IT DISCONFIRMATION JUDGMENTS, SATISFACTION AND TRUST

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ABSTRACT

The purpose of this study is to develop and test a research model that investigates the effects of different disconfirmation judgments about information technology (IT) on users' satisfaction with and trust in the technology. The research model distinguishes between different disconfirmation judgments (i.e., expectation disconfirmation, desire disconfirmation, and norm disconfirmation) and examines their distinct effects on IT satisfaction and IT trust. A survey was conducted to test the research model and its associated hypotheses. The results indicated the predominant effect of desire disconfirmation on IT satisfaction. Desire disconfirmation was found to be a better predictor of IT satisfaction than expectation disconfirmation and norm disconfirmation. The results also revealed the significant effect of norm disconfirmation on IT trust and the full mediation effect of IT satisfaction between desire disconfirmation and IT trust. The findings of this study suggest that IT products/services should be designed to meet or exceed users' desired performance and normative standards to foster IT satisfaction and trust.

Keywords: IT disconfirmation judgments, IT satisfaction, IT trust

INTRODUCTION AND MOTIVATION

The expectation disconfirmation theory (EDT), which was originated from customer satisfaction research in marketing literature, has been widely applied in IS research (Jiang, Klein & Saunders, 2012). EDT has its origin in the discrepancy theory of satisfaction, which suggests that individuals compare their perceived performance of product/service against some standard of performance (e.g., expectations, desires, and norms), resulting in a disconfirmation/discrepancy judgment (Jiang et al., 2012; Niedrich, Kiryanova & Black, 2005). The disconfirmation judgment can be positive or negative. Positive disconfirmation will result when perceived product/service performance is better than the standard; while negative disconfirmation will occur if perceived product/service performance is worse than the standard (Cadotte, Woodruff & Jenkins, 1987). The more positive the disconfirmation judgment, the greater the satisfaction (Yi, 1990). Many studies have shown that disconfirmation judgment is perhaps the most important determinant of satisfaction (Bhattacherjee & Premkumar, 2004; Oliver, 1980; Spreng, Mackenzie & Olshavsky, 1996; Spreng & Page, 2003).

Prior research suggests that individuals may use multiple standards to form disconfirmation judgments and evaluate product/service performance (Niedrich et al., 2005), however, it is not clear whether different disconfirmation judgments about an information technology (IT) product/service based on distinct standards have distinguishing effects on user

satisfaction with the IT product/service and which disconfirmation judgment is a better predictor of satisfaction. More recent research shows that disconfirmation judgment also predicts another important IS success factor – trust in IT (Lankton & McKnight, 2006). However, since satisfaction and trust are generally positively related, it is largely unknown whether disconfirmation judgments have separate impacts on IT satisfaction and IT trust.

The purpose of this paper is to develop and provide empirical validation for an IT disconfirmation judgment model involving multiple standards for IT satisfaction and trust. The model emphasizes the distinctive roles of different disconfirmation judgments as predictors of user satisfaction with and trust in IT.

LITERATURE REVIEW AND HYPOTHESES DEVELOPMENT

Disconfirmation judgments are user judgments constructed by perceived performance of product/service against comparison standards brought to mind at the time of judgment (Niedrich et al., 2005). Expectations, desires, and norms are the most commonly used comparison standards in the literature (Niedrich et al., 2005). Most IS studies adopt user expectations as the standard for disconfirmation judgment and performance evaluation (Jiang et al., 2012). Expectations are typically defined as beliefs or predictions about a product/service performance at some time in the future (Cadotte et al., 1987; Spreng et al., 1996). Such predictive expectations are mainly formed based on personal experience, existing knowledge, and communication with other people (Olson, Roese & Zanna, 1996; Zeithaml & Bitner, 2000). The impact of expectation disconfirmation on satisfaction however was found to vary widely in the literature (Churchill & Surprenant, 1982; Spreng et al., 1996). Some studies showed no relationship between expectation disconfirmation and satisfaction (Churchill & Surprenant, 1982), which is especially true when individuals hold extremely low expectations. In other words, an individual may be dissatisfied if he/she expects and receives poor performance (LaTour & Peat, 1979).

Some researchers suggested the use of desires instead of expectations as the standard in the disconfirmation process leading to satisfaction/dissatisfaction response (Spreng et al., 1996; Suh, Kim & Lee, 1994). Unlike expectations that require an estimate of the likelihood of expected performance/attributes (or probability of occurrence), desires refer to inner emotional needs and wants that do not necessarily involve the assessment of probability of occurrence (Niedrich et al., 2005) and are not constrained by cognitive understanding of environmental circumstances (Jiang et al., 2012). An individual may develop distinctive expectations and desires toward the same object of evaluation. For example, a user may desire or want a technology to provide a high level of information security. However, he or she may not expect much according to his or her prior experience or understanding of current environment. Hence, positive disconfirmation of expectations resulting from perceived performance exceeding expectations may not lead to satisfaction if the perceive performance falls below desires.

Norm is another alternative comparison standard used in the formation of disconfirmation judgment. Norms are the standards that reflect the performance individuals believe a product/service should provide. They represent category knowledge used to evaluate product

performance (Kahneman & Miller, 1986). Although norms and expectations are generated by similar sources of information, norms may include a larger set of attribute or performance information from similar products of the same type than predictive expectations (Niedrich et al., 2005). Hence, the disconfirmation of norm could be superior to the disconfirmation of expectation by accounting for prior experience with similar objects of evaluation (Jiang et al., 2012).

Expectations, desires, and norms are distinct constructs and individuals may use these multiple standards of comparison in forming disconfirmation judgments (Niedrich et al., 2005). Prior satisfaction research has acknowledged the importance of avoiding confounding predictive expectations with judgments that implicitly involve other possible standards of comparison, such as desires and norms (Spreng et al., 1996). Among different disconfirmation judgments, desire disconfirmation seems to be the primary determinant of satisfaction. In consumer satisfaction research, a widely accepted definition of satisfaction is formulated as follows: "Satisfaction is the consumer's fulfillment response." It is a judgment that a product or service "provided a pleasurable level of consumption-related fulfillment, including levels of under- or over-fulfillment" (Oliver, 1997, p. 13). This definition suggests that satisfaction is a pleasurable fulfillment response resulting from an evaluation with respect to how well the consumption of a product or service meets a need, desire, or goal. Therefore, it is the performance in relation to desires, needs, and wants, rather than predictive expectations or norms that determines satisfaction (Westbrook & Reilly, 1983; Wirtz & Mattila, 2001).

Adopting Oliver's definition of satisfaction (Oliver, 1997), IT satisfaction can be defined as a fulfillment response resulting from the evaluation of an IT product/service. IT satisfaction is most likely to be determined by how well an individual perceives that the IT product/service performance fulfills his/her desires, needs, or wants. More specifically, a user is satisfied with an IT product/service when the performance of IT product/service meets or exceeds the user's desires, and dissatisfaction occurs when the performance falls short of the user's desires. Therefore, when compared with disconfirmation of expectations and disconfirmation of norms, disconfirmation of desires better captures user's evaluation of IT performance leading to IT satisfaction/dissatisfaction. I propose that expectation disconfirmation and norm disconfirmation do not account for variance in IT satisfaction over and above desire disconfirmation. Hence, the following three hypotheses can be suggested:

Hypothesis 1: A user's positive disconfirmation of desires about IT performance positively influences his/her satisfaction with IT.

Hypothesis 2: The inclusion of desire disconfirmation will reduce or may even eliminate the observed direct link from expectation disconfirmation to IT satisfaction.

Hypothesis 3: The inclusion of desire disconfirmation will reduce or may even eliminate the observed direct link from norm disconfirmation to IT satisfaction.

Satisfaction is also a function of perceived product/service performance (Oliver & Wayne, 1988; Tse & Wilton, 1988). In addition to disconfirmation judgments, perceived IT

performance is a direct result of evaluation of IT performance during the technology usage experience. In general, one will be satisfied when the IT performance is favorable and dissatisfied when the IT performance is unfavorable. Therefore, I formulate the following hypothesis.

Hypothesis 4: A user's perceived IT performance positively influences his/her satisfaction with IT.

Trust in IT is another important IS success factor that has received much attention in IS research (McKnight, 2005; McKnight, Choudhury & Kacmar, 2002). Trust in IT reflects one's willingness to depend on or be vulnerable to IT (McKnight, 2005). It is an attitude of willingness to rely on IT to perform actions that benefit oneself, together with a normative expectation: IT should perform in a particular way (Nickel, 2011). Trust is similar to satisfaction in the sense that they both represent the overall evaluation, feeling, or attitude about an object (Selnes, 1998). Thus, disconfirmation judgments about IT performance may also play an important role in the formation of trust in IT. According to Nickel's definition of IT trust (Nickel, 2011), IT trust embodies a normative element, which characterizes the normative standard of IT performance. IT trust arises from the human-technology interaction in which technology does what one thinks it should do. Therefore, trust in IT is generated based on the disconfirmation of norms, which involves the use of norms as the comparison standard to evaluate whether IT performance meet or exceed normative standards. This suggests the following hypothesis.

Hypothesis 5: A user's positive disconfirmation of norms about IT performance positively influences his/her trust in IT.

Prior research has suggested that satisfaction is an antecedent of trust (Flavian, Guinaliu & Gurrea, 2005; Ribbink, Riel, Liljander & Streukens, 2004; Selnes, 1998). Trust in IT develops as a result of satisfactory experience with IT. Satisfied users are more willing to rely on IT to perform tasks in the future, while dissatisfied users are not as willing to depend on that technology. Given that satisfaction can act as an instrument to engender greater trust, the following hypothesis is formulated.

Hypothesis 6: A user's satisfaction with IT positively influences his/her trust in IT.

RESEARCH METHOD

Sample, Design and Procedure

Microsoft Access software is used as the target technology to test the proposed research model and its associated hypotheses. A survey was conducted to collect data from undergraduate business students enrolled in an introductory management information systems course at a Southeastern U.S. University. The course offered instruction and practice with MS Access software. Students received extra credit for completing the survey in class during the last week of the semester. During the survey, the respondents were asked to evaluate the performance of MS Access software, compare the perceived performance of MS Access software against their

expectations, norms, and desires, and report their satisfaction with and trust in MS Access software. A total of 89 useable responses were received. There were 47 female respondents (52.81%) and 42 male respondents (47.19%).

Measures

Our survey instrument was developed by incorporating and adapting existing valid and reliable scales where appropriate. The perceived performance of MS Access software was measured as a second-order factor comprised of four dimensions: ease of use, usefulness, functionality, and reliability (Lankton & McKnight, 2011). The item scales measuring each of these four dimensions were adapted from the prior work on IT acceptance and trust (Lankton & McKnight, 2011). The measurement of expectation disconfirmation involved a comparison of perceived performance of MS Access software with originally predicted performance, using a 7-point Likert scale ranging from "much worse than I predicted" (1) to "much better than I predicted" (7). Different labels were used to measure desire disconfirmation using a scale ranging from "much worse than I wanted" (1) to "much better than I wanted" (7), and to measure norm disconfirmation with a scale ranging from "much worse than it should be" (1) to "much better than it should be" (7). The measurement scale of satisfaction with MS Access software was adapted from the work of Spreng at al. (1996) and Bhattacherjee and Premkumar (2004). Trust in MS Access software was measured using McKnight, Kacmar and Choudhury's (2004) technology trusting intention scale.

DATA ANALYSIS AND RESULTS

Partial least square (PLS) – a component-based SEM (structural equation modeling) technique is used for data analysis. PLS is considered suitable for this study due to its superior prediction capability and minimal demands on sample size and residual distributions (Chin, 1998a; Chin, 1998b; Fornell & Bookstein, 1982). In addition, PLS allows us to test the psychometric properties of the measurement scales (the measurement model) and the relationships among the variables (the structural model) simultaneously. All the first-order constructs – the four dimensions of perceived performance, four dimensions of expectation disconfirmation, four dimensions of desire disconfirmation, four dimensions of norm disconfirmation, IT satisfaction, and IT trust were modeled using multiple reflective indicators. Perceived performance, expectation disconfirmation, desire disconfirmation, and norm disconfirmation were modeled as reflective second-order factors with their respective dimensions as first-order factors. The second-order factors were estimated using the hierarchical component model by repeated use of all the indicators of the first-order factors underlying the second-order constructs (Lohmoller, 1989).

Measurement Model

The psychometric properties of the measurement scales for the first-order factors were assessed in terms of convergent validity, discriminant validity, and reliability. The measurement scales have good convergent validity if each item's loading on its corresponding construct exceeds 0.70 (Garver & Mentzer, 1999). All the factor loadings of the measurement items on

their corresponding constructs exceeded 0.70, indicating adequate convergent validity. To establish the discriminant validity, the measurement items should load higher on their respective constructs than the remaining constructs. The results show that all the items' loadings on their own constructs were higher than the cross-loadings on other constructs. Another criterion for evaluating discriminant validity suggests that the average variance shared between the constructs and its indicators should be larger than the variance shared between the construct and other constructs (Fornell & Larcker, 1981). In other words, the square root of average variance extracted (AVE) of the constructs should exceed the inter-correlations among the constructs in the model (Chin, 1998b; Fornell & Larcker, 1981). The correlation matrix presented in Table 1 indicates that the square roots of AVE on the diagonal are greater than the corresponding off diagonal inter-construct correlations. Thus, the discriminant validity of all the first-order factors is supported.

Table 1. Inter-Construct Correlation and Square Root of AVE of First-Order Factors

	ES	FC	RL	US	ED: ES	ED: FC	ED: RL	ED: US	ND: ES	ND: FC	ND: RL	ND: US	DD: ES	DD: FC	DD: RL	DD: US	SA	TT
ES	0.91																	
FC	0.61	0.91																
RL	0.58	0.69	0.88															
US	0.72	0.75	0.60	0.93														
ED: ES	0.58	0.46	0.41	0.51	0.93													
ED: FC	0.37	0.60	0.44	0.53	0.71	0.90												
ED: RL	0.24	0.42	0.47	0.37	0.56	0.69	0.88											
ED: US	0.45	0.54	0.36	0.65	0.73	0.79	0.55	0.92										
ND: ES	0.37	0.29	0.16	0.34	0.54	0.47	0.41	0.52	0.88									
ND: FC	0.20	0.31	0.32	0.37	0.48	0.69	0.60	0.64	0.65	0.93								
ND: RL	0.19	0.25	0.35	0.33	0.48	0.61	0.74	0.53	0.61	0.84	0.90							
ND: US	0.26	0.26	0.22	0.39	0.46	0.57	0.54	0.62	0.79	0.80	0.75	0.92						
DD: ES	0.48	0.47	0.38	0.52	0.74	0.68	0.63	0.67	0.66	0.63	0.59	0.56	0.88					
DD: FC	0.31	0.50	0.33	0.51	0.59	0.82	0.68	0.78	0.61	0.74	0.64	0.70	0.72	0.92				

DD: RL	0.25	0.41	0.46	0.45	0.56	0.73	0.78	0.67	0.49	0.70	0.78	0.62	0.70	0.83	0.90			
DD: US	0.37	0.43	0.34	0.52	0.60	0.77	0.62	0.77	0.59	0.69	0.58	0.67	0.78	0.81	0.70	0.90		
SA	0.54	0.51	0.41	0.65	0.64	0.59	0.50	0.72	0.61	0.54	0.47	0.55	0.71	0.69	0.59	0.73	0.92	
TT	0.31	0.42	0.37	0.45	0.47	0.56	0.61	0.58	0.58	0.58	0.58	0.64	0.59	0.64	0.64	0.66	0.74	0.93

ES = Ease of Use, FC = Functionality, RL = Reliability, US = Usefulness, ED = Expectation Disconfirmation, ND = Norm Disconfirmation, DD = Desire Disconfirmation, SA = Satisfaction, TT = Trust

The reliability of the measurement items was examined using the statistics of Cronbach's alpha (Cronbach, 1971), composite reliability (Chin, 1998a), and AVE (Fornell & Larcker, 1981). It is suggested that Cronbach's alpha should exceed 0.70 (Cronbach, 1971), AVE should be 0.5 or greater (Fornell & Larcker, 1981), and composite reliability should be above 0.70 (Chin, 1998a) to indicate adequate reliability. Table 2 shows that all the values of composite reliability, AVE, and Cronbach's alpha are well above the 0.70, 0.50, and 0.70 thresholds. These results indicate high reliability of the items.

Table 2. Composite Reliability, Cronbach's Alpha, and AVE of First-Order Factors

	Composite Reliability	Cronbach's Alpha	AVE
EASE	0.94	0.90	0.84
FUNC	0.94	0.90	0.83
RELB	0.91	0.86	0.78
USFL	0.95	0.92	0.86
ED: EASE	0.95	0.92	0.86
ED: FUNC	0.93	0.88	0.81
ED:RELB	0.91	0.86	0.78
ED:USFL	0.94	0.91	0.85
ND:EASE	0.91	0.86	0.78
ND:FUNC	0.95	0.92	0.86
ND:RELB	0.93	0.88	0.81
ND:USFL	0.94	0.91	0.85
DD:EASE	0.91	0.86	0.78
DD:FUNC	0.94	0.90	0.84
DD:-RELB	0.93	0.88	0.81
DD:USFL	0.93	0.89	0.82
SATF	0.96	0.94	0.85
TRST	0.95	0.92	0.86

ES = Ease of Use, FC = Functionality, RL = Reliability, US = Usefulness, ED = Expectation Disconfirmation, ND = Norm Disconfirmation, DD = Desire Disconfirmation, SA = Satisfaction, TT = Trust

For the second-order factors of perceived performance, expectation disconfirmation, desire disconfirmation, norm disconfirmation, the path coefficients from the second-order factors to their respective underlying first-order factors (the factor loadings) were all above the recommended value of 0.70 (Chin, 1998a), and all significant at the 0.0001 level. The composite reliability and Cronbach's alpha of all second-order factors exceeded 0.94, well above the suggested threshold of 0.70. In addition, the first-order factors underlying each second-order factor showed high levels of correlation with each other, ranging from 0.54 to 0.83. The positive correlations between the first-order factors were accounted for by their respective second-order factors. Overall, these results provided support for the reflective measurement model of perceived performance, expectation disconfirmation, desire disconfirmation, norm disconfirmation as second-order factors with their respective dimensions being the first-order indicators (Bollen & Lennox, 1991; Edwards & Bagozzi, 2000; Fornell, 1982).

Structural Model

The hypotheses were tested using three PLS models. Model 1 examined the effects of expectation disconfirmation, norm disconfirmation, and perceived IT performance on IT satisfaction without the presence of desire disconfirmation variable (See Figure 1). In model 2, desire disconfirmation was added as an additional independent variable of IT satisfaction (See Figure 2). Model 3 encompassed the effects of perceived IT performance and desire disconfirmation on IT satisfaction as well as the effects of IT satisfaction and norm disconfirmation on IT trust (See Figure 3). PLS model does not generate the model fit statistics, but uses the R square values (explained variance) in the dependent constructs to assess the explanatory power of a structural model. As indicated by the path coefficients in Figures 1, 2, and 3, The PLS results supported all the hypotheses. As expected, desire disconfirmation (H1) and perceived IT performance (H4) were found to positively influence IT satisfaction. Thus, Hypotheses 1 and 4 were supported. The significant effects of expectation disconfirmation (H2) and norm disconfirmation (H3) on IT satisfaction became insignificant after desire disconfirmation was added to the model, hence providing support for hypotheses 2 and 3. The results also provided support for hypotheses 5 and 6. Norm disconfirmation (H5) and IT satisfaction (H6) were found to be significant predictors of IT trust.
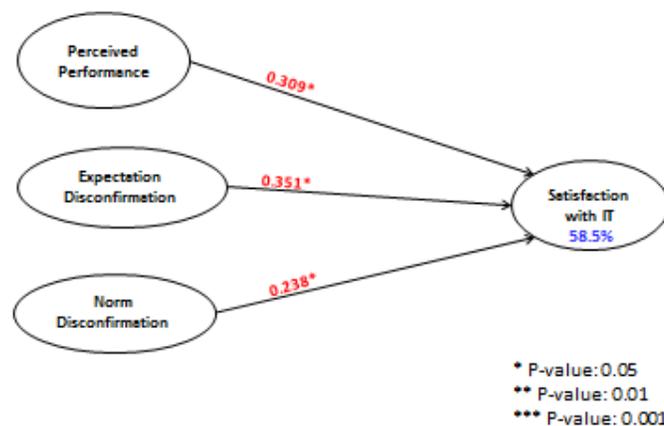
Figure 1. Results of PLS Model 1
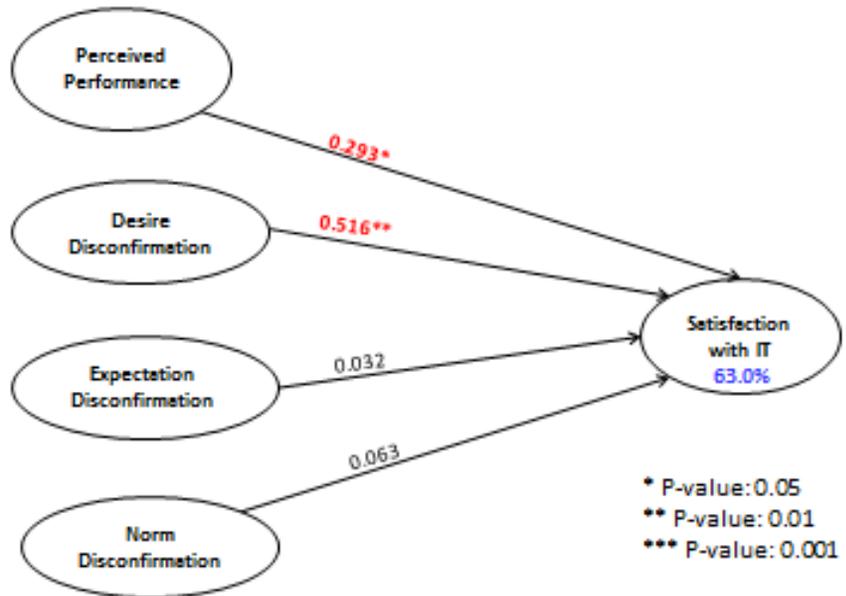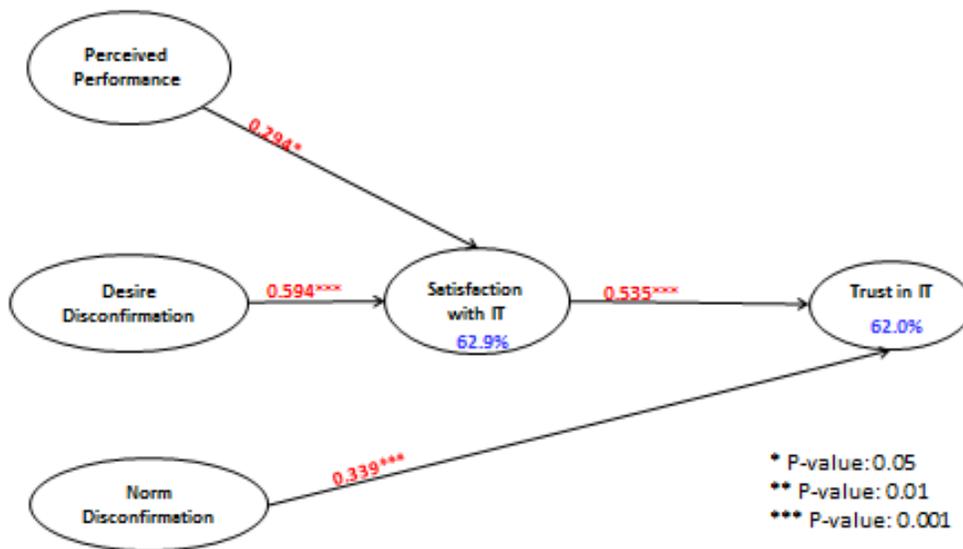
Figure 2. Results of PLS Model 2

Figure 3 shows that 62.9% of the variance in IT satisfaction was accounted for by perceived performance of IT and desire disconfirmation of IT performance. Furthermore, norm disconfirmation of IT performance and IT satisfaction explained 62.0% of the variance in IT trust.

Figure 3. Results of PLS Model 3

An additional supplementary analysis was conducted to determine if IT satisfaction mediates the effect of desire disconfirmation on IT trust. The mediating effect of satisfaction was tested in two separate models. The first model tested the direct effect of desire disconfirmation

on IT trust without the presence of satisfaction variable. A positive relationship was found between desire disconfirmation and IT trust, as indicated by a significant direct path from desire disconfirmation to IT trust (B = 0.414, p <0.01) in the model. The second model tested the direct effects of desire disconfirmation and IT satisfaction on IT trust. The results showed that after the satisfaction variable was included in the model, the significant effect of desire disconfirmation on IT trust became insignificant. These results led me to infer a full mediation effect of IT satisfaction on the relationship between desire disconfirmation of IT performance and IT trust.

CONCLUSIONS AND IMPLICATIONS

The contribution of the research is two folds, theoretical and practical. With regard to theoretical advancement, the major contribution of this research is to provide understanding of the distinctive effects of different disconfirmation judgments on IT satisfaction and IT trust. This study demonstrated that expectation disconfirmation, desire disconfirmation, and norm disconfirmation of IT performance are distinct constructs that play unique roles in the formation of IT satisfaction and IT trust. The findings suggested that desire disconfirmation of IT performance should be incorporated into the formation process of IT satisfaction. Desire disconfirmation was found to be a better predictor of IT satisfaction than expectation disconfirmation and norm disconfirmation. The observed direct links from expectation disconfirmation and norm disconfirmation to IT satisfaction diminished after desire disconfirmation was incorporated in the model. The findings also revealed the significant effect of norm disconfirmation on IT trust, indicating that IT trust is formed through a process whereby individuals compare their normative standards of IT performance to the actual IT performance. Finally, IT satisfaction was found to mediate the relationship between desire disconfirmation and IT trust.

As for practical contribution, this research provides practitioners with insights on how to improve user satisfaction with and trust in IT products/services. Practitioners should consider the findings regarding the effects of desire disconfirmation and norm disconfirmation when designing IT systems. To foster IT satisfaction and trust, IT products/services should be designed to meet or exceed users' desired performance and normative standards.

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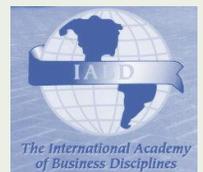
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