**Exploring the Zone of Tolerance for Internal Customers in IT-Enabled Call Centers**

## ABSTRACT

Today, call-center employees' service encounters with external customers are extensively supported with modern information technology (IT). However, prior research on service quality and zone of tolerance (ZOT) focuses on external customers with little attention to how internal customers (e.g., service employees) respond to services provided by internal functions, particularly IT function that supports employees' IT use. Drawing on theory of administrative behavior and IT success literature, we conducted a study at a call center of a telecommunications firm and found that the impact of internal IT service quality (ITSQ) on employees' service quality (ESQ) to external customers, as well as on their satisfaction with and use of the deployed technology, exhibits a positive diminishing pattern as ITSQ increases from below to within to above the ZOT. We also found that ITSQ's impacts on ESQ and employees' satisfaction with technology change more dramatically around adequate service level (ASL) than desired service level (DSL). Finally, we show that call-center employees' satisfaction with technology partially mediates ITSQ's impact on ESQ. Besides adding to the service and IT literature, our findings suggest that managers should understand internal customers' different levels of expectations towards internal IT service and the differential performance impacts of those levels.

**Keywords:** Call center, internal customers, internal services, service quality, zone of tolerance, theory of administrative behavior, IT success, IT-enabled service

**INTRODUCTION**

Studies have shown that customer satisfaction contributes to excess financial returns (Fornell et al. 2006), and high employee service quality (ESQ) is the key for attaining customer satisfaction (Fornell et al. 1996). To improve ESQ, a growing number of organizations are implementing modern information technology (IT), such as customer relationship management technology (CRMT), to assist employees' service encounters with customers (McCalla et al. 2003). Empirical evidence shows that CRMT can indeed amplify frontline employees' capacity to better satisfy customers (Ramasubbu, Mithas, and Krishnan 2008).

Organizations implement CRMT in various service channels (e.g., retail stores, call centers, websites, and others), among which call centers are used most extensively by external consumers (Wickham and Collins 2006). It is estimated that (1) 70% of service encounters occur via call centers, (2) each of the Fortune-500 firms operates, on average, 30 call centers, and (3) 3% of the U.S. and UK working population is employed in call centers (Mandelbaum 2006). Furthermore, every year at least $700 billion worth of goods and services have been sold via call centers since the mid-90's, and this volume of business has been growing at an annual rate of 20% (Mandelbaum 2006). Hence the call-center industry is not only vast in terms of economic scope and workforce size, but it is also of significant business and societal importance.

Against this backdrop, our study investigates service interactions in call centers where frontline service employees undertake customer service work, such as answering customer inquiries, offering information about products and promotions, processing transactions and payments, and providing post-sales support (Sergeant and Frenkel 2000). Today, such service interactions are enabled by CRMT that provides call-center service employees with immediate and comprehensive information about a specific customer, as well as information about the

firm's products and services (Mithas et al. 2005). As call-center employees need to use CRMT for service provision (McCalla et al. 2003), it is important that a firm's supporting IT function, which responds to hardware and/or software problems with the technology, addresses technology-related issues in a responsive and reliable manner.  IT service quality, or the quality of the service provided by the internal IT function to frontline service employees (Pitt et al. 1995), is critical for employees' ability to apply the technology to deliver high-quality service to their customers (Heskett et al. 2008).

Anecdotal evidence suggests that call-center employee dissatisfaction with the quality of internal IT services can have negative consequences, including damage to a firm's image. For example, after a troubled implementation of a CRMT at a leading Australian telecommunication firm's call center, the "I Hate Siebel" Facebook group was developed (Sharma 2008) with more than 3,000 members involved in an active forum of employees and customers sharing their negative views and experiences emanating from the CRMT implementation. Besides many employees' complaints about the IT function's ineffectiveness in supporting their service work (Sharma 2008), the call center also noticed a sharp increase in customer dissatisfaction (Tindal 2008). As one employee noted, "The level of client dissatisfaction and aggression is overwhelming as is the feeling of not being able to do my work effectively" (Tindal 2008). Clearly, the call center failed to understand and manage their employees' expectations and perceptions with respect to the deployed IT.

A plausible reason for such failures is the limited theoretical understanding about the concept of *internal marketing*, which concerns the relationship between the quality of internal services provided by a firm to its employees and the quality of service provided by the firm's employees to its external customers. Scholars studying internal marketing have long supported

the view that "satisfied employees lead to satisfied customers" (Rust, Moorman, Dickson 2002) and suggested that organizations should treat frontline service employees as 'internal customers' and focus on providing them with superior service so they can, in turn, deliver high service quality to external customers (e.g., Wieseke et al. 2009).

Unfortunately, most prior research on service quality focuses on issues related to the interactions between service employees and external customers, such as the impact of employee service quality on customer responses (Zeithaml et al. 1996), different types of customer expectations (Zeithaml et al. 1993), and factors (e.g., customer satisfaction, perceived value, etc.) that mediate the impact of employee service quality on customer responses (Brady et al. 2005). In contrast, with a few exceptions that study the influence of organizational support (e.g., human resources function and service climate) on employee service quality (e.g., Schneider et al. 1998), there is almost no research on how the quality of internal services (e.g., IT service quality) affects internal customers, especially in the IT-enabled service contexts such as call centers.

To address this void, we first apply the zone of tolerance (ZOT) concept, which involves two distinct types of customer expectations—adequate service level (ASL) and desired service level (DSL)—to understand the differences in the influence of call-center internal IT service quality on internal customers' responses when perceived IT service quality is lower, within, or above the ZOT (Zeithaml et al. 1993). Next, drawing on the theory of administrative behavior, which suggests that call-center employees are generally willing to settle for an adequate solution rather than seeking a desired or optimal one (Simon 1976), we hypothesize that ASL may play a more important role than DSL in the relationship between internal IT service quality and employee service quality to external customers. Specifically, we propose that call-center employee service quality may be more sensitive to IT service quality when IT service quality

fails to meet employees' ASL rather than when IT service quality falls short of their DSL. Our premise is that the benefits to employee service quality are likely to be greater when IT service quality increases to meet ASL relative to when IT service quality increases to exceed ASL.

Moreover, the IT success literature suggests that high-quality IT service can foster user satisfaction and stimulate technology usage behavior, which, in turn, lead to positive performance outcomes (DeLone and McLean 2003). However, the proposed mediation relationships have received limited attention and empirical support (Petter and McLean 2009). To fill this gap and investigate the proposed mediations, we hypothesize that call-center service employees' satisfaction with and use of deployed technology will mediate the effect of internal IT service quality on employee service quality to external customers.

To test our hypotheses, we conducted a multi-sourced field study to collect time-lagged data from the service employees and quality-assurance team in a call center of a large telecom service firm. The results support our hypotheses. Specifically, we found the following:

1. A positive diminishing impact of IT service quality on call-center employee service quality (as well as call-center employees' satisfaction with and use of deployed technology) as IT service quality increases from below to within to above the employees' ZOT

2. The positive impact of IT service quality on call-center employee service quality and user satisfaction diminishes more dramatically when IT service quality moves from below to within the ZOT than from within to above the ZOT

3. While user satisfaction partially mediates the impact of IT service quality on call-center employee service quality, technology use has no mediation effect.

## THEORETICAL BACKGROUND AND HYPOTHESES

### Characteristics of Call-Center Employees as Internal Customers

The unit of analysis in our study is the individual call-center employee. Call-center employees' service provision is supported by internal services offered by various functions (Mandelbaum 2006). As such, scholars have drawn from the internal marketing concept and conceived call-

center employees as internal customers of firm-provided internal services (e.g., Chan et al. 2000).

The internal marketing literature suggests that internal customers have several characteristics that distinguish them from external customers. First, internal customers, relative to external customers, have fewer perceived service alternatives with little or no choice in terms of alternative service providers; they are virtually 'captive' customers (Nagel and Cilliers 1990). Internal customers by virtue of their having more knowledge about the environment and circumstances of service delivery, are more realistic in their expectations regarding internal service quality and even cynical about the promises made by internal service providers (Mudie 2003). Furthermore, they may experience pressures that external customers do not, such as compliance with organizational mandates and the need for loyalty and commitment to their employer, coupled with an emphasis on efficiency, quality, and punctuality so as to meet their organization's performance standards (Mudie 2003; Seddon 1997). The aforementioned characteristics of internal customers are important in that they need to be considered explicitly when investigating the impact of internal service quality on internal customers.

**IT Success and IT Service Quality**

Organizations create and implement IT to achieve some type of success, and success is described differently based on the context of the technology and its purpose. DeLone and McLean (1992) first proposed the IS Success Model, which describes the relationships between six distinct but interdependent success variables (i.e., information quality, technology quality, technology use, user satisfaction, individual impact, and organizational impact) that comprise the notion of successful IT implementation. Others have modified DeLone and McLean's work over time and have called for changes.  In response, DeLone and McLean  (2003) have updated their original model. To address the criticism that IT can exercise influence at various levels, such as

at the individual, workgroup, organization, industry, and society levels (Seddon 1997), DeLone and McLean (2003) replaced the individual impact and the organizational impact constructs with the "net benefits" construct and argued that the benefits of IT should be considered according to the context in which it is applied. As the goal of CRMT is to assist call-center employees in providing high-quality service to external customers, this study focuses on call-center employee service quality (ESQ) to external customers as the core benefit, and hence the focal dependent construct, of interest.

In addition, DeLone and McLean (2003) added IT service quality as an important antecedent that goes above and beyond the informational and technical properties of the investigative technology (i.e., technology quality and information quality) and affects technology use, user satisfaction and, ultimately, net benefits. This addition suggests that the impact of IT service quality on net benefits will be mediated through technology use and user satisfaction. Surprisingly, a recent meta-analysis of the IT success literature (Petter and McLean 2009) (a) revealed no empirical support to the proposed influence of IT service quality on technology use, user satisfaction, or net benefits and (b) could not identify the mechanisms through which IT service quality exerts its downstream effect. We believe the lack of findings in this area could be attributed to the failure to consider (1) the unique characteristics of internal customers and (2) the different levels of employees' expectations toward internal IT services. Indeed, Johns (2006) recommends that integrating the unique aspects of the investigative context and potential sources of heterogeneity in the population of interest can be a useful strategy to elaborate on theory and reconcile inconsistent or surprising empirical findings.

Toward this end, this study invokes the aforementioned characteristics of internal customers to theorize about the impact of internal IT service quality (ITSQ) on call-center

employee service quality (ESQ) across different levels of the employees' expectations.

**The Zone of Tolerance (ZOT)**

Different levels of customer expectations exist in a service encounter (Zeithaml et al. 1993). As mentioned before, the desired service level (DSL) is the level of service that the customer hopes to receive, a blend of what a customer believes 'can' and 'should' be the service level, while adequate service level (ASL) is the minimum level of service the customer will accept, or the threshold of acceptable service. Interpersonal service encounters are heterogeneous in that performance may vary across providers, across employees from the same provider, and even within the same employee (Zeithaml, Parasuraman, and Berry 1985). The ZOT represents the extent to which customers recognize and are willing to accept this heterogeneity and is operationalized as the difference between DSL and ASL (Zeithaml et al. 1993).

Prior research explores differences in the impact of service quality on various customer responses (e.g., loyalty, repeat purchase, switching, willingness to pay more, propensity to complain, etc.) across different levels of the ZOT (i.e., below, within, and above the ZOT) in a variety of external marketing contexts, such as restaurants (Liljander and Strandvik 1993), retail stores and auto/life insurance firms (Zeithaml et al. 1996), airlines (Chen 1997), retail banks (Gwynne, Devlin, and Ennew 2000; Yap and Sweeney 2007), student services (Teas and DeCarlo 2004), travel agencies (Lobo, Martiz, and Mehta 2007), hotels (Nadiri and Hussain 2005), life insurance and stock brokerage firms (Durvasula et al. 2006), and passenger rail services (Cavana, Corbett, and Lo 2007). Our review of these studies reveals the dominant patterns for the influence of the ZOT, as summarized in Figures A1, A2, and A3.

< Insert Figures A1, A2, and A3 about here >

Specifically, the relationships between service quality and *positive* dependent variables (e.g., loyalty, repeat purchase intentions, willingness to pay more, willingness to recommend, perceived value, and customer satisfaction) generally assume one of the following patterns: [1]

1. A positive linear pattern such that there is no difference in the positive slope across different levels of the ZOT (e.g., Zeithaml et al. 1996; Teas and DeCarlos 2004; Lobo et al. 2007; Yap and Sweeney 2007), as shown in Figure A1.

2. An upward increasing pattern such that the slope becomes more positive as service quality moves from below to within to beyond the ZOT, as shown in Figure A2 (e.g., Teas and DeCarlos 2004; Yap and Sweeney 2007) and Figure A3 (e.g., Lobo et al. 2007; Teas and DeCarlo 2004).

Notwithstanding these important findings in external service contexts, there is no research on the influence pattern of the ZOT on the relationship between service quality and outcome variables in internal service settings. Thus, we have very little knowledge about the role of the ZOT with regard to internal services (e.g., internal IT service) or if the previous findings in external service context are generalizable to the internal service context. Such generalizability cannot be assumed given the aforementioned significant differences between internal and external customers. Accordingly, we draw on the theory of administrative behavior to address this important gap in the ZOT literature, thereby integrating the ZOT concept into our understanding of IT success from the perspective of internal customers.

**Theory of Administrative Behavior**

As part of the seminal work by Simon (1976), the theory of administrative behavior describes the behaviors of employees working in organizations, challenging the "rational man" and "economic man" assumptions and proposing that "administrative man" is aware of only

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1. The relationships between service quality and negative dependent variables (e.g., complaint intentions and switching behavior) are essentially the opposite to those of the positive variables.

some of the possible decision alternatives (i.e., bounded rationality) and is willing to settle for an *adequate* solution rather than invest additional effort to continue looking for an *optimal* solution (Simon 1976). According to this theory, *satisficing* is a behavior that attempts to achieve some minimum level of a particular variable or outcome but does not strive to maximize it (Simon 1976). Thus, employees may not necessarily look for the *best possible* solutions for their assigned tasks; rather, they may seek a solution that is adequate, or *good enough*.

One unique aspect of internal customers (i.e., employees) is that they need to meet pre-defined performance standards specified for their roles in the organization (Mudie 2003). In the call-center context, frontline service employees, whose primary responsibility is to respond to external customer inquiries, need to comply first with the minimum or *adequate* service standards set by the organization. Then, if possible and resources permit, they make extra effort to provide the *optimal* service to delight their customers.

To provide adequate service to external customers, the call-center employees, as internal customers, need to receive internal IT service that is at least *good enough* for them to be able to apply the CRMT effectively to perform service tasks at the level required to meet the organizational performance standards. However, if the internal IT service providers extend the *best possible* service to the service employees, the employees would be endowed with high-quality internal IT service that may enable them to perform service tasks at a level that could delight their customers. In this vein, the concepts of *adequate* (*good enough*) and *optimal* (*best possible*) services are akin to the notions of ASL and DSL, which we use in the following section to theorize about the differential impact of IT service quality on call-center employees' service quality across the various levels of the ZOT.

**Moderating Role of the ZOT on the ITSQ-ESQ Link**

Although prior research shows that the ZOT may moderate the relationships between service quality and a wide range of outcomes (e.g., Yap and Sweeney 2007; Zeithaml et al. 1996), to the best of our knowledge, the moderating role of the ZOT in internal service contexts such as a call center has not been examined in past research. Given the insignificant and inconsistent effects of IT service quality on user appraisals of the IT and IT use (Petter and McLean, 2009) and the need to integrate key contextual characteristics to elaborate on theory in such situations (Johns 2006), we investigate the differences in the influence of IT service quality on call-center employee service quality when those employees' assessment of IT service quality falls below, within, and above their ZOT.

We map the concepts of ASL and DSL to the notions of *adequate* (*good enough*) and *optimal* (*best possible*) solutions, respectively, that are offered by the internal service providers. Using the theory of administrative behavior, we propose that meeting the minimum performance standards specified by the organization may be a higher priority for call-center employees than trying to excel in their job. Hence, having an *adequate* level of internal service may be more important for those employees than having an *optimal* level. In this vein, the employees' priority toward obtaining *good enough* over *best possible* internal service will affect how positively they respond to increases in ITSQ that supports them, as follows:

- **Below the ZOT:** Call-center employees who perceive the level of IT service quality to be below the ZOT (i.e., below ASL) may find the support from the IT function insufficient to help them serve their external customers even at a minimally acceptable level that meets pre-defined performance standards. Hence, any improvement in IT service quality helps them deliver better service to their external customers, thereby making these

employees more sensitive to improvement in IT service quality compared to those who perceive IT service quality to be within or above the ZOT.

- **Within the ZOT:** Call-center employees who perceive the level of IT service quality as being within the ZOT (i.e., above ASL but below DSL) may find the support from the internal IT function to be sufficient for them to perform a good enough external service function, thereby meeting the organization's performance standards for service to external customers. In this case, IT service quality enhancement can still help call-center employees deliver better customer service (i.e., positive association between IT service quality and employee service quality). Nevertheless, the improvement in employee service quality derived from enhancing IT service quality for employees who perceive the quality of internal services to be within the ZOT will not be as great compared to employees who perceive the quality to be below the ZOT because the risk of sanctions for not meeting performance standards is not an issue for employees who perceive IT service quality to be within the ZOT.

- **Above the ZOT:** Call-center employees who perceive the level of IT service quality to be above the ZOT (i.e., above DSL) may feel that the quality of service provided by the IT function already enables them to provide the best possible service to external customers. According to the theory of administrative behavior, employees may have limited motivation to go beyond providing normal service to customers. As such, call-center employees who perceive IT service quality to be above the ZOT may see lower marginal benefit from a further increase in IT service quality; thus, improvements in IT service quality for employees who perceive IT service quality to be above the ZOT may lead to less improvement in employee service quality compared to employees who

perceive IT service quality to be below or within the ZOT.

The above discussion suggests that the positive impact of IT service quality on call-center employee service quality may vary across the three different ZOT levels, such that the impact of IT service quality on employee service quality will exhibit a decreasing pattern when IT service quality moves upward from below to within to above the ZOT. We therefore hypothesize:

**H1:** The positive effect of IT service quality on call-center employee service quality follows a diminishing pattern as the level of IT service quality increases from (a) below to within the ZOT, and (b) within to above the ZOT.

In addition to having very few or no service alternatives, internal customers, as compared to external customers, tend to have more understanding about the environment and circumstances associated with the provisioning of internal service (Mudie 2003). Hence, they are likely to be practical and realistic in their expectations from the internal services provided by other departments (Mudie 2003). In the call-center context, given employees' realistic expectations and higher priority towards having an *adequate* level over a *desired* level of IT service quality, it is possible that ASL plays a more important role than DSL in anchoring their response to IT service quality. First, call-center employees may feel anxious about whether they can perform their roles adequately if IT service quality is lower than the minimum level expected by them to support their assigned tasks. Second, while it may be nice to have delightful internal IT service (i.e., above DSL), it may not be as essential for call-center employees to be able to meet organizational standards for service to external customers and to avoid sanctions associated with failure to meet those standards.

Hence, we expect the effect of IT service quality on call-center employee service quality to change more dramatically when IT service quality increases from below the ZOT to within the ZOT as compared to when IT service quality increases from within to above the ZOT. In other

words, a decrease in IT service quality from a level within the ZOT to below the ZOT will lead to a much greater drop in call-center employee service quality than would a similar decrease in IT service quality from a level above the ZOT to within the ZOT. As such, we propose:

**H2:**     The change in the magnitude of the positive effect of IT service quality on call-center employee service quality will be larger when IT service quality moves from below to within the ZOT than when IT service quality moves from within to above the ZOT.

**Mediating Role of Technology Use and User Satisfaction on the ITSQ-ESQ Link**

Next, we propose that user satisfaction and technology use will mediate the effect of IT service quality on employee service quality. DeLone and McLean (2003) submit that the quality of internal IT services can affect the benefits derived from IT through employees' technology use and satisfaction with the deployed technology. In the call-center context, employee service quality is the key benefit of employees using the deployed IT to serve external customers. Thus, following DeLone and McLean's logic, call-center employees' use of and satisfaction with the deployed IT will mediate the impact of IT service quality on employee service quality. Prior research has shown that the quality of service extended by a provider can affect the recipients' perceptions about the service and their use of the service (e.g., Brady et al. 2005; Zeithaml et al. 1996). Moreover, employees' interaction with service-enabling technologies can affect the quality of service extended by the employees to their customers (e.g., Ray et al. 2005). Therefore,

**H3:**     The positive effect of IT service quality on call-center employee service quality is mediated by employees' (a) satisfaction with the technology and (b) use of the technology.

## METHODOLOGY

**Research Site**

To test the hypotheses empirically, we collected data at multiple time points as part of a multi-source field study at a Chinese telecommunications firm's call center. By the end of 2008,

the firm achieved a subscription base of 457.3 million. To support inquiries from its hundreds of millions of customers, the firm recognized the strategic importance of implementing a CRMT to support its customer service processes in different channels, including its call centers. At the time of data collection, the firm had implemented the CRMT, along with standardized service processes, across all 31 provinces in China.

The subjects are frontline call-center employees who utilize the CRMT to support their interactions with customers. The internal IT function provides services to support the employees' CRMT use. Consistent with most CRMT initiatives, employees in the call center are mandated to use the technology to serve external customers (McCalla et al. 2003). Our interviews with the call center's managers revealed that even though calls were routed to employees randomly and employees are required to use the CRMT during their work, they may spend different amounts of time using the technology to support their interactions with customers. The managers suggested that this variation in the time employees spent using IT occurred due to the degree to which employees relied on their personal service skills and knowledge rather than on the CRMT alone to address specific customer service situations. Our follow-up interviews with the call-center employees further confirmed that they indeed had control over, as well as varied significantly in, the extent to which they spent their time using the CRMT to support their work.

**Measures**

We developed the construct measures that focused on individual call-center employees (the units of analysis in our study) who use the CRMT to serve external customers. We operationalized employees' usage duration of the technology and employee service quality as single-item measures. For all other constructs we used multi-item measures from established scales with minor modifications to fit our study context.

***User Satisfaction.*** User satisfaction was measured using three seven-point semantic differential scales ranging from 1 to 7, adapted from Bhattacherjee (2001): (1) I am very dissatisfied/very satisfied with the use of the CRMT, (2) I am very displeased/very pleased to use the CRMT, and (3) It is absolutely terrible/absolutely delightful to use the CRMT.

***Technology Use.*** Following Rai, Lang, and Welker (2002), we measured technology use as the percentage of employees' work time spent on using CRMT (Use_Time) on a 0–100% scale.

***ZOT Measures.*** For the IT service–related constructs (i.e., ASL, DSL, and IT service quality), we used the three-column ZOT survey format proposed by Parasuraman, Zeithaml, and Berry (1994) and the items adapted for the IT context by Kettinger and Lee (1994) (Appendix A).

To measure ***IT service quality***, we originally intended to adapt all the items for the five dimensions (i.e., tangibles, assurance, reliability, responsiveness, and empathy) of the SERVQUAL scale developed by Parasuraman, Zeithaml, and Berry (1988), which has been adapted to the IT services context by Kettinger and Lee (1994), Jiang, Klein, and Carr (2002), and others. However, the extant literature shows that the original five dimensions proposed by SERVQUAL do not replicate well across studies (e.g., Cronin and Taylor 1992; Gotlieb, Grewal, and Brown 1994). Researchers have hence cautioned that the most appropriate SERVQUAL dimensions should be selected carefully to fit the investigative context (e.g., Olorunniwo, Hsu, and Udo 2006). For instance, Malhotra and Mukherjee (2004) indicated that some dimensions, such as the tangibles dimension that represents visual aspects like the appearance of the facility and personnel, may be irrelevant in certain circumstances when these visual aspects are not routinely accessible to customers in the service delivery process. Parasuraman, Zeithaml, and Berry (1994) found empirical support for merging the empathy dimension with other dimensions like responsiveness and assurance, suggesting the unidimensionality of these dimensions.

Olorunniwo, Hsu, and Udo (2006) also argue that when the service tasks are rather standardized and require little customization, a service dimension that pertains to customization and personal attention (i.e., empathy) may not be as relevant as the other service quality dimensions.

The preliminary investigation that we conducted in this study also suggested that the tangibles and the empathy dimensions are not particularly relevant to the study context. During our initial visits to the call center, the managers and employees described the interactions between the employees and the IT function. In general, when a call-center employee encounters a problem during CRMT use, the IT staff may come to the employee's location to address the issue. However, all IT staff wear the same uniform as the employees, and the employees have little chance or need to visit the physical facility housing the IT function, rendering tangibles a less relevant dimension. Moreover, the CRMT is a standardized technology that requires no customization for any specific service employee; instead, responsiveness to IT-related issues, assurance that these issues are being handled well, and having reliable and dependable IT-related service, would be far more important for these employees' service work than would empathy per se. Also, although the empathy dimension of service quality encompasses other customer-oriented aspects, the results from a pilot study (described later) we conducted to identify the dimensions of IT service quality relevant to our study context showed low internal consistency (coefficient alpha) for empathy, suggesting that it may not be a distinct dimension in our study. Thus, on the basis of prior literature that suggests excluding the empathy dimension when service tasks are standardized and demand little personalization (Olorunniwo et al. 2006), previous findings that empathy may be subsumed under other dimensions (Parasuraman et al. 1994), our discussions with call-center managers and service employees, the nature of our study context, and the findings from our pilot study, we excluded the tangibles and empathy

dimensions in our main study.

*Employee Service Quality.* For this construct, we used a performance score assessed by the firm's quality-assurance personnel. At the research site, all service interactions are recorded, and the quality-assurance personnel systematically review a random sample of these interactions for each employee to evaluate the extent to which his/her service quality conforms to the criteria set by the firm for service interactions. As the company has millions of customers, management recognized the importance of having well-rounded evaluation criteria as the gauge for high-quality service. To accomplish this goal, the firm invited leading marketing scholars and consultants to develop evaluation criteria that focus on whether an employee delivers timely, accurate, reliable, attentive, and courteous service. These dimensions are in accordance with the concepts of assurance, reliability, responsiveness, and empathy underlying the notion of service quality proposed in the literature (Parasuraman et al. 1988). At the end of the month, an overall score, ranging from 0 to 25, is assigned to each employee based on the reviews performed by the quality-assurance personnel throughout the month. We used this overall score as our single-item measure of employee service quality, which is consistent with the approaches employed by Witt, Andrews, and Carlson (2004), who used a similar measure in their study of call-center employees, and by Zeithaml et al. (1996), who also used a single-item measure to evaluate overall  service quality.

*Control Variables.* Prior literature has indicated that employee differences in gender (Roth, Purvis, and Bobko 2010), education (Ng and Feldman 2009), age (Hedge, Borman, and Lammlein 2006), service experience (Crandall, Jackson, and Singer 2003), and technology usage experience (Morris and Venkatesh 2010), may affect job-related outcomes like employee service quality. Similarly, studies also report that individual responses to an information technology may

vary across such personal factors as gender, education, age, functional experience, and technology usage experience (Agarwal and Prasad 1999).

In view of the above, we used multiple demographic variables as controls. Specifically, we collected data from the employees about their gender, age, education level, experience using the CRMT at the focal firm (in months), and the duration of their service experience at the focal firm (in months). To better capture the effect of IT service quality on the three dependent variables (Use_Time, user satisfaction, and employee service quality) across different ZOT levels, we also controlled for the endogenous effect of these variables by including the values of all these variables measured four months prior to the main study, as additional control variables.

**Data Collection**

Data collection consisted of three steps. First, two certified professional translators independently carried out questionnaire translation and back-translation between English and Chinese. Next, we conducted a pilot study to preliminarily examine construct validity and reliability. The instrument used in the pilot study contained measures for all five dimensions of IT service quality. Questionnaires in Chinese were distributed to 35 employees. As expected based on our previous discussions with the managers and employees, responses from the pilot study suggested limited relevance of the tangibles and empathy dimensions for call-center employees' interactions with the IT staff. The reliabilities of the multi-item constructs representing the five IT service quality dimensions were above the 0.70 threshold except for the tangibles and empathy dimensions. As a result, we only retained the assurance, reliability, and responsiveness dimensions in the final survey. We also made minor modifications to some items based on the respondents' comments.

The survey was administered at the beginning of the month (Time 0) to 300 randomly sampled employees in the call center. Each respondent received the instrument with a cover letter explaining the purpose of the study and emphasizing that their responses were confidential and that the results would only be reported in an aggregated format. Each questionnaire was coded with a unique identification number for us to later match data from different sources with regards to each individual employee. In total, 233 respondents returned complete surveys. Four months later (Time 1), we distributed the survey instrument to these 233 respondents and received 195 completed surveys. The firm provided us with employee service quality both at Time 0 and one month after Time 1 (i.e., Time 2). Table 1 summarizes our data-collection timeline.

< Insert Tables 1 and 2 about here >

Table 2 presents the demographic characteristics of the 195 sampled employees. A majority of them were females and had less than a bachelor's degree in terms of education level. This profile is similar to that in prior call-center studies, which reported most call-center employees as being female (e.g., Malhotra and Mukerjee 2004), with education levels lower than a bachelor's degree (Sergeant and Frenkel 2000). Of our total sample, 69, 96, and 30 respondents perceived IT service quality to be below, within, and above their ZOT, respectively.

## DATA ANALYSIS AND RESULTS

### Measurement Model

We evaluated the properties of the measurement model prior to hypothesis testing. Table 3 shows the descriptive statistics, correlations, reliabilities, and average variance extracted. We conducted principal component analysis (PCA) (rotation: direct oblique) to evaluate the measurement model. As shown in Table 4, each item loaded higher on its principal construct than on other constructs, suggesting convergent and discriminant validity (Hair et al. 1998). Cronbach's alpha values and composite reliabilities are all greater than the recommended

threshold of 0.70 (Nunnally and Bernstein 1994), suggesting high internal consistency and reliability for all the scales used. The AVE values of multi-item constructs are also higher than 0.50, suggesting that the observed items explained more variance than the error terms; the square root of AVE for each multi-item construct is also higher than its zero-order correlations with other constructs, thereby supporting discriminant validity (Fornell and Larcker 1981).

< Insert Tables 3 and 4 about here >

Note that while SERVQUAL was originally proposed as having five dimensions (Parasuraman et al. 1988), empirical evidence shows mixed support for this structure. For instance, Cronin and Taylor (1992) found all 22 items of SERVQUAL loaded on one factor; others propose a two-factor structure: one factor consisting of only the tangibles dimension and another factor consisting of the other four dimensions (Gotlieb et al 1994; Wakefield and Blodgett 1999). Gotlieb et al. (1994) conceived these two factors of service quality as the focal stimuli (which a consumer directly responds to) and the contextual stimuli (the background against which the focal stimuli are perceived), and others show empirical evidence supporting this two-factor structure (e.g., Yap and Sweeney 2007). As we excluded the tangibles and empathy dimensions, our results showing that the items for the other three dimensions load on the same factor are consistent with the above literature. [2]

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2. We also conducted confirmatory factor analysis (CFA) using AMOS 5 as a supplementary analysis to gauge further the quality of the measurement model of multi-item constructs (i.e., user satisfaction and IT service quality) that we derived from our PCA (an approach typically used in exploratory factor analysis (EFA)). The CFA results ($x^2$/df=1.854, CFI=0.973, RMSEA=0.06, and SRMR=0.078) provided triangulation evidence on the adequacy of the proposed measurement model. While it would have been ideal for us to conduct EFA and CFA with two different data sets (i.e., two entirely different data sets or two randomly split sub-groups based on a single data set), our research design and sample size prevent us from doing so. However, we were motivated to conduct CFA as a supplementary analysis using the same sample as some methodology scholars suggest performing CFA using the same data set used in EFA as a necessary assessment before moving further to conduct CFA using a different data set (Roy 2010; van Prooijen and van der Kloot 2001). These methodologists (van Prooijen and van der Kloot 2001) have cautioned that, by testing EFA and CFA using different data sets, if there is a lack of correspondence between the EFA and CFA results, we cannot rule out the possibility that the discrepancy is due to using two different data sets. Therefore, recent empirical studies have also adopted this approach to conduct EFA and CFA with the same data set (e.g., Knutson et al. 2009; Shi, Kunnathur, and Ragu-Nathan 2005).

**Hypothesis Testing**

The first three hypotheses (i.e., H1a, H1b, and H2) focus on whether the impact of IT service quality varies as it moves from below to within to above the ZOT. Following the ZOT testing procedure proposed by Zeithaml et al. (1996), we created two dummy variables to test the hypotheses relating to changes in slopes across the three zones. We used dummy variables to indicate if IT service quality perceived by an employee is below, within, or above his/her own ZOT. Specifically, $d_1$ and $d_2$ are dummy variables in the following equation, which represents the relationship between IT service quality and its outcome variables (Y) across the different ZOT levels. According to Zeithaml et al. (1996), the regression equation can be expressed as below:

$$Y = \beta_0 + \beta_{d1}*d_1 + \beta_{d2}*d_2 + \beta_1 * (\text{IT service quality}) + \beta_2 * (d_1* \text{IT service quality}) + \beta_3 * (d_2* \text{IT service quality}) + error$$

Y:   Dependent Variable
$d_1$:   1 when perceived IT service quality is below Adequate Service Level; 0 otherwise
$d_2$:   1 when perceived service quality is above Desired Service Level; 0 otherwise
$\beta_0$:   Constant
$\beta_{d1}, \beta_{d2}, \beta_1, \beta_2, \beta_3$:   Unstandardized regression coefficients

In this equation, the slope is $\beta_1$ inside ZOT, $\beta_1 + \beta_2$ below the ZOT and $\beta_1 + \beta_3$ above the ZOT. Table 5 shows the results of hypothesis testing in terms of the path coefficients and $R^2$ values. Since we have included gender, education, age, technology usage experience, and service experience, as well as the dependent variable measured four months prior to the main study, as control variables, the complete regression equation in our investigative context should be:

$$Y = \beta_0 + \beta_{d1}*d_1 + \beta_{d2}*d_2 + \beta_t * \text{Tech Experience} + \beta_s * \text{Service Experience} + \beta_g * \text{Gender} + \beta_a * \text{Age} + \beta_e * \text{Education} + \beta_c * \text{Controlled DV@T0} + \beta_1 * (\text{IT service quality}) + \beta_2 * (d_1* \text{IT service quality}) + \beta_3 * (d_2* \text{IT service quality}) + error$$

Y:   Dependent Variable
$d_1$:   1 when perceived IT service quality is below Adequate Service Level; 0 otherwise
$d_2$:   1 when perceived service quality is above Desired Service Level; 0 otherwise
$\beta_0$:   Constant
$\beta_{d1}, \beta_{d2}, \beta_t, \beta_s, \beta_g, \beta_a, \beta_e, \beta_c, \beta_1, \beta_2, \beta_3$:   Unstandardized regression coefficients

To assess H1a, H1b, and H2, Model 1 in Table 5 tests the effect of IT service quality on call-center employee service quality below, within, and above the ZOT. To assess H3a and H3b, Models 4-5 in Table 5 include user satisfaction and Use_Time, one at a time, assessing whether these variables mediate the effect of IT service quality on employee service quality. Moreover, since H3a and H3b propose that user satisfaction and Use_Time, respectively, mediate the effect of IT service quality on employee service quality, the hypothesized moderation effect of ZOT on the link between IT service quality and employee service quality (i.e., H1a, H1b, and H2) may be applicable to both user satisfaction and Use_Time. In other words, ZOT may moderate the effect of IT service quality on both user satisfaction and Use_Time, so that the positive impacts of IT service quality on user satisfaction and Use_Time, if any, may be strongest at the level of IT service quality below ZOT compared to within and above ZOT. Similarly, the difference in these impacts could be stronger between below and within ZOT, as compared to the difference between within and above ZOT. As such, Models 2-3 test the effect of IT service quality on user satisfaction and Use_Time across different levels of ZOT.

< Insert Table 5 about here >

**Impact of ITSQ on ESQ across different levels of Zone of Tolerance**

H1a and H1b state that the impact of IT service quality on call-center employee service quality decreases as IT service quality moves upward from below to within to above the ZOT. As discussed above, there could be a similar effect of IT service quality on Use_Time and user satisfaction. Models 1–3 in Table 5 show the differential impact of IT service quality on each of the three dependent variables (i.e., user satisfaction, Use_Time, and employee service quality) across levels of the ZOT. Specifically, IT service quality has a significant positive impact ($\beta_1$) on all three variables. Also, for all three variables, the changes in slope below the ZOT ($\beta_2$) are

positive and significant, suggesting that the influence of IT service quality within the ZOT ($\beta_1$) is significantly weaker than below the ZOT ($\beta_1+\beta_2$). Moreover, for Use_Time (Model 3), the changes in slope above the ZOT ($\beta_3$) are significantly negative; hence, the influence of IT service quality above the ZOT ($\beta_1+\beta_3$) is significantly weaker than within the ZOT ($\beta_1$). These findings collectively suggest a general diminishing pattern of the positive impact of IT service quality on the call-center employees' service quality to customers (supporting H1a and H1b), user satisfaction, and technology use.

**Differences in the Roles of ASL and DSL**

H2 suggests that the changes in the slopes when IT service quality shifts from below to within the ZOT are greater than the changes in slopes when IT service quality shifts from within to above the ZOT. Again, given the proposed mediating role of user satisfaction and Use_Time (i.e., H3a and H3b), we expect a similar effect of IT service quality on both user satisfaction and Use_Time. We examined if the absolute value of $\beta_2$ (i.e., $|\beta_2|$) is greater than the absolute value of $\beta_3$ (i.e., $|\beta_3|$) for each dependent variable. First, for both employee service quality and user satisfaction, $\beta_2$ is positive and significant, whereas $\beta_3$ is not significant. Hence, H2 is supported. However, this is not exactly the case for Use_Time; when considering the beta coefficient for Use_Time, the absolute value of $\beta_2$ is only slightly larger than the absolute value of $\beta_3$ ($|\beta_2|$=0.025 vs. $|\beta_3|$=0.024); hence, for Use_Time, the change in slope when IT service quality shifts from below to within the ZOT is not necessarily significantly greater than the change in slope when IT service quality shifts from within to above the ZOT. To develop a better understanding of the identified influence patterns of the ZOT, we plotted the above results in Figures B1, B2 and B3. These patterns are significantly different from those identified in the

external services context (Figures A1, A2, & A3).

<center>< Insert Figures B1, B2, and B3 about here ></center>

**Mediation Mechanisms**

H3a and H3b, respectively, concern whether user satisfaction and Use_Time mediate the effect of IT service quality on employee service quality. According to Baron and Kenny (1986), if (a) X impacts Z, and (b) Y impacts Z, we can assess whether Y mediates X's effect on Z by including Y as a control variable when regressing Z on X. If the result shows that X's impact on Z decreases due the inclusion of Y and that Y significantly affects Z, we can then conclude that Y mediates the impact of X on Z. Table 5 shows that (a) IT service quality affects employee service quality differentially across different ZOT levels (Model 1) and that (b) IT service quality also affects user satisfaction and Use_Time differentially across different ZOT levels (Models 2 & 3). Based on Models 1–3, Models 4 and 5 test whether user satisfaction and Use_Time mediate the differential effect of IT service quality on employee service quality. This was done by adding each of the two variables (i.e., user satisfaction and Use_Time) as an additional control variable in Model 4 and Model 5, respectively. The results indicate that while user satisfaction did affect employee service quality significantly (Model 4), Use_Time had no such impact (Models 5).

Furthermore, $\beta_1$ and $\beta_2$ in Model 1 dropped significantly after including user satisfaction as the control variable (Model 4). In particular, $\beta_1$ and $\beta_2$ of IT service quality for employee service quality are 0.88 and 0.83, respectively (Model 1); however, when we controlled the effect of user satisfaction on employee service quality, $\beta_1$ became insignificant, and $\beta_2$ dropped to 0.75 (Model 4), thereby suggesting a partial mediation effect. Thus, although H3b is rejected because Use_Time had no mediating effect, H3a is supported, as user satisfaction partially mediated the effect of IT service quality on employee service quality across different ZOT levels.

**DISCUSSION AND IMPLICATIONS**

In this research, we draw on the theory of administrative behavior to formulate several hypotheses and conduct empirical analyses to generate insights into (1) how internal IT service quality affects (a) the quality of service that call-center employees (or internal customers) provide to external customers, and (b) call-center employees' satisfaction with and use of the deployed IT, across different levels of the ZOT; (2) the differential roles of adequate service level (ASL) and desired service level (DSL) in shaping call-center employees' response to IT service quality; and (3) the mechanisms through which IT service quality impacts call-center employee service quality. Given the aforementioned economic and societal importance of the call-center industry, our findings bear significant values for both theory and practice. We now discuss the key contributions of our research in the following section.

**ZOT's Role in Understanding IT Service Quality's Effect on Service Employees**

Our findings contribute to service marketing theory by demonstrating the need for and value of considering the unique characteristics of internal customers when applying concepts derived from external marketing contexts, such as the ZOT, to an internal marketing setting such as a call center. By considering call-center employees as customers of the internal IT function, we investigated the nature and the effects of internal customers' unique circumstances. Specifically, viewing the internal-customer setting through the lens of the theory of administrative behavior, we examined patterns of the ZOT's influence on the relationship between internal IT service quality and employee service quality to external customers in an IT-enabled call-center context.

Findings from our investigation offer strong evidence of two distinct patterns that we hypothesized regarding the influence of IT service quality across different levels of the ZOT.

First, there is a *diminishing positive impact* of IT service quality on employee service quality, user satisfaction, and technology use, from below to within to above the ZOT. Second, we showed that internal customers' ASL plays a more pivotal role than their DSL in shaping the extent of the positive returns from IT service quality for call-center employees' service performance (i.e., employee service quality) and their interactions with the deployed technology (i.e., user satisfaction and technology use). As such, the difference in the positive response between employees below and within the ZOT is significantly larger than the difference in the positive response between employees within and above the ZOT.

Both these patterns of influence have important implications for call centers' investments directed at improving their IT service quality and the return on these investments that are likely to result in terms of call-center employees' service quality, user satisfaction, and technology use. Specifically, call-center managers should recognize that ensuring the IT service support for their employees meets the minimum threshold (i.e., ASL) is likely to generate greater benefits than increasing IT service quality above ASL. Managers should evaluate the benefits against the costs of increasing IT service quality by considering how both the marginal benefits and costs associated with increasing IT service quality change below, within, and above the ZOT.  In other words, call-center managers are likely to do well by placing emphasis on at least consistently meeting employees' ASL regarding internal IT service quality as this level of IT service quality will equip call-center employees to meet performance standards expected of them. We caution that managers should not misinterpret our findings to suggest that the optimal level of IT service quality is ASL but rather should recognize that the marginal benefits can be expected to decline beyond ASL.  Apart from recognizing that the benefits from increasing IT service quality decline beyond ASL, call-center managers should proceed to evaluate the magrinal net benefits (i.e., the

marginal benefits and costs) of continuing to enhance IT service quality beyond ASL and determine if these magrinal net benefits are susbtantial given competing resource allocation priorities to support the work of call-center employees.

Importantly, the influence patterns of the ZOT we found for internal customers in call centers appear to be different from, and almost opposite to, those identified in prior studies (which are typically conducted with external customers). In particular, the pattern of the ZOT's influence for positive variables in external marketing settings is either a positive linear pattern (Figure A1) or an upward increasing pattern (Figures A2 & A3) as service quality moves from below to within to beyond the ZOT. In contrast, findings from our study reveal an *upward decreasing* influence pattern of the ZOT for all the positive variables (i.e., employee service quality, user satisfaction, and technology use) for call-center employees (Figures B1, B2, and B3, respectively). These findings serve to reinforce our view that a conscious conceptualization of the distinct characteristics of internal-service environments such as in a call center (vis-à-vis external-service contexts that have dominated scholarly investigations to date) could lead to commensurate differences in how the recipients of internal IT service quality respond to incremental improvements in it.

## IT Success and the Mediation Mechanisms through which IT Service Quality affects Employee Service Quality

This study also contributes to the IT success literature. First, it is among the first to provide evidence about the effects of IT service quality on user satisfaction and technology use. More importantly, while the model proposed by DeLone and McLean (2003) has long implied that user satisfaction and technology use are two important mediators through which IT service quality exerts its downstream impact on the net benefits of technology, to our knowledge this study is the first to empirically test these mediation mechanisms. Specifically, our findings

suggest that call-center employees' user satisfaction partially mediates the effect IT service quality on employee service quality, whereas employees' technology use does not.

This differential mediation effect is perhaps attributable to the mandatory technology use setting of our investigation and, for that matter, most call-center operations. Recent IT success literature has indicated that, in IT-enabled service contexts, service employees' performance could be affected by a variety of factors, including employees' technology use, satisfaction with the technology, personal service skills and knowledge, prior performance, and so on (e.g., Heskett et al. 1997). Moreover, the performance effects of resources accessed through IT use and those that are embodied in employees (e.g., personal service skills and knowledge) are substitutive in nature (Hsieh et al. forthcoming). Hence, employees may draw upon different kinds of resources (e.g., IT-based and embodied resources) to deliver quality service and satisfy their customers. As such, even though their technology use is mandatory, they may vary in terms of the *extent* to which they use the technology.

Moreover, scholars have conceived UserSat from the needs fulfillment perspective and argued that employees' satisfaction with implemented CRMT reflects the extent to which their need to provide quality service that satisfies their customers is facilitated by their technology use (e.g., Au et al. 2008). Some have further differentiated user satisfaction from technology use in mandatory contexts by arguing that while employees' technology use could be influenced by organizational mandate and its effect on employee performance is interchangeable with the effect of other embodied factors (e.g., personal service skills and knowledge), user satisfaction, which reflects the extent to which employees' work needs are fulfilled, is independent of the organizational mandate (Hsieh et al. forthcoming). Use_Time and UserSat, in essence, represent different types of IT success in mandatory contexts. Our findings with regard to the differential

mediation effects between UserSat and Use_Time provide important empirical support for this critical distinction between the psychological and behavioral success when IT use is mandated.

Lastly, prior literature shows that factors like job satisfaction mediate the impact of human resources on employee job performance (Schneider et al. 1998, 2009). Our work complements this research by identifying user satisfaction as the mediator through which internal IT service quality affects call-center employees' service quality.

- **Differential Effects of User Satisfaction and Technology Usage Behaviors**

Our results reveal two noteworthy differences between user satisfaction and technology use (Use_Time), which warrant elaboration. First, the pictorial illustrations in Figures B2 and B3 suggest a difference in the influence pattern of the ZOT between call-center employees' user satisfaction and Use_Time. For both variables, the effect of IT service quality generally displays a diminishing pattern as IT service quality increases. For Use_Time, there is a significant decrease in the effect of IT service quality when moving from within the ZOT to above the ZOT. For user satisfaction, however, there is no such change in the effect/slope. In other words, there are two inflection points for Use_Time, but there is only one for user satisfaction. Once the quality of the provided IT service goes beyond the desired service level, the marginal utility of additional IT service quality remains the same for employees' user satisfaction but drops for their Use_Time. One possible explanation is that an increase in usage behaviors requires more (physical) effort from employees who use the technology, whereas increase in positive psychological evaluations requires almost none. Given that the provided internal service has surpassed the desired level and that longer Use_Time may require more effort from employees, they may not necessarily keep increasing their technology use as much as when the provided IT service quality is below the desired level.

Finally, we notice that the pattern for the ZOT's influence on employee service quality (Figure B1) is the same as the pattern for user satisfaction (Figure B2) but different from the pattern for technology use (Figure B3). This result may be attributed to the fact that UserSat mediates the effect of IT service quality on employee service quality but Use_Time does not.

## LIMITATIONS AND FUTURE RESEARCH

As is typical of all empirical studies, our study also has its limitations. First, our study was conducted in one call center of a large Chinese telecom firm. While we believe that the nature of employee-customer interactions is similar across many service industries, the dynamics of social interactions could vary across cultural settings. Moreover, since China has become one of the most important emerging markets, multi-national firms that are interested in the Chinese market should pay attention to research findings pertaining to this region. Further research can verify if our findings are applicable to call centers in other cultural and economic settings, as well as to other internal marketing contexts.

Prior ZOT studies have examined the effect of (external) service quality on both positive-outcome variables (e.g., satisfaction, loyalty, repurchase, etc.) and negative-outcome variables (e.g., complaining, switching, etc). However, the present study only investigated the effect of internal service quality on positive-outcome variables (i.e., user satisfaction, technology use, and employee service quality). Future research can incorporate a broader range of variables, including both positive- and negative-outcome variables, when studying the pattern of the ZOT's influence in other internal-service contexts. While we evaluated the changes in positive-outcome variables as ITSQ increases from below to within to above the ZOT, furture research can also extend our work to evaluate the net benefits (i.e., benefits versus costs) of increasing ITSQ from below to within to above the ZOT.

Lastly, research on the ZOT has tended to investigate both the tangible and intangible aspects of service quality on customer responses (e.g., Yap and Sweeny 2007). However, due to the unique nature of the interactions between the IT function and call-center employees in our study, we only captured the intangible aspects of internal service quality. In future studies, scholars should investigate internal services that have tangible components and examine whether tangible and intangible aspects share similar patterns for the ZOT's influence.

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**Figures A1, A2, & A3:**
**ZOT Influence Patterns for Positive Dependent Variables in External Marketing Contexts**



| Figure A1 | Figure A2 | Figure A3 |
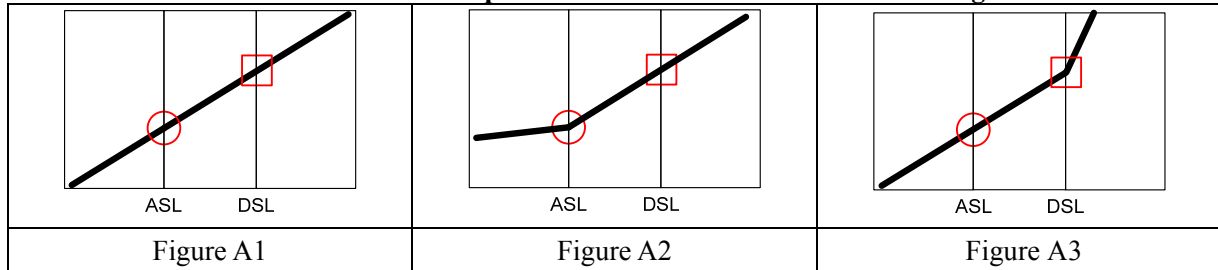
1. X-axis represents service quality to *external* customers.
2. Y-axis represents the dependent variables of consideration.
3. Circles denote the points where service quality meets *external* customers' adequate service level (ASL)
4. Squares denote the points where service quality meets *external* customer' desired service level (DSL).

**Figures B1, B2, & B3:**
**Pictorial Illustration of the effect of IT service quality below, within, and above the ZOT**



| Dependent Variable | | |
|---|---|---|
| **Employee Service Quality** | **User Satisfaction** | **Use_Time** |
| Figure B1 | Figure B2 | Figure B3 |
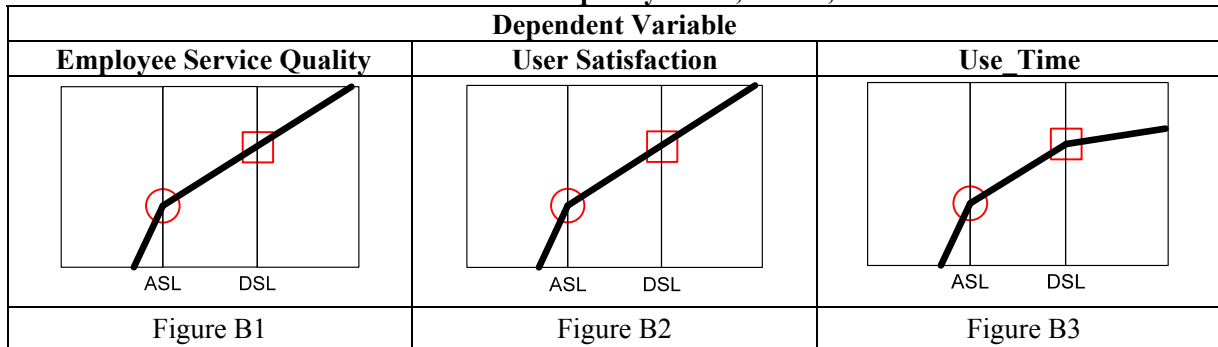
1. X-axis represents internal IT Service Quality (ITSQ).
2. Y-axis represents the dependent variables of consideration.
3. Circles denote the points where ITSQ meets call-center employees' adequate service level (ASL)
4. Squares denote the points where ITSQ meets call-center employees' desired service level (DSL).

**Table 1—Data Collection Timeline**

| Time / Source | Time 0 (Control Variables) | Time 1 (Four Months after T0) | Time 2 (One Month after T1) |
|---|---|---|---|
| Employee Data | % of Time Using IT<br><br>User Satisfaction<br><br>**(233 respondents)** | Adequate Service Level<br>Desired Service Level<br>Perceived IT Service Quality<br><br>% of Time Using IT<br><br>User Satisfaction<br><br>**(195 respondents)** | - |
| Firm Data | Employee Service Quality | - | Employee Service Quality |
| Demographics | Age, Gender, Education Level, CRMT Usage Experience, Service Experience | - | - |

**Table 2—Sample Demographics**

| | Category | Percentage |
|---|---|---|
| Education | Senior High School | 38.5% |
| | College (Associate Degree) | 59.9% |
| | Bachelor's or Higher | 1.6% |
| Gender | Male | 4.8% |
| | Female | 95.2% |
| | **Mean** | **Std. Deviation** |
| Age (years) | 23.27 | 2.64 |
| CRMT Usage Experience (months) | 13.94 | 4.19 |
| Service Experience (months) | 21.96 | 12.33 |

**Table 3—Descriptives, Reliabilities, and Zero-Order Correlations**

| | Mean | S.D. | α | AVE | Sqr of AVE | Gen-der | Age | Edu | Tech. Exp. | Serv. Exp. | ASL | DSL | ITSQ | Use_ Time | User Sat |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Gender | 1.05 | .22 | NA | NA | NA | | | | | | | | | | |
| Age | 23.27 | 2.64 | NA | NA | NA | .12 | | | | | | | | | |
| Edu | 3.63 | .516 | NA | NA | NA | -.13 | .11 | | | | | | | | |
| Tech.Exp | 13.94 | 4.19 | NA | NA | NA | .06 | **.30** | -.11 | | | | | | | |
| Serv.Exp. | 21.96 | 12.3 | NA | NA | NA | **.21** | **.43** | **-.27** | **.51** | | | | | | |
| ASL | 5.52 | 1.15 | .97 | 0.79 | 0.89 | .06 | -.09 | -.06 | -.01 | .05 | | | | | |
| DSL | 7.05 | 1.39 | .97 | 0.79 | 0.89 | .11 | .04 | -.10 | .07 | .11 | **.38** | | | | |
| ITSQ | 5.81 | 1.79 | .98 | 0.80 | 0.89 | .13 | -.06 | -.13 | .02 | .07 | **.47** | **.46** | | | |
| Use_Time | 77% | 19% | NA | NA | NA | .06 | -.05 | .10 | -.05 | -.04 | **.25** | **.24** | **.21** | | |
| UserSat | 3.94 | 1.19 | .95 | .86 | .93 | .04 | .00 | -.09 | .14 | .08 | **.45** | **.23** | **.43** | **.15** | |
| ESQ | 16.36 | 5.72 | NA | NA | NA | -.01 | -.08 | .01 | -.15 | -.11 | **.23** | .11 | .12 | .08 | .11 |

\* Figures in **bold** indicate significant correlations (p<.05, two tailed).
\*\* AVE=Average Variance Extracted; Sqr of AVE=Square Root of AVE; Tech.Exp.=CRMT Usage Experience; Serv.Exp.=Service Experience; ASL=Adequate Service Level; DSL=Desired Service Level; ITSQ=IT Service Quality; Use_Time=% of Work Time Using CRMT; UserSat=User Satisfaction; ESQ=Employee Service Quality

**Table 4—PCA Factor Loadings and Cross-Loadings**

| | 1 | 2 | 3 | 4 |
|---|---|---|---|---|
| IT_SrvQual_Assurance_1 | **0.84** | 0.08 | -0.04 | 0.00 |
| IT_SrvQual_Assurance_2 | **0.81** | 0.10 | -0.03 | 0.08 |
| IT_SrvQual_Assurance_3 | **0.83** | 0.03 | 0.07 | 0.23 |
| IT_SrvQual_Assurance_4 | **0.89** | 0.01 | -0.04 | 0.11 |
| IT_SrvQual_Resonsiveness_1 | **0.93** | -0.08 | -0.17 | -0.04 |
| IT_SrvQual_Resonsiveness_2 | **0.94** | 0.00 | -0.15 | 0.02 |
| IT_SrvQual_Resonsiveness_3 | **0.90** | -0.03 | -0.02 | 0.06 |
| IT_SrvQual_Resonsiveness_4 | **0.87** | 0.03 | -0.08 | 0.01 |
| IT_SrvQual_Relaibility_1 | **0.77** | 0.09 | 0.13 | -0.25 |
| IT_SrvQual_Relaibility_2 | **0.72** | 0.09 | 0.21 | -0.23 |
| IT_SrvQual_Relaibility_3 | **0.72** | 0.03 | 0.17 | -0.21 |
| IT_SrvQual_Relaibility_4 | **0.72** | -0.05 | 0.18 | -0.14 |
| IT_SrvQual_Relaibility_5 | **0.68** | 0.14 | 0.22 | -0.12 |
| User Satisfaction_1 | -0.02 | **0.90** | 0.11 | -0.02 |
| User Satisfaction_2 | 0.00 | **0.95** | -0.05 | -0.02 |
| User Satisfaction_3 | 0.03 | **0.93** | -0.09 | 0.05 |
| % of Time Using the IT | -0.03 | 0.02 | **0.89** | 0.13 |
| Employee Service Performance | 0.04 | -0.01 | 0.14 | **0.92** |

**Table 5—Testing the Moderation Effect of the ZOT**

| | Direct Effect on ESQ | Direct Effect on UserSat & Use_Time | | Mediation Effect via UserSat & Use_Time | |
|---|---|---|---|---|---|
| | **Model 1** | **Model 2** | **Model 3** | **Model 4** | **Model 5** |
| **Dependent Variable (DV)** | **Employee Service Quality** | **User Satisfaction** | **Use_Time** | **Employee Service Quality** | **Employee Service Quality** |
| <u>**Constant & Control Variables**</u> | | | | | |
| $B_0$: **Constant** | **7.53 (1.95)** [b] **\*\*** | **1.07 (0.44) \*\*** | **0.41 (0.13) \*\*** | **8.14 (2.09) \*\*** | **9.33 (2.45) \*\*** |
| $\beta_t$: **CRMT Usage Experience** | -1.06 (0.91) [c] | 0.13 (0.10) | -0.01 (0.02) | -1.15 (0.88) | -0.85 (0.87) |
| $B_s$: **Service Experience** | -0.15 (0.65) | 0.01 (0.09) | -0.02 (0.02) | -0.14 (0.63) | -0.24 (0.58) |
| $B_g$: **Gender** | -0.70 (0.27) | -0.10 (0.35) | 0.08 (0.07) | -0.77 (0.91) | -0.87 (0.91) |
| $B_{ad1}$: **Age** | -0.09 (0.49) | 0.00 (0.09) | -0.01 (0.02) | -0.04 (0.49) | -0.01 (0.43) |
| $B_e$: **Education** | -0.31 (0.47) | -0.09 (0.09) | 0.01 (0.02) | -0.33 (0.46) | -0.21 (0.42) |
| $B_c$: **Controlled DV @ Time 0** [a] | **0.39 (0.09) \*\*** | **0.47 (0.10) \*\*** | **0.44 (0.11) \*\*** | **0.38 (0.10) \*\*** | **0.41 (0.10) \*\*** |
| $B_{d1}$: **d1** | 0.54 (0.43) | 0.09 (0.15) | 0.03 (0.03) | 0.52 (0.43) | 0.50 (0.41) |
| $B_{d2}$: **d2** | 0.07 (0.06) | 0.37 (0.27) | -0.06 (0.05) | 0.06 (0.05) | 0.05 (0.06) |
| <u>**Mediator**</u> | | | | **User Satisfaction** | **Use_Time** |
| $\beta_m$: **Mediator** | | | | **0.64 (0.31) \*** | 1.67 (2.15) |
| **R-square** | 14.2 % | 42.5 % | 24.1 % | 16.3 % | 14.8 % |

| <u>**IT Service Quality across ZOT levels**</u> | | | | | |
|---|---|---|---|---|---|
| $\beta_1$: **Slope within the ZOT** | **0.88 (0.39) \*** | **0.27 (0.10) \*\*** | **0.033 (0.012) \*\*** | 0.62 (0.41) | **0.88 (0.40) \*** |
| $\beta_2$: <u>**Change in Slope below the ZOT**</u> | **0.83 (0.37) \*** | **0.15 (0.05) \*\*** | **0.025 (0.012) \*** | **0.75 (0.36) \*** | **0.81 (0.38) \*** |
| $\beta_3$: <u>**Change in Slope above the ZOT**</u> | -0.10 (0.29) | -0.07 (0.06) | **-0.024 (0.011) \*** | -0.04 (0.24) | -0.04 (0.25) |
| **R-square** | 18.5 % | 48.5 % | 29.3 % | 19.2 % | 18.9 % |
| **Δ R-square** | 4.3 % | 6.0 % | 5.2 % | 2.9 % | 4.1 % |
| *Significance of F-Test (P-Value)* | **0.024 \*** | **0.000 \*\*** | **0.005 \*\*** | 0.092 | **0.029 \*** |
| **Hypothesis Supported?** | **H1a(√) H1b(√) H2(√)** | | | **H3a(√) Partial Mediation** | **H3b(×) No Mediation** |

a. Dependent Variable measured at Time 0 to control for and rule out its impact.  NOTE: \* p<0.05  \*\* p<0.01
b. Significant coefficients are highlighted in bold.
c. Numbers without parentheses represent the unstandardized beta coefficients. Numbers inside parentheses represent corresponding standard errors.

**Appendix A—Operationalization of the IT ZOT Service Quality Constructs**

**IT ZOT ServQual's Anchor Questions and Format for Item Descriptions** (Adapted from Kettinger and Lee 2005):

Minimum Service Level—The expected *minimum* level of service performance you consider adequate.

Desired Service Level—The level of service performance you desire.

| Regarding the Service Offered by the IT Service Staff | My Minimum Service Level Is<br>Low　　　Middle　　　High | | | | | | | | | My Desired Level of Service Is<br>Low　　　Middle　　　High | | | | | | | | | My Perception of Service Quality by the IT Staff Is<br>Low　　　Middle　　　High | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 |

**Item Descriptions**

**When it comes to　　　　　　　　　　　　　　　　[the Reliability dimension]**

1. Providing service as promised…

2. Dependability in handling customer's service problems…

3. Performing service right at the first time…

4. Providing services at the promised time…

5. Maintaining reliable technology and system…

**When it comes to　　　　　　　　　　　　　　　　[the Responsive dimension]**

1. Keeping customers informed about when service will be made…

2. Prompt service to customers…

3. Willingness to help customers…

4. Readiness to respond to customers' requests…

**When it comes to　　　　　　　　　　　　　　　　[the Assurance dimension]**

1. IT staff whose behaviors install confidence in users...

2. Making users feel comfortable and safe during their interactions with IT staff…

3. IT staff who are consistently courteous…

4. IT staff who have the knowledge to answer employee users' questions