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Why Good Technologies Disappoint

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Abstract

This paper investigates the link between expectations and the success or failure of an organizational information system (OIS). Expectations affect satisfaction (and dissatisfaction), which in turn affects the adoption, implementation, and use of the system. The paper follows expectation confirmation theory (ECT) to explore the link between expectations, satisfaction, and OIS success/failure. Drawing on focus group data, we propose important extensions to ECT to account for the complex nature of OISs. These extensions advance a novel approach to understanding why good technologies can be perceived as unsuccessful, even when they function as designed.

Keywords: IS expectations; Expectations-Confirmation theory; focus groups; VoIP

1 Introduction

Information systems adoption and success have been widely studied in the IS literature. Models of IS adoption focus on individual, organizational, and system characteristics to understand the acceptance/non-acceptance of a system (see review by Venkatesh et al., 2003). IS success models incorporate the quality of the information, service, and system, as well as usage and user satisfaction, to understand the net benefits stemming from the IS to different stakeholder groups (DeLone and McLean 1992, 2003; Seddon, 1997). While user satisfaction has been recognized as important in both IS adoption and success literatures (Au et al., 2002), an important antecedent of satisfaction –namely, expectations- is often overlooked, especially in the case of large scale organizational information systems (OIS). Expectations create a standard by which the IS is evaluated, and therefore have an important role in determining user satisfaction. The objective of this paper is to offer some new insights to the adoption literature by focusing on the role of IS expectations in the success/failure of organizational information systems.

This paper does not ask 'why good technologies fail', because many OIS do not fail in the objective, operational sense. Rather, this paper asks 'why good technologies disappoint'. The distinction between these two concepts - failure and disappointment - is central to the contribution of this paper. Failure is often accompanied by disappointment, but disappointment can (and often does) exist in the absence of failure. As IS researchers, we focus on IS failure (although far less than IS success), but spend comparatively little time on disappointment. This is unfortunate since, in the eyes of users, a disappointment can be tantamount to failure. An extension of this logic leads to an interesting observation: an OIS can function precisely as it was designed to function, and still result in dissatisfaction.

The issue of dissatisfaction[1] is important. The Standish group has published the Chaos Report every year since 1994. The highlight of this report is data on the percentage of OIS implementation projects that fail. The most recent data from 2004 suggests that 18% of IS

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[1] In this paper, we use the terms dissatisfaction and disappointment interchangeably.

projects fail, 53% are challenged, while 29% succeed. Projects are deigned to have failed if the system is cancelled or never used. Challenged projects are defined as those that are late, over budget, and/or have fewer than expected features and functions. In other words, challenged projects are those that did not meet expectations. Thus, studying and understanding dissatisfaction can provide important insights to over half of all OIS projects that are sub-optimal. Moreover, understanding the role of dissatisfaction in IS project outcomes can save organizations valuable resources by enabling them to focus on an under-explored cause of poor results – the mismanagement of expectations.

This paper calls for a stronger emphasis in IS research on the management of expectations within our models of OIS adoption, use, and success. Drawing on expectation-confirmation theory (ECT; Oliver 1977, 1980), an accepted theory of satisfaction with consumer goods (including IS products), we investigate the importance of confirmation between expectations and satisfaction in the context of large-scale OIS. Based on our review of the literature, we conclude that in order to benefit the full range of IS research, the ECT model needs to be extended and adapted to the unique nature of OIS. We then draw on exploratory focus group data on a hosted VoIP solution to propose a revised ECT model and identify and propose relevant research issues in the IS field.

2 Expectations and OIS Success

The academic field of marketing has long recognized the importance of expectations on the success of products and services. A consumer's reaction to a movie may vary widely depending on whether her a priori expectations were low (what a pleasant surprise!), or high (what a disappointment!). Marketers have developed expectation-confirmation theory to elucidate this concept. The theory posits that expectations, coupled with perceived performance, lead to post-purchase satisfaction. This effect is mediated through positive or negative disconfirmation between expectations and performance (see Figure 1). If a product outperforms expectations (positive disconfirmation) post-purchase satisfaction will result. If a product falls short of expectations (negative disconfirmation) the consumer is likely to be dissatisfied (Oliver, 1980; Spreng et al. 1996). The four main constructs in the model - expectations, performance, disconfirmation, and satisfaction - are briefly discussed below.

Expectations reflect anticipated behavior (Churchill and Suprenant, 1982). They are predictive, indicating expected product attributes at some point in the future (Spreng et al. 1996). Expectations serve as the comparison standard in ECT – what consumers use to evaluate performance and form a disconfirmation judgment (Halstead, 1999). Disconfirmation can be measured subjectively (e.g. evaluate performance on a scale of "better than / worse than expected") or by subtracting perceived performance from expectations, with the former being more prominent in the literature (Tse and Wilton, 1988; Spreng and Page, 2003).

Disconfirmation is hypothesized to affect satisfaction, with positive disconfirmation leading to above average satisfaction and negative disconfirmation leading to dissatisfaction. However, the exact effect of disconfirmation on satisfaction has been the subject of considerable debate in marketing research (Santos and Boote 2003). Consider the example of negative initial expectations. Confirmation of negative predictive expectations may not lead to satisfaction. To overcome this problem, researchers have proposed other comparison standards such as desires, ideals, equity, or past product and brand experience (see reviews by Halstead, 1999; Yi 1990 and analysis by Tse and Wilton, 1988. Also see Spreng et al. 1996; Woodruff et al., 1983).

ECT has been applied in IS research in a number of areas. Recent examples include the application of ECT to study web customer satisfaction (McKinney et al., 2002), continued adoption of IT in organizations (Bhattacherjee, 2001, Bhattacherjee and Premkumar, 2004), and satisfaction from application service providers (Susarla et al., 2003). Some IS researchers have argued that ECT is particularly relevant to the IS field due to the complexity and novelty of many IT products/services offerings (Khalifa and Liu, 2004). These offerings are often poorly understood, and thus expectations vary substantially, and may further change over time (Bhattacherjee, 2001). Further, Staples et al. (2002) note that pre-implementation expectations are an important factor determining perceived net benefits of OISs. A practical example of the importance of expectations can be found in the CRM literature: "[m]any executives stumble into one of four pitfalls while trying to implement CRM. Each of these pitfalls is a consequence of a single flawed assumption – that CRM is a software tool that will manage customer relationships for you. It isn't." (Rigby et al., 2002:102). This example highlights the observation made at the

beginning of this paper: that an OIS can function precisely as it was designed to function, and still lead to dissatisfaction.

Information Systems researchers have largely appropriated the original ECT model (see Figure 1). In this paper we propose that while the model is suitable for simple IS products and services, some modifications are needed to better represent the case of complex OIS, such as ERP, CRM, and VoIP systems. These systems have some characteristics that distinguish them from traditional consumption goods that have been the focus of the majority of ECT studies (i.e. a video camera or a Website). For example, OISs are not just products, but product/services combinations that require tight integration with organizational processes. Thus, expectations, performance, disconfirmation, and satisfaction may be associated with the product, the service, or both. Expectations may further vary along specific attributes such as functionality, cost, reliability, quality, and a host of other factors (Staples et al., 2002). Moreover, expectations may differ depending on the stakeholder. With complex OIS product/service offerings, the end user is not likely to be the same person who manages the system, who, in turn, is not likely to be the same person who authorizes the purchase of the system. Each stakeholder is likely to have their own set of expectations and performance perceptions (for a discussion of success measures by stakeholder group see Seddon et al., 1999).

Building on the above, this paper's contribution is to incorporate some of the unique aspects of large scale OIS into the traditional ECT model. Since this research is exploratory, no formal hypotheses are proposed. Instead, our general objective is to open a new avenue for IS success and adoption research by proposing modifications to the ECT model that can be empirically tested and applied in the context of large-scale OIS. To this end, we use an exploratory focus group methodology and the example of a hosted VoIP solution.

The following section outlines the methodology employed in the research. This is followed by a discussion of the findings of the research along with the research issues that these findings generate. A discussion section then summarizes and ties together these research issues, proposes a revised ECT model, and reflects on the changes necessary to apply the model in the IS field.

3 Methodology

The specific technology examined in this study is a hosted Voice over IP (VoIP) solution[2]. The market for VoIP products and services is poised to grow exponentially over the next few years, promising reduced costs, increased functionality, and improved performance. Despite these benefits, however, the VoIP market has thus far not lived up to expectations (Duffy, 2005). The disappointing uptake of VoIP solutions by corporations and consumers can be traced to a number of factors, including lower than expected cost savings, less than perfect reliability and quality of service, and insufficient bandwidth (Dalrymple, 200; Ellison and Kaven, 2004). It is therefore surprising to note that in many cases VoIP solutions *have* reduced costs while at the same time they *have* increased the range of available functionality (Huseething, 2005). These benefits have just not lived up to expected levels. Thus, the use of a hosted VoIP solution in this study is appropriate since it appears to demonstrate the same observation introduced earlier in the paper – a technology that functions as designed, but still result in dissatisfaction.

This research employed a focus group methodology to explore the expectations underlying the use of VoIP in organizations. Focus groups are used to generate discussion and debate on matters of interest, facilitate experiments, review materials, and/or to test-run emerging strategies and approaches (Stewart and Shamdasani, 1990). Therefore, we believe this is a suitable methodology to explore potential extensions to the ECT model. For this study, four focus groups were studied over two days during the summer of 2004 in a major North American city. The researchers received permission from a large telecommunications vendor to build the discussion guide around a genuine hosted VoIP solution. This solution was chosen because it is relatively new on the market, highly complex, and contains product and service elements. Participants were senior level IT, systems or telecommunications managers within medium or large organizations. Each participant was the primary decision maker regarding telecommunications solutions within their firm. The sampling frame for the research was drawn from the Dun and Bradstreet

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[2] VoIP systems typically come in one of two varieties: hosted and on-premise. Hosted solutions are managed by a service provider. Clients do not own equipment directly and pay a monthly fee for a package of services. In the case of on-premise solutions, the client purchases the equipment and manages the VoIP system internally. The two approaches are analogous to Centrex vs PBX

directory, and participants were pre-screened for appropriateness for the study. Four groups of 8 or 9 participants were drafted, for a total of 33 participants in the study. Each participant came from a different firm. In order to remove experiential bias, the participants were pre-screened to ensure that none of the firms currently used a VoIP solution, but each was familiar with the concept. Thus, the study focused on hypothetical use of the VoIP solution rather than actual use, consistent with the focus group methodology.

The discussion guide was organized as follows. Participants were first introduced to the focal topic through a general discussion of existing OIS within their organizations (e.g. CRM, ERP, and similar). This first phase was designed to 'break the ice' and get the participants to think in terms of expectations and performance measures. Following on from this initial discussion, the purpose of the second phase was to generate a list of expectations specifically related to the hosted VoIP solution. In order to accomplish this objective, participants were asked to review marketing collateral on the VoIP solution. Two genuine product brochures were provided by the telecommunications partner, the first presenting a marketing view and the second a FAQ brochure. Participants then discussed the expectations that had been generated by the materials, and organized them into higher order categories.

The purpose of the third phase was to explore the link between expectations, disconfirmation, and satisfaction using hypothetical scenarios, focused on VoIP. Participants were first asked to identify, on a scale of 1 to 5, the extent of their satisfaction if expectations were met for each of the categories generated in phase two. For each category, they were then asked to rate, on a scale of -10 to +10, how their satisfaction would change in the case of unmet expectations, or if expectations were exceeded. An example of this task is presented in Figure 2.

[Insert Figure 2 here]

4   Findings

This section briefly describes the insights obtained from the focus group. A detailed discussion of the results follows in the next section. The results were broadly consistent with ECT, in that satisfaction (and dissatisfaction) with the VoIP solution was found to be driven by confirmation (disconfirmation) of expectations. Nevertheless, a number of issues arose that are not extensively

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considered in the current ECT literature, and which we consider to be important for researchers applying ECT to study OIS. We will focus our discussion on these issues.

Categories of expectations. Mainstream ECT considers product performance as the most salient factor upon which to base expectations. On the other hand, findings in IS research have pointed to the existence of several factors that affect expectations. In particular, Staples et al. (2002) found that expectations concerning the system's usefulness, ease of use, and information quality all play an important role in determining the perceived net benefits from the system. Our findings support this work and indicate that in the case of the hosted VoIP solution, expectations were generated for a very large number of factors (see Appendix 1 for a full list of expectations). These factors were organized into higher-order categories by the participants, as shown in Table 1. The focus group participants clearly indicated that they formed expectations on much more than just the performance of the solution.

[Insert Table 1 here]

During the process of expectation aggregation, quality and reliability quickly emerged as the most important expectation categories. Cost was mentioned by all groups as the second most important category.

Discounting of expectations. Perhaps not surprisingly, respondents did not believe everything they heard or read about the VoIP solution. Participants readily admitted that they frequently "discounted" the expectations created by sales people and marketing materials. This discount ranged from 10% to 80%, with the median value around 30%. In other words, respondents believed only about 70% of what they heard or read. They considered the remaining 30% to be over-selling of product features, over-promising of service levels, or more general marketing embellishments. In order not to be surprised, disappointed, or embarrassed, they dampened expectations through an intuitive discounting process.

> *You have to meet in the middle, they are sales people as well. You don't want to tell your users what they say. I don't believe everything they say. Maybe 60-70% I'd rather be pleasantly surprised and my clients as well.*
> (IT project Manager, Global insurance company)

> *I would start at 50%, and then it would raise or fall depending on where I was in the sales process.*
>
> (CIO, large commercial real estate firm)

> *I discount depending on the vendor 30-40 %.*
>
> (Director of IT, large beverage retailer)

Interestingly, the discounting of expectations was amplified when passed through to other stakeholders within the firm. IT managers would tend to under-sell some benefits and features of the solution to internal clients (typically end users or senior managers) in order to avoid creating unrealistic expectations. Although it was not measured in this study, it is possible that internal stakeholders would also discount their own expectations based on what they heard from the IT managers.

Multiple Stakeholders. Unlike most ECT research that deals with the expectations of purchasers, OISs typically incorporate multiple stakeholders. For example, executives are involved in the purchase decision, IT managers are involved in implementation and maintenance, and end-users work with the system on a daily basis. The relevant success measures for these groups are subsequently different from each other, as they depend on what is perceived as important to the specific stakeholder (Seddon et al., 1999). Since the focus groups consisted of senior IT managers and executives, we could only learn about these stakeholder groups. Interestingly, participants' satisfaction was driven by how well a technology solution worked for other stakeholders within the company, i.e. IT managers, end users, and senior management. For example, IT managers made it clear that until internal stakeholders were satisfied they would not be satisfied.

> *If my non-IT people knew how to use it, and were excited about it, I would be extremely happy.*
>
> (Director of Networking, large apparel retailer)

> *We didn't want to build up too much expectation, we were concerned in selling the expectations to our internal customers as to whether or not the product could deliver what the vendor said it could.*
>
> (Managing Director of Communications, large accounting firm)

Impact of confirmation on satisfaction. As mentioned previously, respondents were asked to rate their level of satisfaction for each of the expectation categories on a five point scale, assuming that their expectations were met. They were then asked to indicate how their satisfaction would change from that base level in case their expectations were not met or were exceeded. The results of this procedure are shown in Figure 3. For all eight categories of expectations, satisfaction in the case of simple confirmation (i.e. met expectations) ranged between 3.6 and 4.1[3]. This result is in line with the ECT literature highlighting that simple confirmation for predictive positive expectations leads to satisfaction but not delight (thus scores are lower than 5).

Once participants had established baseline levels of satisfaction for each category, they were asked to indicate on a scale of –10 to +10 how their satisfaction might change if their expectation were: greatly exceeded, somewhat exceeded, somewhat unmet, or greatly unmet (recall Figure 2). The center of the scale represented the zero point from the previous exercise. For all of the categories there was a greater negative shift in the level satisfaction if expectations were "Greatly unmet" than a positive shift if the expectations were "Greatly exceeded" (see Figure 3). Thus, there appears to be a greater downside risk to under-delivering on these attributes, than an up-side reward for over-delivering.

[Insert Figure 3 here]

A general indicator for the inequality of negative and positive disconfirmation was computed by measuring the distance between the negative and positive values for each of the participant's evaluation sheets. This difference was termed the zone of variation as it represents the extent of variation in stakeholders' satisfaction for negative and positive disconfirmation. To illustrate, our findings show that cost has a higher zone of variation (-8.2 to +6.8) than revenue (-7 to +6.1) or efficiency (-6.2 to +5.3). This implies that satisfaction with respect to the cost of the system is more sensitive to negative or positive disconfirmation than satisfaction resulting from revenue gains or efficiency.

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[3] Measured on a scale of 1 to 5, 1 being extremely dissatisfied and 5 extremely satisfied.

5 Discussion and model extension

This paper argues that IS research has under-estimated the importance of expectations in determining outcomes for the adoption and success of large scale organizational information systems. In particular, unmet expectations can lead to disappointment, which in turn can lead to the perception of failure. Overlooking the importance of expectations may lead researchers to neglect important contributors to OIS project failure – cornerstones of IS research. In this section, we propose an extension to the expectations confirmation theory (ECT) so that it can be effectively utilized in studying OIS. This extension is based on conceptual arguments and results from the focus group research.

Expectations. Our results support the existence of different expectation categories for OIS. It is insufficient to consider expectations as a single unidimensional construct. For the sake of parsimony, we propose that the eight expectation categories be further grouped into four theory-driven groups. Following DeLone and McLean (1992, 2003), we propose that the individual expectation categories can be classified into expectations concerning information attributes, system attributes, and service attributes. For example, expectations about system functionality, efficiency and implementation fall under the system attributes dimension. Expectations about quality and reliability can be placed in multiple categories depending on context, so that the reliability of the information provided by the system is placed in the information attributes dimension, and so on. In addition, since our results indicate that OISs are embedded within other organizational systems, we propose an additional dimension to encompass expectations about the organizational impacts of the OIS. The mapping of expectation categories onto these four dimensions is presented in Table 2.

[Insert Table 2 here]

Each individual expectations dimension is likely to impact overall satisfaction to a different extent, depending on its importance relative to the other dimensions. Thus, we model overall satisfaction as a weighted function of the satisfaction arising from disconfirmation of expectations in each dimension. This weighting function is ascribed with the following notation (w_i), and is shown along with other modifications to the original ECT model in Figure 4.

The existence of different expectations dimensions has important implications for IS adoption and success research. Specifically, being able to analyze the exact source of dissatisfaction (i.e. the specific dimension that exhibits negative disconfirmation) can allow organizations to be more focused in recovery efforts. In addition, organizations that can identify the relative weights of the individual expectations dimensions can be more efficient in spending resources on improved adoption, as they can target the most important expectations first.

[Insert Figure 4 here]

Stakeholders' satisfaction. Another construct proposed as an addition to the model is stakeholders' satisfaction. Our focus group findings support prior research that suggests the satisfaction of one stakeholder group (e.g. IT manager) depends to a large extent on the expectations and satisfaction of other stakeholder groups in the organization (e.g. end users). Thus, overall satisfaction from the OIS does not depend solely on the disconfirmation of the focal group's expectations but also on the disconfirmation of the expectations of the other groups, as shown in Figure 4. This finding highlights the need for managers to monitor and control expectations at various levels to ensure that OIS capabilities and benefits are well understood by all groups.

From a research point of view, adding stakeholders' satisfaction to the model provides an additional explanatory variable for low levels of satisfaction. Thus, an IT manager can be dissatisfied with a new system that operates according to his expectations, because the new system did not meet the expectations of the end users. Understanding this alternate cause of dissatisfaction can assist organizations in achieving satisfaction among all stakeholder groups.

Zone of variation. As suggested earlier, much of the research on ECT has focused on the nature of expectations, performance, and disconfirmation. Specifically, expectations –in their role as the comparison standard used to evaluate performance- can range from the ideal ("what should be"), to the predictive ("what will be"), to the minimum tolerable, or even intolerable expectations (Santos and Boote, 2003). Building on this range of expectations, the service quality literature (Zeithmal et al., 1993) has introduced the notion of the zone of tolerance, defined as "The extent to which customers are willing to accept heterogeneity…representing the difference between desired service and the level of service considered adequate…"(p. 6). A similar concept, the zone

of indifference (Woodruff et al., 1983) refers to performance: "For all practical purposes, perceived performance within some interval around a performance norm is likely to be considered equivalent to the norm. This interval is called a "zone of indifference"." (p. 299). Perceived performance that is above or below the norm but still within this zone of indifference leads to confirmation (Santos and Boote, 2003; Woodruff et al., 1983).

Building on these notions, we propose a complementary concept focusing on the right-hand-side of the model, namely – satisfaction. The zone of variation describes the sensitivity of satisfaction to negative or positive disconfirmation. It moderates the extent of change in satisfaction that one can expect for a given level of disconfirmation. The zone of variation is thus incorporated into the model presented in Figure 4 through the use of a moderator variable on the link between confirmation and satisfaction for each expectations dimension.

Understanding the zone of variation has important implications for managers. Specifically, the zone of variation allows organizations to focus resources on managing the expectations of those dimensions for which satisfaction is most sensitive.

6   Conclusion

The examination of OIS disappointment has been under-explored in IS research. Systems may function as designed, but still disappoint various stakeholders, the result of which may be tantamount to failure. Disappointment is inextricably linked to the formation and confirmation of expectations. Thus, we draw on expectations confirmation theory from the field of marketing.

We presented the findings of an exploratory qualitative study. More work is required to test and validate the proposed model. Specific research stemming from this study can include identifying the strongest path from expectations to satisfaction (using the different categories); investigating the full range of interactions among stakeholders' expectations and satisfaction; and measuring the sensitivity of satisfaction to individual expectations categories. A future longitudinal study on an actual OIS implementation would benefit the validation of the model proposed here.

This paper offers several important contributions to the use of ECT in IS research and practice. First, it validates and highlights the importance of using multi-dimensional expectations to

capture the complex nature of large scale OIS. Second, it proposes that individual expectations dimensions impact satisfaction to a different extent. Third, it ties the expectations and satisfaction of all stakeholders involved with new OISs. By adding other stakeholders' satisfaction to the model, we provide an additional explanation for dissatisfaction, enabling organizations to better identify and solve problems related to sub-optimal system adoption, implementation, and use. Finally, we propose the notion of the zone of variation, identifying the range of satisfaction gain (or loss) that can be expected from managing expectations.

7   References

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Appendix: Examples of detailed expectations generated by each of the focus groups

Group 1	Group 2
Better/Faster/Cheaper	Handle needs of organization
Reduced costs	Lower cost of ownership
Productivity	Features updated automatically
Flexibility	Easy to use
Continuity	Provide service (repair) in 24 hrs
Easier to manage	Won't go down as much as current
Scalability	Less to maintain
More toys/features	Easy to install
Unified messages	Compatible with cell phone network
Reduction in manpower	Better than traditional phones
Enhanced services	Competitive
Leverage ROI (current systems)	More functions for less money
Reachability (for employee)	Expect faster response (repair)
Greater mobility	Web accessibility
Collaboration	Employees more accessible
Customer satisfaction	Minimal disruption
Productivity	Re-route calls
Easier moves, adds, deletes	Choice of call options
Disruption of service	Scalability
Less dependability	Save money – LD. Local, video conferencing
Increased applications	Need fewer lines
System will grow with business	Staff satisfaction
Expensive	Easy to use audio advertising
Long term commitment to *[company]*	Disruption in business numbers
Expect parity in service (to current service)	Some inconvenience to customers during
Integrated systems	installation
Reduced maintenance	
Match reliability (to current)	
Increased connectivity	
Group 3	**Group 4**
Reduced costs	Reduced communications costs for LD, Local
Staff more flexible	Not integrated with PBX
Access messages from anywhere	Not strong on SLA
Increase employee productivity	Replaces PBX
Reliable	More features than current
Tailored to company's	Lower costs
Easy to use	Easy to use
Stable/reliable	Low reliability
Secure	Simple to use
Converge network(s)	Quick to install
Ownership by *[company]*	Improves employee mobility
Better handset features	Web backup
Mobile work force	Leverage existing network
Cost savings	All-in-one service
Extend longevity of current system	Less than seamless
More down time	Uses existing infrastructure
Quality	Lots of service features
Hassle free	24/7 accessibility
Scalable/add services	Low security
Become value added	Internal, external caller ID
Provides business recovery plan option	Voice quality
Any where/any time	Match PBX performance

Table 1: Higher-order expectations categories

Category of expectations	Raised by # of groups	Examples of expectations within each category (as raised by focus group participants)
Quality of product and service	All	We expect the product to be superior to other products on the market. We expect the vendor to provide superior service.
Reliability of product and service	All	We expect that there will be no bugs in the product. We expect that the vendor will provide service on a timely basis.
Cost/value	All	We expect that the cost of the product will not exceed the quoted estimate. We expect that the product will provide value for money.
Efficiency of product	2	We expect that the product will allow us to do more with less. We expect the product will save us time.
Revenue generation	2	We expect that the product will allow us to increase sales. We expect that the product will help us to enhance profits.
Functionality/versatility	2	We expect the product to have multiple, useful features. We expect to be able to customize the product to our specific needs.
Business sustainability /competitive advantage	2	We expect this product will provide us with a competitive edge. We expect this product to provide long-term strategic benefits.
Implementation	2	We expect few problems when implementing this product. We expect this product will work seamlessly with existing systems.

Table 2: dimensions of expectations categories

Information attributes	System attributes	Service attributes	Organizational impact
Quality Reliability	Quality Reliability Efficiency Functionality/versatility Implementation	Quality Reliability	Cost/value Revenue generation Business sustainability/competitive advantage

Figure 1: Expectation-Confirmation Theory
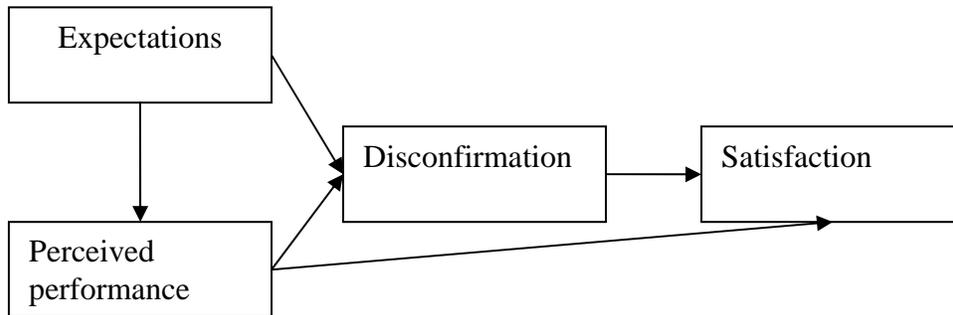
Figure 2: Measure of the disconfirmation effect on satisfaction
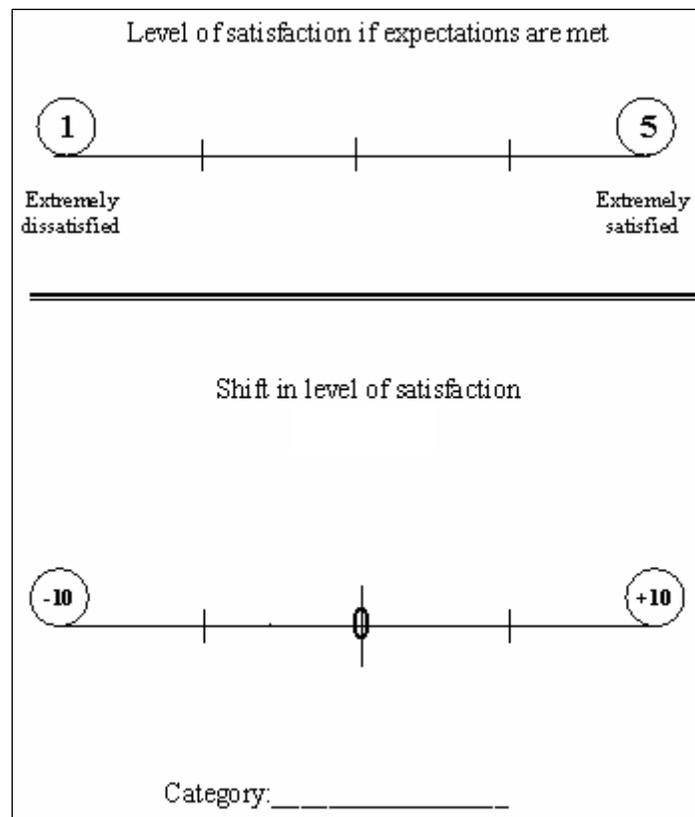
Figure 3: The Zone of Variation
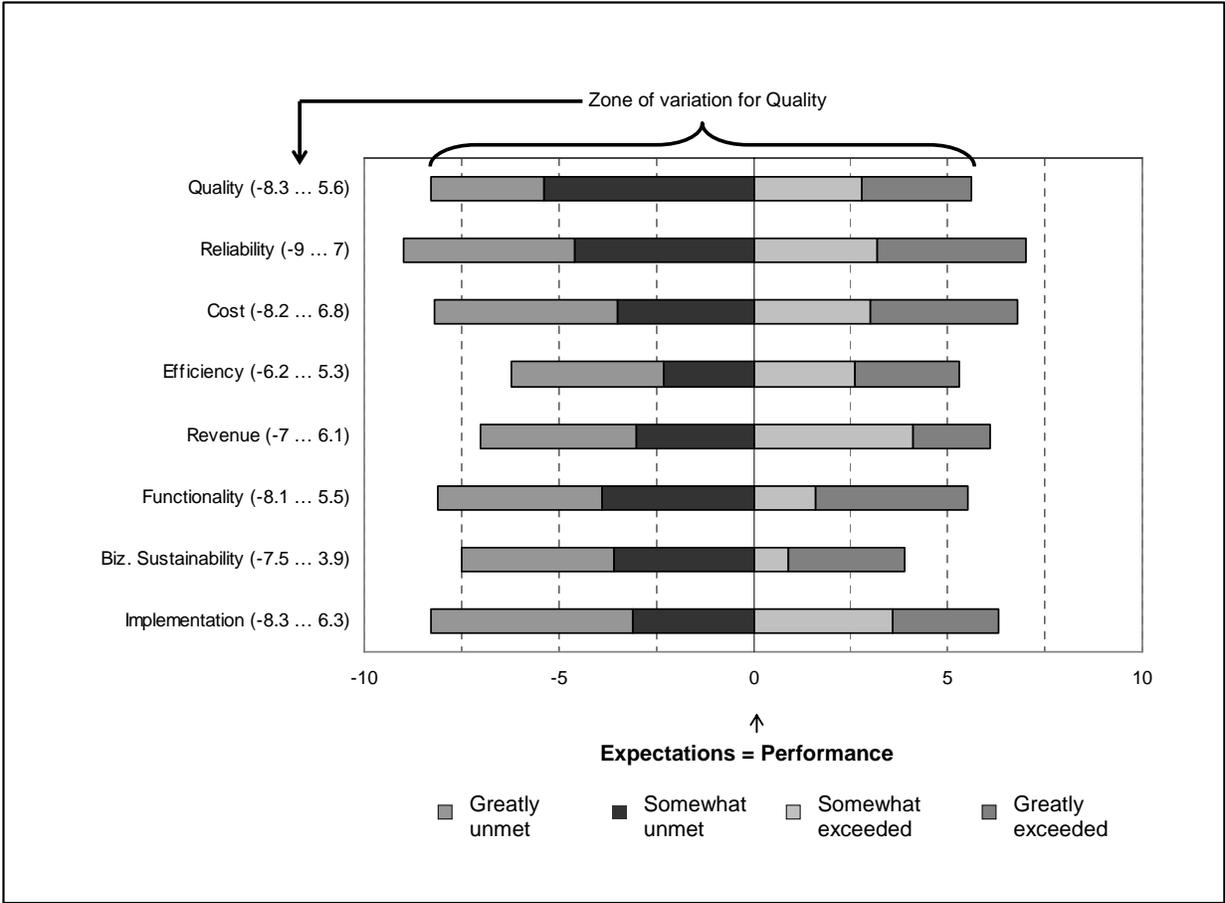
Figure 4: the revised ECT model for IS research (additions are dotted)
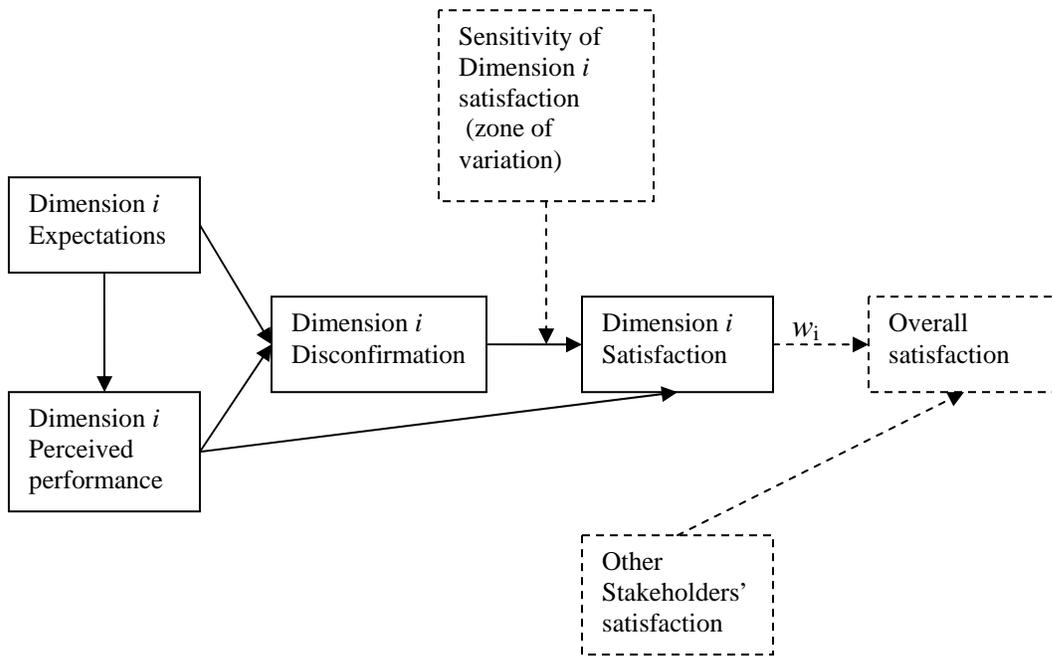
* The index i refers to the expectations dimensions