0.56	0.34	0.54	0.44	0.47	0.50
SrR3	**0.88**	0.67	0.66	0.51	0.38	0.60	0.36	0.52	0.52	0.54	0.53
SrRp1	0.67	**0.89**	0.61	0.46	0.37	0.54	0.29	0.48	0.54	0.49	0.47
SrRp2	0.65	**0.90**	0.64	0.42	0.38	0.55	0.32	0.50	0.47	0.48	0.47
SrRp3	0.64	**0.90**	0.68	0.42	0.42	0.59	0.29	0.51	0.55	0.48	0.47
SrRp4	0.68	**0.92**	0.71	0.48	0.45	0.63	0.36	0.57	0.56	0.57	0.53
SrA1	0.68	0.67	**0.94**	0.53	0.44	0.68	0.38	0.58	0.48	0.57	0.52
SrA2	0.70	0.68	**0.94**	0.58	0.50	0.66	0.43	0.58	0.49	0.58	0.55
SrA3	0.66	0.69	**0.93**	0.53	0.44	0.70	0.40	0.59	0.49	0.59	0.52
SrC1	0.53	0.44	0.54	**0.96**	0.54	0.59	0.47	0.60	0.44	0.59	0.55
SrC2	0.55	0.46	0.54	**0.96**	0.57	0.61	0.49	0.62	0.46	0.61	0.55
SrC3	0.58	0.50	0.59	**0.94**	0.55	0.63	0.46	0.64	0.48	0.67	0.57
SrSc1	0.42	0.38	0.43	0.53	**0.92**	0.46	0.54	0.52	0.36	0.43	0.44
SrSc2	0.46	0.43	0.48	0.57	**0.96**	0.53	0.60	0.55	0.42	0.45	0.50
SrSc3	0.47	0.45	0.48	0.54	**0.94**	0.52	0.58	0.53	0.44	0.44	0.50
SrCp1	0.60	0.62	0.69	0.60	0.46	**0.89**	0.47	0.63	0.51	0.62	0.57
SrCp2	0.60	0.59	0.67	0.57	0.49	**0.93**	0.48	0.63	0.49	0.58	0.56
SrCp3	0.61	0.56	0.64	0.59	0.50	**0.92**	0.47	0.63	0.47	0.60	0.55
SrCp4	0.59	0.57	0.64	0.59	0.50	**0.90**	0.44	0.68	0.47	0.64	0.58
SrP1	0.39	0.34	0.41	0.48	0.57	0.50	**0.97**	0.52	0.35	0.45	0.52
SrP2	0.40	0.34	0.43	0.49	0.60	0.49	**0.97**	0.55	0.36	0.42	0.51
SrCm1	0.57	0.52	0.60	0.57	0.50	0.67	0.56	**0.90**	0.42	0.62	0.60
SrCm2	0.50	0.51	0.52	0.56	0.48	0.58	0.43	**0.90**	0.39	0.59	0.49
SrCm3	0.57	0.51	0.57	0.64	0.55	0.65	0.49	**0.91**	0.44	0.64	0.62
SrAc1	0.48	0.54	0.50	0.43	0.39	0.49	0.33	0.41	**0.93**	0.51	0.52
SrAc2	0.52	0.55	0.46	0.46	0.42	0.48	0.34	0.43	**0.94**	0.52	0.56
SrAc3	0.48	0.54	0.49	0.44	0.39	0.51	0.36	0.44	**0.91**	0.54	0.54
SrE1	0.55	0.54	0.59	0.59	0.44	0.66	0.44	0.64	0.60	**0.89**	0.64
SrE2	0.54	0.53	0.59	0.62	0.45	0.62	0.42	0.65	0.52	**0.96**	0.63
SrE3	0.53	0.51	0.58	0.63	0.44	0.61	0.42	0.62	0.49	**0.95**	0.64
SrE4	0.53	0.51	0.56	0.62	0.40	0.61	0.39	0.63	0.48	**0.94**	0.63
SrTa1	0.53	0.51	0.52	0.51	0.42	0.58	0.43	0.56	0.53	0.66	**0.83**
SrTa2	0.48	0.44	0.46	0.51	0.48	0.52	0.46	0.50	0.51	0.57	**0.84**
SrTa3	0.53	0.49	0.51	0.53	0.45	0.57	0.46	0.57	0.52	0.64	**0.87**
SrTa4	0.56	0.49	0.52	0.54	0.46	0.57	0.44	0.58	0.51	0.63	**0.85**

SrTa5	0.33	0.34	0.35	0.38	0.34	0.36	0.37	0.43	0.39	0.40	**0.76**
SrTa6	0.40	0.36	0.40	0.40	0.36	0.42	0.41	0.45	0.39	0.42	**0.75**
SrTa7	0.40	0.34	0.39	0.39	0.35	0.38	0.39	0.44	0.37	0.41	**0.72**

Table 50: Study Two - Service Attributes - Composite Reliability (CR), Average Variance Extracted (AVE), and Squared Correlations (SrEnc: Yes & No, N=432)

	CR	AVE	Service Attributes										
			SrR	SrRp	SrA	SrC	SrSc	SrCp	SrP	SrCm	SrAc	SrE	SrTa
Reliability	0.96	0.88	1.00										
Responsiveness	0.97	0.87	0.80	1.00									
Assurance	0.96	0.88	0.87	0.82	1.00								
Courtesy	0.96	0.89	0.53	0.45	0.54	1.00							
Security	0.95	0.87	0.57	0.49	0.57	0.77	1.00						
Competence	0.95	0.82	0.65	0.56	0.64	0.79	0.85	1.00					
Privacy	0.94	0.88	0.63	0.53	0.62	0.77	0.79	0.86	1.00				
Communication	0.96	0.89	0.66	0.56	0.63	0.71	0.71	0.81	0.82	1.00			
Access	0.95	0.87	0.62	0.59	0.59	0.57	0.55	0.61	0.59	0.59	1.00		
Empathy	0.97	0.89	0.55	0.51	0.58	0.67	0.58	0.69	0.67	0.68	0.65	1.00	
Tangibles	0.97	0.80	0.55	0.51	0.55	0.65	0.64	0.70	0.67	0.65	0.74	0.75	1.00

Table 51: Study Two - Overall Satisfaction and IS Key Aspects Satisfaction Item Reliability (SrEnc: Yes & No, N=432)

	Overall Satisfaction (OS)	Information Satisfaction (IS)	System Satisfaction (SyS)	Service Satisfaction (SrS)
OS1	**0.92**	0.65	0.75	0.67
OS2	**0.91**	0.65	0.73	0.66
OS3	**0.93**	0.65	0.74	0.69
OS4	**0.93**	0.70	0.72	0.69
OS5	**0.92**	0.72	0.72	0.72
OS6	**0.88**	0.72	0.68	0.69
OS7	**0.87**	0.70	0.70	0.68
IS1p2	0.67	**0.87**	0.59	0.55
IS2p2	0.60	**0.83**	0.55	0.52
IS3p2	0.70	**0.92**	0.63	0.64
IS4p2	0.69	**0.91**	0.64	0.63
IS5p2	0.66	**0.88**	0.60	0.62
IS6p2	0.67	**0.87**	0.62	0.62
SyS1p2	0.76	0.60	**0.91**	0.64
SyS2p2	0.74	0.61	**0.92**	0.66
SyS3p2	0.74	0.61	**0.93**	0.64
SyS4p2	0.73	0.67	**0.93**	0.65
SyS5p2	0.72	0.64	**0.91**	0.65
SyS6p2	0.70	0.65	**0.89**	0.65
SrS1p2	0.65	0.56	0.59	**0.85**
SrS2p2	0.66	0.59	0.63	**0.83**
SrS3p2	0.70	0.59	0.65	**0.90**
SrS4p2	0.67	0.63	0.63	**0.91**
SrS5p2	0.62	0.58	0.60	**0.87**
SrS6p2	0.63	0.59	0.60	**0.86**

Table 52: Study Two - Overall Satisfaction and IS Key Aspects Satisfaction Composite Reliability, Average Variance Extracted, and Squared Correlations (SrEnc: Yes & No, N=432)

	CR	AVE	Overall Satisfaction	Information Satisfaction	System Satisfaction	Service Satisfaction
Overall Satisfaction	0.97	0.83	1.00			
Information Satisfaction	0.95	0.78	0.57	1.00		
System Satisfaction	0.97	0.83	0.71	0.47	1.00	
Service Satisfaction	0.95	0.76	0.57	0.46	0.50	1.00
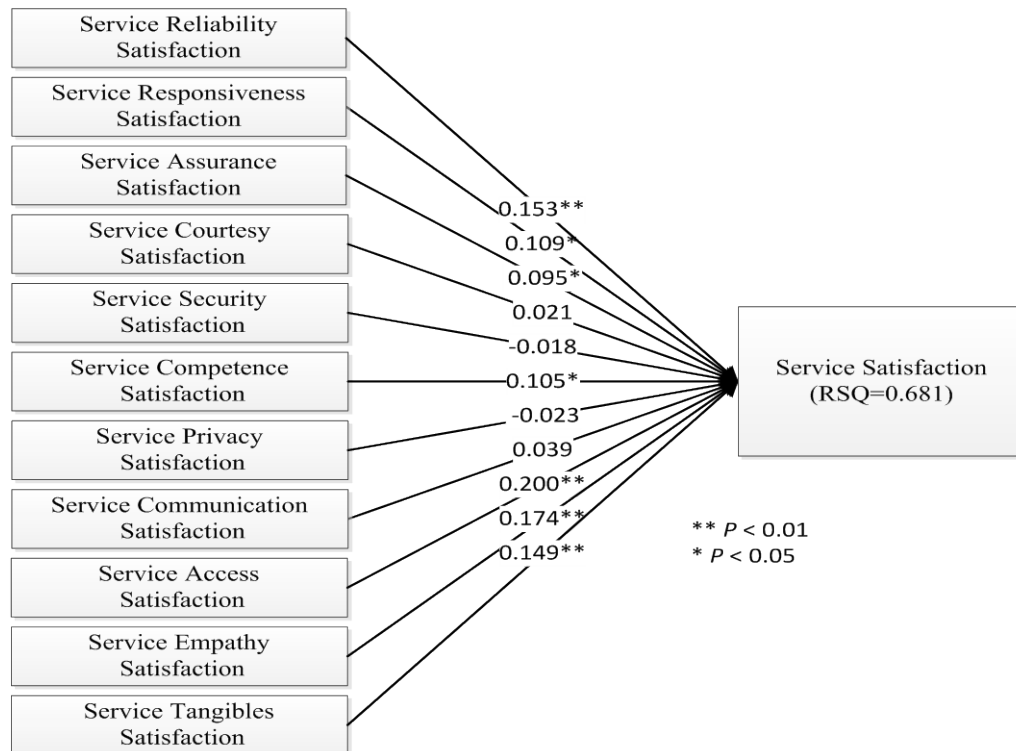
Figure 47: Study Two - Service Attributes to Service Satisfaction Structural Model (SrEnc: Yes & No, N=432)
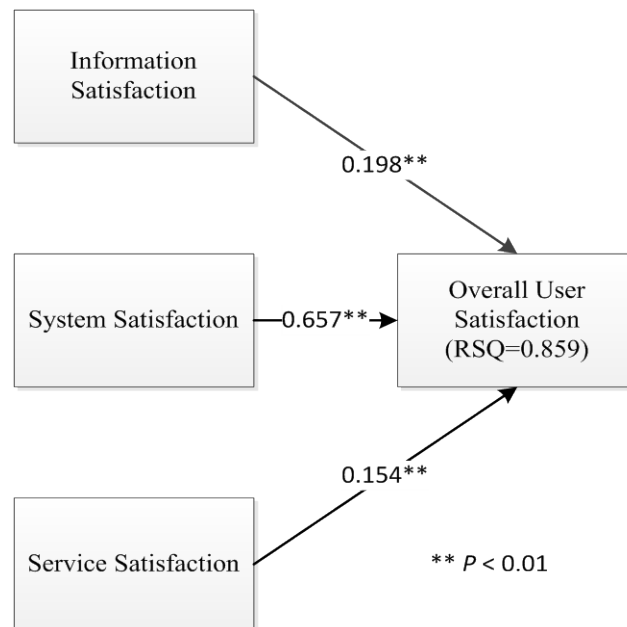
Figure 48: Study Two - Satisfaction with Key IS Aspects to Overall Satisfaction (SrEnc: Yes & No, N=432)

Table 53: Service Attribute Satisfaction to Service Satisfaction - CMV Analysis (SrEnc: Yes & No, N=432)

	Original Data	Construct Level Correction	Item Level Correction
Service Reliability	0.153^{**}	0.152^{**}	0.143^{**}
Service Responsiveness	0.109^{*}	0.120^{*}	0.149^{**}
Service Assurance	0.095^{*}	0.083^{*}	0.070^{+}
Service Courtesy	0.021	0.016	0.023
Service Security	-0.018	-0.022	-0.014
Service Competence	0.105^{*}	0.106^{*}	0.087^{+}
Service Privacy	-0.023	-0.025	-0.024
Service Communication	0.039	0.032	0.040
Service Access	0.200^{**}	0.205^{**}	0.180^{**}
Service Empathy	0.174^{**}	0.181^{**}	0.175^{**}
Service Tangibles	0.149^{**}	0.141^{**}	0.167^{**}
R-squared (Service satisfaction)	*0.681*	*0.642*	*0.631*

$^{**} p < .01$
$^{*} p < .05$
$^{+} p < .1$

Table 54: Key Aspects Satisfaction to Overall Satisfaction - CMV Analysis (SrEnc: Yes & No, N=432)

	Original Data	Construct Level Correction	Item Level Correction
Information Satisfaction	0.198^{**}	0.210^{**}	0.220^{**}
System Satisfaction	0.657^{**}	0.653^{**}	0.610^{**}
Service Satisfaction	0.154^{**}	0.151^{**}	0.168^{**}
R-squared (Overall satisfaction)	*0.859*	*0.842*	*0.812*

$^{**} p < .01$

APPENDIX E: STATISTICAL ANALYSIS AND RESULTS FOR NO SERVICE ENCOUNTER POPULATION

Table 55: Information Attributes - Item Reliability (SrEnc: No, N=207)

	Relevance (IR)	Currency (ICU)	Accuracy (IA)	Understandability (IU)	Format (IF)	Completeness (ICO)	Credibility (ICR)
IR1	**0.94**	0.58	0.54	0.53	0.53	0.56	0.55
IR2	**0.93**	0.56	0.59	0.56	0.52	0.55	0.58
IR3	**0.93**	0.57	0.58	0.49	0.47	0.54	0.58
ICU1	0.53	**0.92**	0.73	0.62	0.57	0.65	0.63
ICU2	0.59	**0.94**	0.74	0.60	0.60	0.69	0.63
ICU3	0.58	**0.91**	0.75	0.61	0.59	0.67	0.65
IA1	0.53	0.70	**0.91**	0.52	0.55	0.60	0.66
IA2	0.54	0.78	**0.85**	0.61	0.52	0.60	0.66
IA3	0.54	0.63	**0.88**	0.45	0.45	0.53	0.58
IU1	0.54	0.57	0.53	**0.93**	0.78	0.73	0.70
IU2	0.51	0.58	0.52	**0.93**	0.82	0.76	0.67
IU3	0.52	0.67	0.60	**0.91**	0.77	0.79	0.73
IF1	0.46	0.53	0.53	0.73	**0.90**	0.66	0.60
IF2	0.53	0.61	0.53	0.86	**0.93**	0.77	0.67
IF3	0.49	0.60	0.54	0.76	**0.91**	0.72	0.66
ICO1	0.56	0.69	0.64	0.79	0.73	**0.93**	0.81
ICO2	0.52	0.62	0.58	0.71	0.71	**0.90**	0.69
ICO3	0.55	0.68	0.58	0.77	0.71	**0.91**	0.77
ICR1	0.53	0.60	0.61	0.69	0.67	0.72	**0.90**
ICR2	0.57	0.66	0.70	0.68	0.63	0.76	**0.94**
ICR3	0.58	0.65	0.68	0.73	0.65	0.81	**0.92**

Table 56: Information Attributes - Composite Reliability (CR), Average Variance Extracted (AVE), and Squared Correlations (SrEnc: No, N=207)

	CR	AVE	Information Attributes						
			IR	ICU	IA	IU	IF	ICO	ICR
Relevance (IR)	0.95	0.87	1.00						
Currency (ICU)	0.95	0.86	0.37	1.00					
Accuracy (IA)	0.91	0.77	0.37	0.64	1.00				
Understandability (IU)	0.94	0.85	0.32	0.44	0.36	1.00			
Format (IF)	0.94	0.84	0.29	0.40	0.34	0.74	1.00		
Completeness (ICO)	0.94	0.84	0.35	0.52	0.43	0.68	0.62	1.00	
Credibility (ICR)	0.94	0.85	0.37	0.48	0.52	0.58	0.50	0.69	1.00

Table 57: System Attributes - Item Reliability (SrEnc: No, N=207)

	Ease Of Use (EOU)	Reliability (SyR)	Availability (SyA)	Response Time (SyT)	Flexibility (SyF)	Integration (SyI)	Security (SySc)
EOU1	**0.93**	0.72	0.61	0.66	0.67	0.62	0.51
EOU2	**0.90**	0.73	0.66	0.70	0.69	0.71	0.49
EOU3	**0.91**	0.73	0.60	0.68	0.72	0.63	0.53
SyR1	0.71	**0.90**	0.68	0.62	0.78	0.67	0.60
SyR2	0.72	**0.91**	0.67	0.58	0.78	0.62	0.59
SyR3	0.72	**0.89**	0.69	0.60	0.77	0.62	0.56
SyR4	0.69	**0.87**	0.69	0.60	0.73	0.68	0.47
SyA2	0.63	0.71	**0.91**	0.70	0.67	0.72	0.63
SyA3	0.62	0.66	**0.90**	0.72	0.60	0.70	0.55
SyA1	0.59	0.69	**0.89**	0.71	0.60	0.76	0.66
SyT1	0.70	0.64	0.74	**0.94**	0.56	0.76	0.62
SyT2	0.71	0.65	0.74	**0.94**	0.62	0.74	0.53
SyT3	0.68	0.59	0.74	**0.92**	0.55	0.78	0.51
SyF1	0.65	0.75	0.61	0.54	**0.92**	0.57	0.55
SyF2	0.67	0.78	0.61	0.53	**0.93**	0.57	0.55
SyF3	0.75	0.82	0.68	0.62	**0.90**	0.65	0.63
SyI1	0.69	0.68	0.78	0.77	0.62	**0.93**	0.68
SyI2	0.66	0.68	0.73	0.76	0.62	**0.93**	0.65
SyI3	0.67	0.67	0.76	0.75	0.61	**0.95**	0.69
SySc1	0.63	0.67	0.71	0.64	0.56	0.69	**0.94**
SySc2	0.58	0.68	0.70	0.62	0.56	0.68	**0.94**
SySc3	0.60	0.64	0.64	0.58	0.55	0.64	**0.95**

Table 58: System Attributes - Composite Reliability (CR), Average Variance Extracted (AVE), and Squared Correlations (SrEnc: No, N=207)

	CR	AVE	System Attributes						
			EOU	SyR	SyA	SyT	SyF	SyI	SySc
Ease Of Use (EOU)	0.94	0.84	1.00						
Reliability (SyR)	0.94	0.80	0.64	1.00					
Availability (SyA)	0.93	0.81	0.47	0.59	1.00				
Response Time (SyT)	0.95	0.87	0.55	0.45	0.62	1.00			
Flexibility (SyF)	0.94	0.84	0.58	0.73	0.48	0.38	1.00		
integration (SyI)	0.96	0.88	0.51	0.53	0.65	0.66	0.43	1.00	
Security (SySc)	0.95	0.88	0.41	0.50	0.53	0.43	0.36	0.51	1.00

Table 59: Service Attributes - Item Reliability (SrEnc: No, N=207)

	Reliability (SrR)	Responsiveness (SrRp)	Assurance (SrA)	Courtesy (SrC)	Security (SrSc)	Competence (SrCp)	Privacy (SrP)	Communication (SrCm)	Access (SrAc)	Empathy (SrE)	Tangibles (SrTa)
SrR1	**0.95**	0.90	0.91	0.80	0.83	0.84	0.81	0.84	0.80	0.78	0.79
SrR2	**0.95**	0.84	0.88	0.76	0.80	0.78	0.80	0.80	0.78	0.75	0.74
SrR3	**0.96**	0.87	0.89	0.78	0.79	0.81	0.81	0.84	0.81	0.78	0.78
SrRp1	0.85	**0.95**	0.88	0.77	0.79	0.82	0.78	0.82	0.78	0.79	0.81
SrRp2	0.87	**0.94**	0.88	0.77	0.78	0.79	0.77	0.81	0.79	0.77	0.78
SrRp3	0.83	**0.94**	0.89	0.77	0.80	0.81	0.75	0.80	0.75	0.78	0.81
SrRp4	0.90	**0.94**	0.90	0.77	0.82	0.81	0.79	0.83	0.79	0.78	0.80
SrA1	0.88	0.89	**0.94**	0.80	0.84	0.83	0.82	0.84	0.81	0.80	0.80
SrA2	0.89	0.88	**0.95**	0.81	0.85	0.84	0.81	0.81	0.78	0.79	0.80
SrA3	0.89	0.90	**0.95**	0.81	0.85	0.84	0.79	0.82	0.82	0.81	0.81
SrC1	0.77	0.77	0.80	**0.93**	0.88	0.86	0.87	0.84	0.77	0.81	0.80
SrC2	0.77	0.79	0.81	**0.95**	0.90	0.88	0.84	0.85	0.80	0.83	0.85
SrC3	0.77	0.76	0.79	**0.94**	0.88	0.87	0.84	0.81	0.77	0.80	0.79
SrSc1	0.78	0.82	0.85	0.90	**0.94**	0.90	0.86	0.88	0.82	0.85	0.87
SrSc2	0.81	0.79	0.85	0.89	**0.94**	0.88	0.87	0.86	0.80	0.81	0.80
SrSc3	0.80	0.78	0.83	0.87	**0.94**	0.92	0.88	0.87	0.80	0.84	0.85
SrCp1	0.77	0.77	0.82	0.89	0.90	**0.93**	0.88	0.88	0.80	0.86	0.85
SrCp2	0.79	0.78	0.82	0.83	0.90	**0.93**	0.91	0.88	0.80	0.83	0.83
SrCp3	0.83	0.84	0.85	0.86	0.91	**0.94**	0.90	0.89	0.81	0.89	0.88
SrCp4	0.77	0.79	0.81	0.85	0.86	**0.91**	0.84	0.84	0.75	0.79	0.80
SrP1	0.81	0.81	0.83	0.86	0.89	0.92	**0.96**	0.90	0.84	0.85	0.86
SrP2	0.81	0.76	0.80	0.87	0.88	0.90	**0.95**	0.88	0.80	0.82	0.81

SrCm1	0.84	0.82	0.84	0.85	0.88	0.91	0.90	**0.96**	0.85	0.86	0.86
SrCm2	0.83	0.84	0.84	0.88	0.89	0.92	0.91	**0.97**	0.85	0.87	0.88
SrCm3	0.82	0.81	0.82	0.82	0.88	0.87	0.85	**0.94**	0.80	0.85	0.84
SrAc1	0.80	0.78	0.80	0.79	0.79	0.79	0.79	0.82	**0.95**	0.84	0.85
SrAc2	0.77	0.76	0.78	0.79	0.80	0.79	0.80	0.79	**0.93**	0.83	0.84
SrAc3	0.79	0.78	0.80	0.76	0.81	0.81	0.83	0.84	**0.93**	0.86	0.84
SrE1	0.78	0.79	0.80	0.83	0.85	0.85	0.82	0.86	0.85	**0.94**	0.89
SrE2	0.76	0.78	0.80	0.80	0.83	0.86	0.84	0.85	0.85	**0.94**	0.89
SrE3	0.75	0.78	0.79	0.82	0.84	0.85	0.81	0.85	0.85	**0.93**	0.90
SrE4	0.76	0.76	0.78	0.80	0.82	0.84	0.81	0.83	0.84	**0.95**	0.88
SrTa1	0.74	0.76	0.77	0.79	0.80	0.82	0.79	0.80	0.84	0.86	**0.91**
SrTa2	0.78	0.79	0.80	0.80	0.82	0.84	0.83	0.86	0.86	0.88	**0.93**
SrTa3	0.73	0.77	0.78	0.81	0.84	0.85	0.80	0.86	0.84	0.88	**0.92**
SrTa4	0.78	0.78	0.80	0.79	0.84	0.86	0.83	0.87	0.85	0.88	**0.92**
SrTa5	0.73	0.75	0.76	0.77	0.80	0.79	0.76	0.78	0.79	0.84	**0.90**
SrTa6	0.72	0.78	0.76	0.79	0.81	0.84	0.81	0.80	0.79	0.85	**0.91**
SrTa7	0.73	0.80	0.78	0.80	0.81	0.82	0.80	0.81	0.82	0.87	**0.94**

Table 60: Service Attributes - Composite Reliability (CR), Average Variance Extracted (AVE), and Squared Correlations (SrEnc: No, N=207)

	CR	AVE	SrR	SrRp	SrA	SrC	SrSc	SrCp	SrP	SrCm	SrAc	SrE	SrTa
								Service Attributes					
Reliability	0.97	0.91	1.00										
Responsiveness	0.97	0.89	0.83	1.00									
Assurance	0.96	0.90	0.88	0.88	1.00								
Courtesy	0.96	0.88	0.67	0.67	0.73	1.00							
Security	0.96	0.88	0.72	0.71	0.80	0.89	1.00						
Competence	0.96	0.86	0.72	0.73	0.79	0.86	0.92	1.00					
Privacy	0.96	0.91	0.72	0.67	0.73	0.81	0.86	0.90	1.00				
Communication	0.97	0.91	0.75	0.74	0.76	0.79	0.86	0.88	0.86	1.00			
Access	0.96	0.88	0.71	0.68	0.72	0.69	0.73	0.72	0.74	0.76	1.00		
Empathy	0.97	0.88	0.66	0.68	0.71	0.75	0.79	0.82	0.76	0.81	0.81	1.00	
Tangibles	0.97	0.84	0.66	0.72	0.72	0.75	0.80	0.82	0.77	0.81	0.81	0.89	1.00

Table 61: Overall Satisfaction and IS Key Aspects Satisfaction Item Reliability (Phase 1, SrEnc: No, N=207)

	Overall Satisfaction (OS)	Information Satisfaction (IS)	System Satisfaction (SyS)	Service Satisfaction (SrS)
OS1p1	**0.93**	0.69	0.83	0.72
OS2p1	**0.94**	0.69	0.83	0.70
OS3p1	**0.93**	0.67	0.80	0.69
OS4p1	**0.94**	0.73	0.75	0.67
OS5p1	**0.94**	0.73	0.76	0.67
OS6p1	**0.90**	0.67	0.75	0.62
OS7p1	**0.91**	0.76	0.75	0.69
IS1p1	0.68	**0.89**	0.63	0.63
IS2p1	0.65	**0.88**	0.62	0.64
IS3p1	0.68	**0.93**	0.64	0.65
IS4p1	0.72	**0.93**	0.72	0.70
IS5p1	0.73	**0.94**	0.71	0.68
IS6p1	0.73	**0.94**	0.69	0.70
SyS1p1	0.79	0.66	**0.93**	0.71
SyS2p1	0.72	0.60	**0.90**	0.66
SyS3p1	0.79	0.69	**0.94**	0.70
SyS4p1	0.80	0.71	**0.94**	0.76
SyS5p1	0.79	0.69	**0.94**	0.72
SyS6p1	0.80	0.72	**0.92**	0.77
SrS1p1	0.68	0.69	0.69	**0.89**
SrS2p1	0.69	0.70	0.73	**0.94**
SrS3p1	0.69	0.65	0.74	**0.95**
SrS4p1	0.69	0.69	0.74	**0.96**
SrS5p1	0.67	0.66	0.72	**0.93**
SrS6p1	0.69	0.69	0.74	**0.94**

Table 62: Overall Satisfaction and IS Key Aspects Satisfaction Composite Reliability, Average Variance Extracted, and Squared Correlations (Phase 1, SrEnc: No, N=207)

	CR	AVE	Overall Satisfaction	Information Satisfaction	System Satisfaction	Service Satisfaction
Overall Satisfaction	0.98	0.86	1.00			
Information Satisfaction	0.97	0.84	0.58	1.00		
System Satisfaction	0.97	0.86	0.71	0.54	1.00	
Service Satisfaction	0.98	0.87	0.54	0.53	0.60	1.00

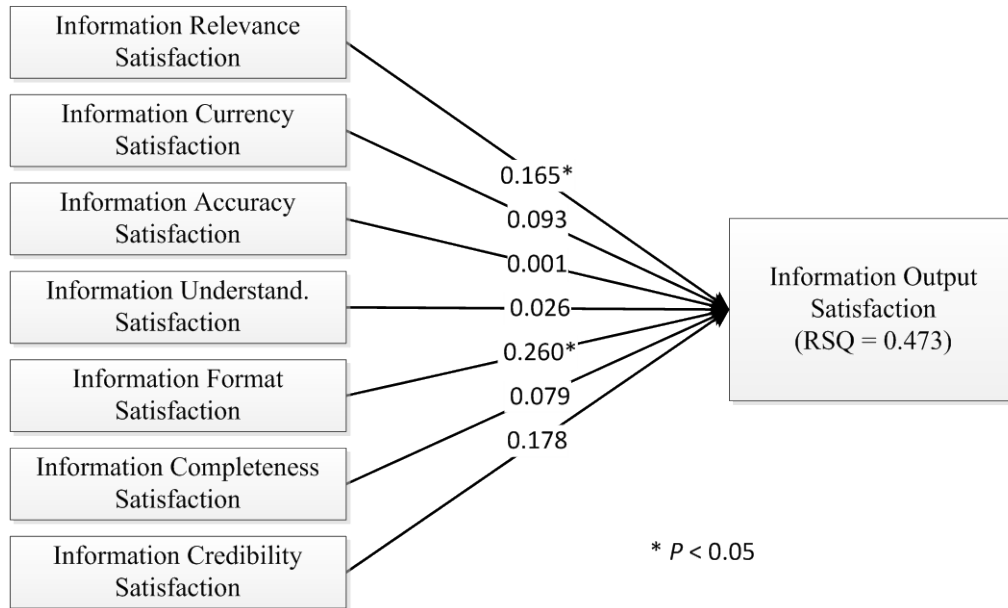**Figure 49: Information Attributes to Information Satisfaction Structural Model (SrEnc: No, N=207)**
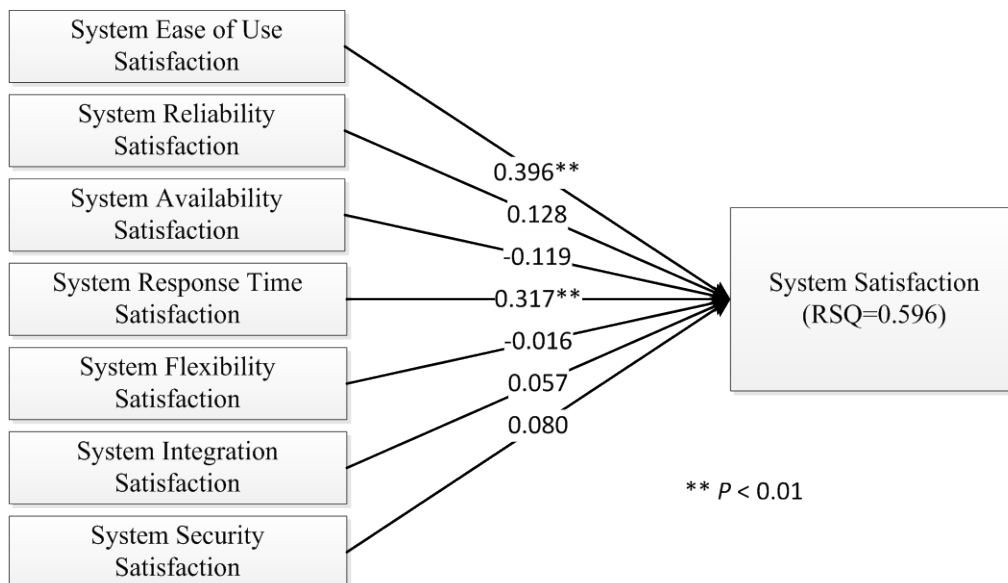

Figure 50: System Attributes to System Satisfaction Structural Model (SrEnc: No, N=207)
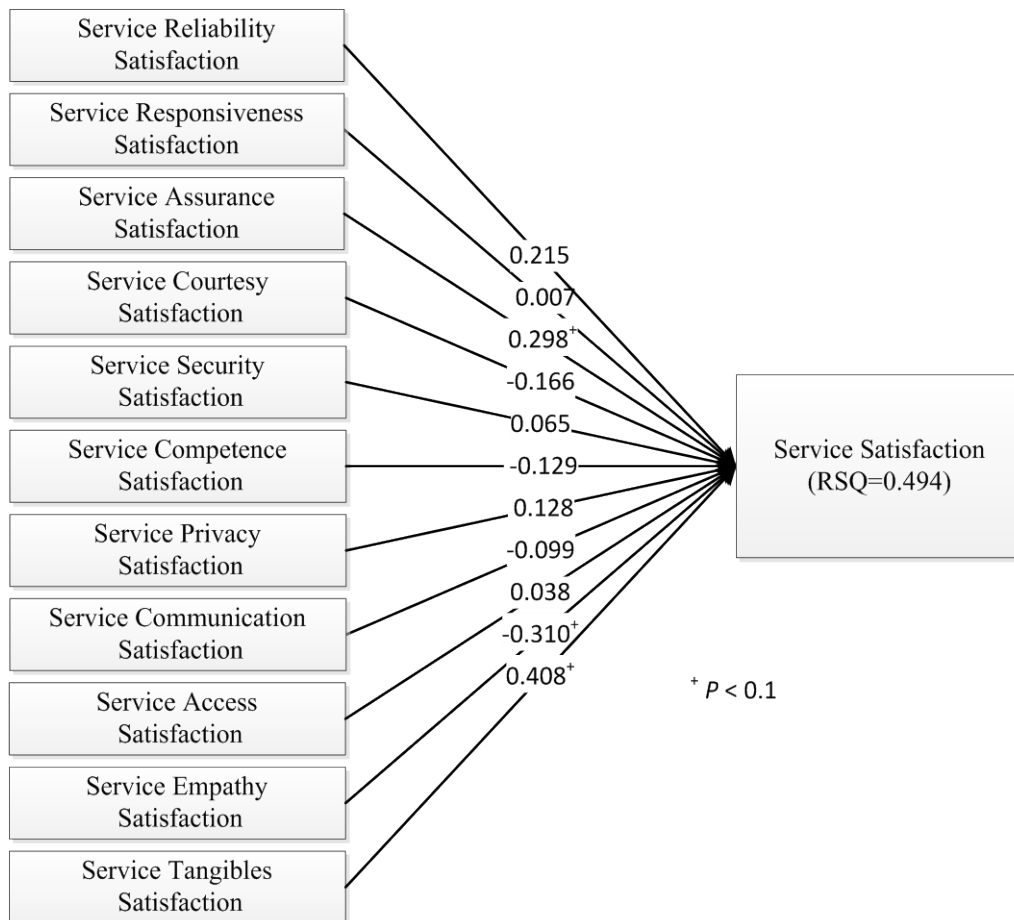
Figure 51: Service Attributes to Service Satisfaction Structural Model (Phase 1, SrEnc: No, N=207)
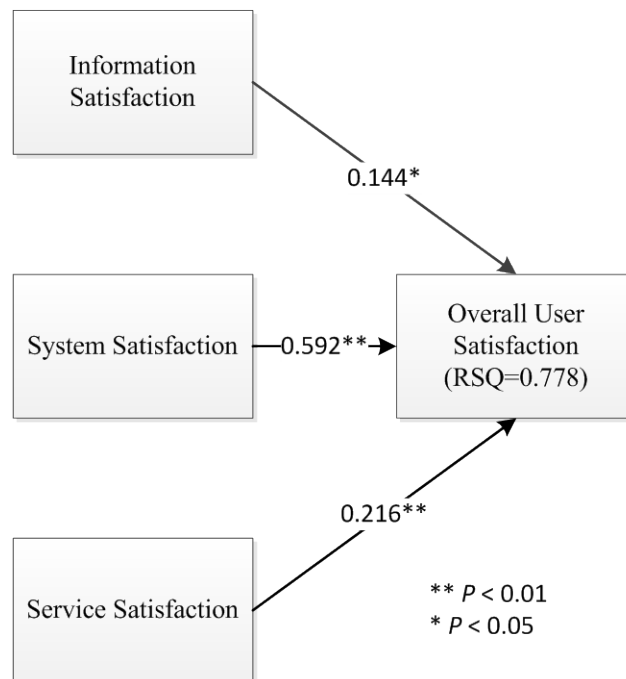

Figure 52: Satisfaction with Key IS Aspects to Overall Satisfaction (Phase 1, SrEnc: No, N=207)

Table 63: Overall Satisfaction and IS Key Aspects Satisfaction Item Reliability (Phase 2, SrEnc: No, N=189)

	Overall Satisfaction (OS)	Information Satisfaction (IS)	System Satisfaction (SyS)	Service Satisfaction (SrS)
OS1p2	**0.91**	0.71	0.74	0.63
OS2p2	**0.91**	0.76	0.78	0.64
OS3p2	**0.90**	0.73	0.77	0.69
OS4p2	**0.92**	0.72	0.75	0.66
OS5p2	**0.92**	0.74	0.76	0.72
OS6p2	**0.89**	0.73	0.77	0.61
OS7p2	**0.86**	0.76	0.73	0.69
IS1p2	0.74	**0.87**	0.72	0.57
IS2p2	0.66	**0.85**	0.65	0.58
IS3p2	0.75	**0.92**	0.77	0.66
IS4p2	0.75	**0.93**	0.79	0.67
IS5p2	0.76	**0.92**	0.79	0.66
IS6p2	0.75	**0.90**	0.82	0.69
SyS1p2	0.80	0.75	**0.92**	0.63
SyS2p2	0.77	0.74	**0.91**	0.63
SyS3p2	0.74	0.75	**0.92**	0.64
SyS4p2	0.76	0.79	**0.93**	0.66
SyS5p2	0.78	0.79	**0.92**	0.71
SyS6p2	0.77	0.81	**0.92**	0.75
SrS1p2	0.68	0.68	0.69	**0.93**
SrS2p2	0.71	0.70	0.69	**0.92**
SrS3p2	0.68	0.64	0.67	**0.94**
SrS4p2	0.71	0.66	0.68	**0.95**
SrS5p2	0.69	0.66	0.69	**0.95**
SrS6p2	0.66	0.66	0.66	**0.93**

Table 64: Overall Satisfaction and IS Key Aspects Satisfaction Composite Reliability, Average Variance Extracted, and Squared Correlations (Phase 2, SrEnc: No, N=189)

	CR	AVE	Overall Satisfaction	Information Satisfaction	System Satisfaction	Service Satisfaction
Overall Satisfaction	0.97	0.82	1.00			
Information Satisfaction	0.96	0.81	0.67	1.00		
System Satisfaction	0.97	0.85	0.70	0.71	1.00	
Service Satisfaction	0.98	0.88	0.54	0.51	0.53	1.00

Table 65: Overall Satisfaction and IS Key Aspects Satisfaction Item Reliability (Phase 3, SrEnc: No, N=171)

	Overall Satisfaction (OS)	Information Satisfaction (IS)	System Satisfaction (SyS)	Service Satisfaction (SrS)
OS1p3	**0.91**	0.77	0.75	0.72
OS2p3	**0.94**	0.78	0.77	0.76
OS3p3	**0.93**	0.79	0.78	0.75
OS4p3	**0.94**	0.80	0.78	0.72
OS5p3	**0.93**	0.80	0.76	0.73
OS6p3	**0.93**	0.79	0.77	0.76
OS7p3	**0.90**	0.84	0.78	0.77
IS1p3	0.82	**0.92**	0.79	0.73
IS2p3	0.73	**0.87**	0.75	0.69
IS3p3	0.83	**0.95**	0.86	0.78
IS4p3	0.80	**0.95**	0.82	0.74
IS5p3	0.82	**0.96**	0.84	0.76
IS6p3	0.79	**0.94**	0.81	0.78
SyS1p3	0.79	0.81	**0.93**	0.71
SyS2p3	0.77	0.80	**0.93**	0.73
SyS3p3	0.77	0.81	**0.93**	0.70
SyS4p3	0.75	0.78	**0.91**	0.67
SyS5p3	0.78	0.84	**0.94**	0.76
SyS6p3	0.77	0.79	**0.92**	0.75
SrS1p3	0.76	0.77	0.75	**0.91**
SrS2p3	0.73	0.74	0.71	**0.92**
SrS3p3	0.74	0.76	0.74	**0.94**
SrS4p3	0.76	0.77	0.72	**0.96**
SrS5p3	0.74	0.71	0.70	**0.93**
SrS6p3	0.77	0.75	0.74	**0.94**

Table 66: Overall Satisfaction and IS Key Aspects Satisfaction Composite Reliability, Average Variance Extracted, and Squared Correlations (Phase 3, SrEnc: No, N=171)

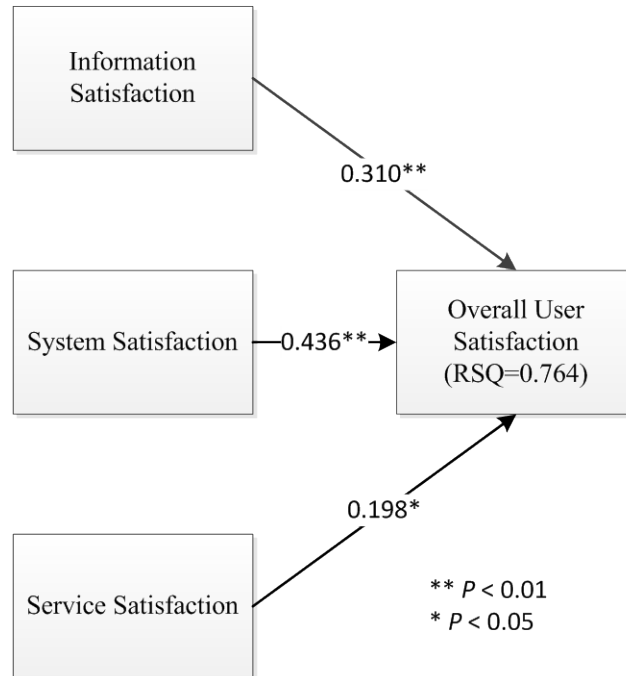|	CR	AVE	Overall Satisfaction	Information Satisfaction	System Satisfaction	Service Satisfaction
Overall Satisfaction	0.98	0.86	1.00			
Information Satisfaction	0.98	0.87	0.74	1.00		
System Satisfaction	0.97	0.86	0.78	0.76	1.00	
Service Satisfaction	0.98	0.87	0.65	0.65	0.60	1.00

Figure 53: Satisfaction with Key IS Aspects to Overall Satisfaction (Phase 2, SrEnc: No, N=189)
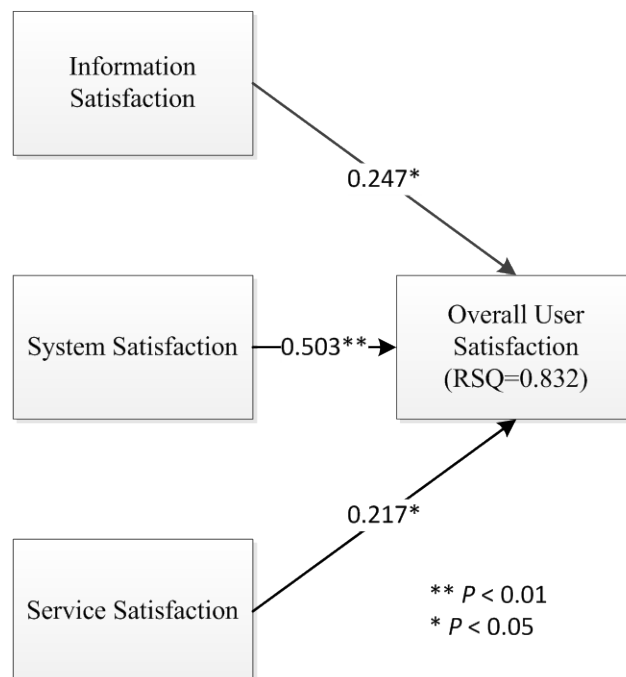

Figure 54: Satisfaction with Key IS Aspects to Overall Satisfaction (Phase 3, SrEnc: No, N=171)

Table 67: Information Attributes Satisfaction across all Phases (SrEnc: No, N=167)

	Phase 1	Phase 2	Phase 3
Information Relevance	0.146[+]	-0.012	-0.049
Information Currency	0.196[+]	0.125	0.000
Information Accuracy	-0.052	0.044	0.012
Information Understandability	-0.078	0.047	0.021
Information Format	0.273[*]	0.326[*]	0.265[*]
Information Credibility	0.031	0.017	0.067
Information Completeness	0.113[+]	0.106	0.095
R-squared (Information satisfaction)	*0.526*	*0.346*	*0.330*

[**] $p < .01$
[*] $p < .05$
[+] $p < .1$

Table 68: System Attributes Satisfaction across all Phases (SrEnc: No, N=167)

	Phase 1	Phase 2	Phase 3
System Ease Of Use	0.480[**]	0.227[*]	0.379[*]
System Reliability	0.028	0.086	-0.067
System Availability	0.047	0.081	0.062
System Response Time	0.302[**]	0.425[**]	0.447[**]
System Flexibility	0.022	-0.072	0.001
System integration	0.087	0.086	-0.072
System Security	0.009	-0.112	0.100
R-squared (System satisfaction)	*0.670*	*0.424*	*0.366*

[**] $p < .01$
[*] $p < .05$
[+] $p < .1$

Table 69: Service Attributes Satisfaction across all Phases (SrEnc: No, N=167)

	Phase 1	Phase 2	Phase 3
Service Reliability	0.250	0.088	0.193
Service Responsiveness	0.079	0.076	0.089
Service Assurance	0.182	0.093	-0.058
Service Courtesy	-0.193	-0.291	-0.111
Service Security	-0.059	-0.156	-0.174
Service Competence	0.412[+]	0.551[+]	0.428[+]
Service Privacy	0.171	0.136	0.088
Service Communication	-0.241	-0.032	0.127
Service Access	0.158	0.363[+]	0.197[+]
Service Empathy	-0.603[**]	-0.145	0.024
Service Tangibles	0.560[*]	-0.077	-0.207
R-squared (Service satisfaction)	*0.517*	*0.371*	*0.342*

[**] $p < .01$
[*] $p < .05$
[+] $p < .1$

Table 70: IS Key Aspects to Overall Satisfaction across all Phases (SrEnc: No, N=167)

	Phase 1	Phase 2	Phase 3
Information Satisfaction	0.170*	0.235**	0.262**
System Satisfaction	0.631**	0.573**	0.647**
Service Satisfaction	0.145*	0.152$^+$	0.068
R-squared (Overall satisfaction)	*0.791*	*0.828*	*0.895*

** $p < .01$
* $p < .05$
$^+$ $p < .1$

Table 71: Impact of Phase 1 Satisfaction with Key Aspects measures on overall satisfaction for Phases 2 and 3 (SrEnc: No, N=167)

	Phase 2	Phase 3
Information Satisfaction (P1)	0.132	0.130
System Satisfaction (P1)	0.687**	0.519**
Service Satisfaction (P1)	0.114	0.276*
R-squared (Overall satisfaction)	*0.490*	*0.437*

** $p < .01$
* $p < .05$
$^+$ $p < .1$

Table 72: Impact of Phase 2 Satisfaction with Key Aspects measures on overall satisfaction for Phase 3 (SrEnc: No, N=167)

	Phase 3
Information Satisfaction (P2)	0.319**
System Satisfaction (P2)	0.220*
Service Satisfaction (P2)	0.218**
R-squared (Overall satisfaction)	*0.503*

** $p < .01$
* $p < .05$

Table 73: Study Two - Service Attributes - Item Reliability (SrEnc: No, N=87)

	Reliability (SrR)	Responsiveness (SrRp)	Assurance (SrA)	Courtesy (SrC)	Security (SrSc)	Competence (SrCp)	Privacy (SrP)	Communication (SrCm)	Access (SrAc)	Empathy (SrE)	Tangibles (SrTa)
SrR1	**0.89**	0.73	0.61	0.58	0.63	0.67	0.54	0.61	0.54	0.61	0.61
SrR2	**0.87**	0.60	0.52	0.54	0.53	0.51	0.43	0.55	0.52	0.44	0.62
SrR3	**0.88**	0.74	0.67	0.62	0.53	0.67	0.57	0.59	0.58	0.68	0.59
SrRp1	0.73	**0.89**	0.74	0.67	0.58	0.74	0.65	0.61	0.61	0.70	0.63
SrRp2	0.73	**0.88**	0.73	0.60	0.50	0.66	0.60	0.57	0.60	0.70	0.59
SrRp3	0.66	**0.88**	0.68	0.51	0.63	0.57	0.39	0.61	0.53	0.59	0.61
SrRp4	0.68	**0.90**	0.70	0.62	0.69	0.68	0.51	0.70	0.59	0.62	0.61
SrA1	0.61	0.73	**0.93**	0.60	0.55	0.63	0.51	0.63	0.56	0.71	0.55
SrA2	0.69	0.78	**0.97**	0.62	0.56	0.73	0.60	0.68	0.57	0.70	0.62
SrA3	0.65	0.76	**0.94**	0.63	0.57	0.74	0.63	0.69	0.56	0.64	0.56
SrC1	0.57	0.62	0.60	**0.95**	0.58	0.64	0.48	0.57	0.60	0.63	0.53
SrC2	0.63	0.64	0.60	**0.95**	0.54	0.64	0.56	0.58	0.63	0.58	0.57
SrC3	0.66	0.66	0.65	**0.94**	0.60	0.59	0.50	0.59	0.66	0.69	0.64
SrSc1	0.57	0.59	0.55	0.60	**0.93**	0.69	0.61	0.65	0.45	0.52	0.54
SrSc2	0.65	0.67	0.56	0.61	**0.96**	0.70	0.69	0.66	0.49	0.54	0.54
SrSc3	0.60	0.64	0.56	0.51	**0.93**	0.69	0.66	0.65	0.45	0.51	0.54
SrCp1	0.62	0.67	0.68	0.59	0.58	**0.85**	0.64	0.64	0.53	0.63	0.55
SrCp2	0.62	0.67	0.67	0.62	0.65	**0.92**	0.71	0.70	0.54	0.65	0.57
SrCp3	0.63	0.65	0.60	0.52	0.68	**0.90**	0.74	0.66	0.51	0.57	0.53
SrCp4	0.65	0.66	0.68	0.61	0.70	**0.88**	0.61	0.73	0.60	0.68	0.62
SrP1	0.56	0.60	0.59	0.55	0.64	0.73	**0.97**	0.65	0.49	0.60	0.54
SrP2	0.58	0.58	0.60	0.51	0.70	0.75	**0.97**	0.70	0.46	0.60	0.52
SrCm1	0.67	0.66	0.66	0.54	0.61	0.70	0.69	**0.90**	0.61	0.71	0.65
SrCm2	0.55	0.65	0.65	0.59	0.68	0.71	0.54	**0.93**	0.57	0.71	0.62
SrCm3	0.61	0.63	0.64	0.56	0.64	0.73	0.67	**0.94**	0.61	0.70	0.68
SrAc1	0.63	0.71	0.66	0.68	0.53	0.63	0.46	0.62	**0.94**	0.65	0.64
SrAc2	0.59	0.61	0.50	0.58	0.50	0.54	0.42	0.55	**0.95**	0.56	0.71
SrAc3	0.52	0.50	0.49	0.59	0.33	0.55	0.48	0.62	**0.91**	0.61	0.64
SrE1	0.64	0.72	0.75	0.65	0.58	0.70	0.64	0.76	0.72	**0.86**	0.71
SrE2	0.57	0.67	0.65	0.61	0.49	0.62	0.55	0.70	0.59	**0.95**	0.68
SrE3	0.62	0.68	0.65	0.61	0.52	0.66	0.61	0.68	0.54	**0.95**	0.71
SrE4	0.60	0.65	0.60	0.60	0.46	0.64	0.47	0.68	0.54	**0.93**	0.68
SrTa1	0.66	0.60	0.59	0.63	0.41	0.59	0.43	0.58	0.63	0.79	**0.83**
SrTa2	0.64	0.63	0.60	0.62	0.49	0.65	0.51	0.65	0.67	0.78	**0.89**
SrTa3	0.60	0.60	0.59	0.57	0.51	0.62	0.50	0.63	0.67	0.71	**0.91**
SrTa4	0.62	0.60	0.54	0.57	0.54	0.57	0.51	0.65	0.70	0.67	**0.90**

SrTa5	0.50	0.56	0.42	0.40	0.50	0.43	0.42	0.54	0.53	0.48	**0.81**
SrTa6	0.43	0.50	0.37	0.29	0.43	0.45	0.40	0.50	0.44	0.42	**0.77**
SrTa7	0.48	0.44	0.34	0.37	0.45	0.31	0.34	0.49	0.41	0.36	**0.67**

Table 74: Study Two - Service Attributes - Composite Reliability (CR), Average Variance Extracted (AVE), and Squared Correlations (SrEnc: No, N=167)

			Service Attributes										
	CR	AVE	SrR	SrRp	SrA	SrC	SrSc	SrCp	SrP	SrCm	SrAc	SrE	SrTa
Reliability	0.91	0.77	1.00										
Responsiveness	0.94	0.79	0.62	1.00									
Assurance	0.96	0.89	0.47	0.64	1.00								
Courtesy	0.96	0.89	0.43	0.46	0.43	1.00							
Security	0.96	0.89	0.41	0.45	0.35	0.37	1.00						
Competence	0.94	0.79	0.51	0.56	0.55	0.44	0.54	1.00					
Privacy	0.97	0.95	0.35	0.37	0.38	0.30	0.48	0.58	1.00				
Communication	0.95	0.85	0.44	0.49	0.50	0.38	0.49	0.60	0.48	1.00			
Access	0.95	0.87	0.39	0.43	0.35	0.44	0.24	0.38	0.24	0.42	1.00		
Empathy	0.96	0.86	0.44	0.55	0.52	0.45	0.31	0.51	0.38	0.59	0.42	1.00	
Tangibles	0.94	0.69	0.47	0.47	0.37	0.38	0.33	0.41	0.29	0.49	0.51	0.57	1.00

Table 75: Study Two - Overall Satisfaction and IS Key Aspects Satisfaction Item Reliability (SrEnc: No, N=167)

	Overall Satisfaction (OS)	Information Satisfaction (IS)	System Satisfaction (SyS)	Service Satisfaction (SrS)
OS1	**0.91**	0.56	0.77	0.65
OS2	**0.88**	0.54	0.70	0.57
OS3	**0.92**	0.52	0.79	0.61
OS4	**0.94**	0.68	0.76	0.68
OS5	**0.90**	0.72	0.72	0.69
OS6	**0.87**	0.63	0.69	0.67
OS7	**0.90**	0.63	0.73	0.60
IS1p2	0.57	**0.83**	0.50	0.51
IS2p2	0.55	**0.83**	0.49	0.55
IS3p2	0.65	**0.91**	0.58	0.65
IS4p2	0.59	**0.89**	0.58	0.58
IS5p2	0.59	**0.86**	0.54	0.59
IS6p2	0.59	**0.87**	0.55	0.56
SyS1p2	0.73	0.52	**0.91**	0.68
SyS2p2	0.76	0.56	**0.93**	0.63
SyS3p2	0.80	0.58	**0.95**	0.62
SyS4p2	0.76	0.68	**0.93**	0.61
SyS5p2	0.78	0.54	**0.94**	0.59
SyS6p2	0.77	0.59	**0.94**	0.61
SrS1p2	0.66	0.59	0.62	**0.91**
SrS2p2	0.65	0.53	0.63	**0.84**
SrS3p2	0.68	0.60	0.64	**0.92**
SrS4p2	0.59	0.67	0.55	**0.87**
SrS5p2	0.56	0.55	0.54	**0.89**
SrS6p2	0.59	0.53	0.54	**0.84**

Table 76: Study Two - Overall Satisfaction and IS Key Aspects Satisfaction Composite Reliability, Average Variance Extracted, and Squared Correlations (SrEnc: No, N=167)

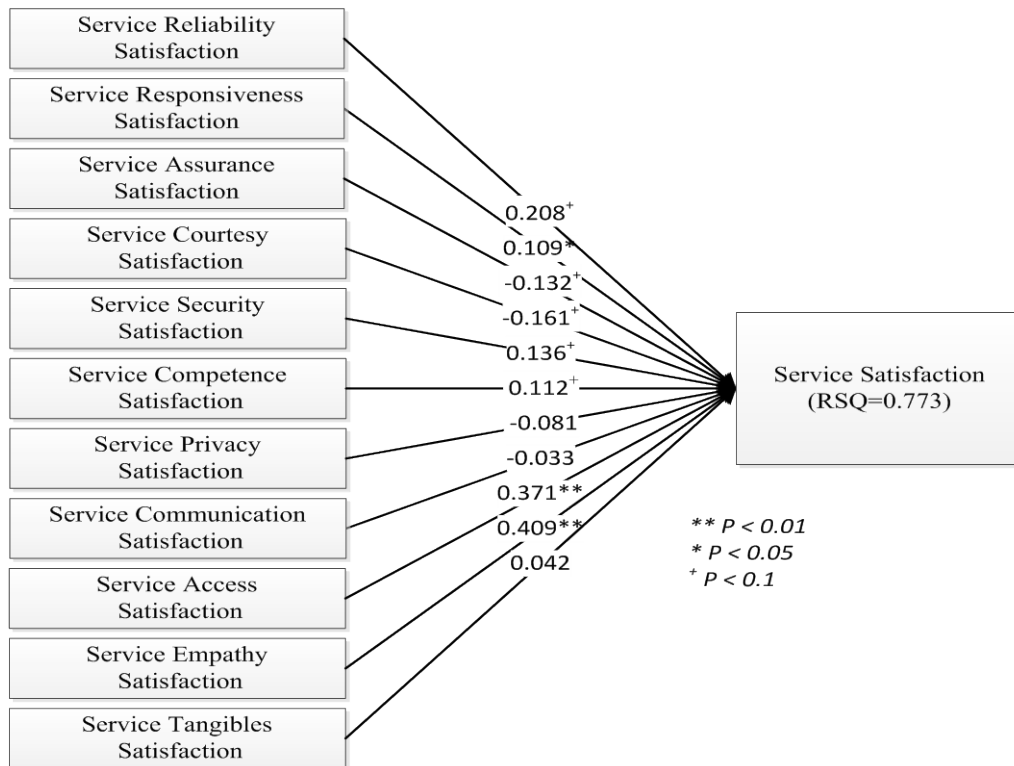|	CR	AVE	Overall Satisfaction	Information Satisfaction	System Satisfaction	Service Satisfaction
Overall Satisfaction	0.97	0.81	1.00			
Information Satisfaction	0.95	0.75	0.47	1.00		
System Satisfaction	0.98	0.87	0.86	0.39	1.00	
Service Satisfaction	0.95	0.77	0.50	0.44	0.45	1.00

Figure 55: Study Two - Service Attributes to Service Satisfaction Structural Model (SrEnc: No, N=167)
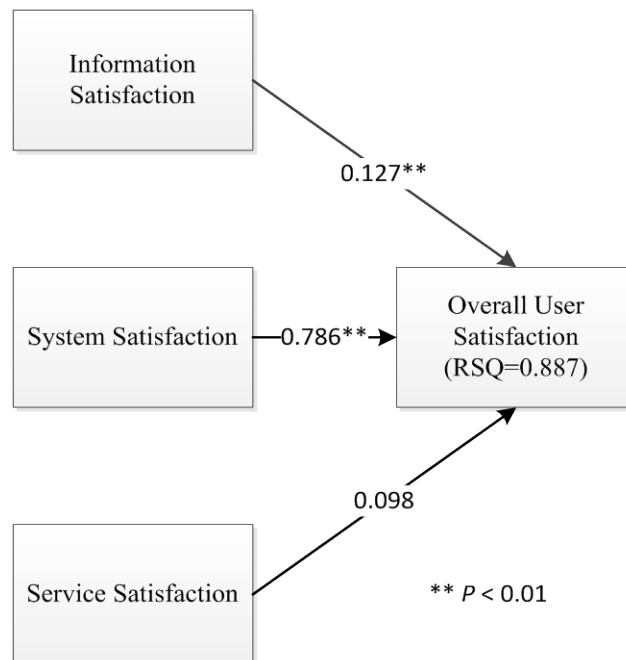

Figure 56: Study Two - Satisfaction with Key IS Aspects to Overall Satisfaction (SrEnc: No, N=167)

Table 77: Service Attribute Satisfaction to Service Satisfaction - CMV Analysis (SrEnc: No, N=167)

	Original Data	Construct Level Correction	Item Level Correction
Service Reliability	0.208^{+}	0.213^{+}	0.222^{+}
Service Responsiveness	0.109^{*}	0.281^{**}	0.305^{*}
Service Assurance	-0.132^{+}	-0.241^{*}	-0.222^{*}
Service Courtesy	-0.161^{+}	-0.100^{+}	0.033
Service Security	0.136^{+}	0.020	-0.124
Service Competence	0.112^{+}	0.121	0.076
Service Privacy	-0.081	-0.142^{+}	-0.078
Service Communication	-0.033	0.071	0.202^{+}
Service Access	0.371^{**}	0.339^{**}	0.107
Service Empathy	0.409^{**}	0.369^{**}	0.298^{*}
Service Tangibles	0.042	0.016	0.005
R-squared (Service satisfaction)	*0.773*	*0.692*	*0.654*

** $p < .01$
* $p < .05$
$^{+}$ $p < .1$

Table 78: Key Aspects Satisfaction to Overall Satisfaction - CMV Analysis (SrEnc: No, N=167)

	Original Data	Construct Level Correction	Item Level Correction
Information Satisfaction	0.127^{**}	0.184^{**}	0.176^{**}
System Satisfaction	0.786^{**}	0.771^{**}	0.733^{**}
Service Satisfaction	0.098	0.058	0.105
R-squared (Overall satisfaction)	*0.887*	*0.873*	*0.840*

** $p < .01$

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