

# Impacts of Information and Communication Technology Implementations on Employees' Jobs in Service Organizations in India: A Multi-Method Longitudinal Field Study

Viswanath Venkatesh

Information Systems Department, Walton College of Business, University of Arkansas, Fayetteville, AR 72701, USA, vvenkatesh@vvenkatesh.us

Hillol Bala

Operations and Decision Technologies Department, Kelley School of Business, Indiana University, Bloomington, IN 47405, USA, hbala@indiana.edu

Tracy Ann Sykes

Research School of Business, College of Business and Economics, Australian National University, Canberra, ACT 0200 Australia, tracy@tracyannsykes.com

India is an important frontier for economic growth, investments, and development. The service sector, like the manufacturing industry, in India is booming. Following the trend of their western counterparts, service organizations in India are implementing enterprise-level information and communication technologies (ICTs) to support service processes. In this paper, we used socio-technical systems theory to develop hypotheses about the effects of ICTs on the five job characteristics, i.e., skill variety, task identity, task significance, autonomy, and feedback, in the job characteristics model (JCM) in a service organization (a bank) in India. We also tested the entire JCM that relates job characteristics to job satisfaction and job performance via various mediators and moderators. In a 32-month longitudinal field study of 1743 employees, we gathered one wave of data before an ICT implementation and two waves after the implementation. We found that, although the ICT enriched employees' job characteristics, employees reported significantly lower job satisfaction and job performance. To understand this puzzling finding, we conducted a qualitative study and identified four contextual forces that contribute to these results and hinder successful implementation of ICTs in the service sector in India and, possibly, other developing countries: environmental barriers, learning difficulty, culture shock, and employee valuation.

*Key words:* information and communications technology (ICT); ICT implementation; developing countries; India; job characteristics; job outcomes; service; service organizations

*History:* Received: May 2007; Accepted February 2009 by Cheryl Gaimon, after 2 revisions.

## 1. Introduction

There have been two great shifts in global power over the past 400 years. The first was the rise of Europe, which around the 17th century became the richest, most enterprising and ambitious part of the world. The second was the rise of the United States, in the late 19th and early 20th centuries, when it became the single most powerful country in the world, the globe's decisive player in economics and politics ... For centuries, the rest of the world was a stage for the ambitions and interests of the West's great powers. China's rise, along with that of India ... represents the third great shift in global power ... (Zakaria 2005).

Billions of dollars are spent annually on information and communication technology (ICT) implementations in developing countries, such as India and China (UNDP 2004, Zakaria 2006). Such ICT implementations play an important role in fostering socio-economic development in these countries (UNDP 2004). In particular, ICTs have been suggested as a key building block in bringing better quality of life, education, health care, and government to these countries (UN Millennium Project 2005). One of the reasons for such large investments in technologies is foreign investors' interest in these countries as new frontiers for corporate expansion via a physical presence or outsourcing (Roberts and Arndt 2005, Smith

and Hallward-Driemeier 2005, Zakaria 2006). It is because of these foreign direct investments (FDIs) and other favorable factors (e.g., economic reforms) that developing countries, especially India and China, are now among the fastest growing economies in the world (Rajat 2005, Zakaria 2005, 2006). Beyond the broad benefits expected, ICT implementations in organizations in these countries are an important avenue for upgrading employees' skills and creating better career opportunities (Rubery and Grimshaw 2001). It is thus important to understand the effects of ICT implementations on employees' jobs in these countries.

There is a rich body of literature that has investigated the impact of ICTs on operational performance of organizations in general (e.g., Banker et al. 1990, Cotteleer 2006, Cotteleer and Bendoly 2006, Gaimon 1988, Jacobs and Bendoly 2003, Mabert et al. 2000, McAfee 2002) and service organizations in particular (e.g., Napoleon and Gaimon 2004). There is another body of research that has investigated the impacts of ICTs on employees' jobs (Barley 1986, Brass 1985, or Burk Burkhardt 1994, Edmondson et al. 2001, Gaimon 1997, Kraut et al. 1989). Notwithstanding the vast body of research in these areas, there is a dearth of research on the impact of ICTs on employees' jobs (Venkatesh and Bala 2008, Venkatesh et al. 2003, 2007) in developing countries, particularly in the service sector (Venkatesh 2006). The service sector in developing countries has traditionally been less ICT intensive (see Napoleon and Gaimon 2004) because the justification related to costs typically relevant in developed countries (Fung 2008) does not hold in developing countries due to the low cost of labor in these countries. This thus presents an opportunity to have a positive impact under the right set of circumstances.

Much prior research has questioned the generalizability of theories and empirical findings of research in developed countries to developing countries because of the unique socioeconomic, cultural, and regulatory conditions in the latter (Kirkman and Shapiro 1997, Lachman et al. 1994, Rosenzweig 1994). Similarly, there have been calls for research on global aspects of operations and technology management in the production and operations management literature (Chakravarty et al. 1997). Such research will shed light on important contextual factors and enrich our understanding of the phenomenon of interest (Johns 2006). Service organizations in developing countries are now implementing complex, enterprise-level ICTs<sup>1</sup> in response to highly competitive and dynamic business environments. It is not clear how these technologies, developed primarily to support the service processes of organizations in developed countries (Davenport 1998), will affect employees' jobs in developing countries. While all types of service organizations are important, they are also quite different from one

another. Of the many types, the banking industry is recognized as one of the largest (Fung 2008), a frontier for ICT leadership and critical in helping developing economies grow. Therefore, from a scientific perspective, there is a need to understand the impact of ICTs on employees' jobs in service organizations, particularly banks, in developing countries.

Against the backdrop of the above-described gaps and calls for research, we seek to understand the impact of ICTs on employees' job characteristics and outcomes in a service organization—i.e., a bank—in India. In particular, we build on the job characteristics model (JCM; Hackman and Oldham 1980) and draw from socio-technical systems (STS) theory (e.g., Avgerou et al. 2004) to understand the role of ICT implementations in service organizations in developing countries. Specifically, we seek to understand: (1) how an ICT implementation will influence job characteristics—i.e., skill variety, task identity, task significance, autonomy, and feedback; and (2) whether these characteristics will influence employees' psychological states and important job outcomes as suggested in the JCM and found in prior research conducted in studies of ICT implementations in the developed world (e.g., Morris and Venkatesh 2010). We conducted a field study over a 32-month period in a bank in India and found that, consistent with our expectations, the ICT had a positive influence on job characteristics, but, contrary to our expectations, after the ICT implementation, the effects of job characteristics on psychological states and job outcomes were negative. In order to understand this surprising finding, we conducted a qualitative study to discover underlying reasons for the diminished job satisfaction and job performance. Our findings suggest that, while ICTs may enhance employees' core job characteristics, it lowers job satisfaction and job performance in a service organization in India because of important contextual factors.

Our work makes key contributions to the streams of research on both ICT implementation and job characteristics. We contribute to the service management literature by offering insights on challenges that service organizations, particularly banks, in developing countries, particularly India, may face while implementing ICTs to support their business processes. Further, this work enriches our understanding of the impacts of ICT implementations in developing countries. By focusing on job characteristics and job outcomes, we extend the nomological network around the core phenomenon of ICT implementations. With regard to JCM, while much prior research on the JCM has been conducted primarily in North America, there have been a few studies outside North America as well (e.g., Birnbaum et al. 1986, Sankar and Yeong 1997). In general, these studies have

supported the JCM, indicating the robustness of the model. By examining the boundary conditions of the JCM and the factors contributing to the explanation of job outcomes in situations of organizational change tied to ICT implementation in developing countries, we enrich this literature base by providing a central role for the context of a service organization—i.e., a bank—in India (Johns 2006). Finally, our two-step approach to theory development provides an opportunity for inductive theory development in light of firmly held assumptions and propositions of the JCM not being supported in the context, thus allowing us to greatly enrich our understanding of this topic by breaking away from traditional thought (Alvesson and Karreman 2007, Locke 2007).

## 2. Theory

In this section, we first discuss the JCM that serves as the theoretical foundation for this work. We then discuss the basics of STS theory. We follow this with a discussion of the generalizability of the JCM in India, particularly the importance of replicating the JCM in India where there have been few tests of the model. Finally, we develop the hypotheses related to the effects of an ICT implementation on job characteristics.

### 2.1. JCM

Hackman and Oldham (1975, 1980) introduced the JCM to explain how and why core job characteristics influence key job outcomes, such as job satisfaction and job performance. The model posits that organizations can encourage positive employee attitudes and enhanced quality of work by enriching a job along five *job characteristics*—i.e., *skill variety*, *task identity*, *task significance*, *task autonomy*, and *feedback*. *Skill variety* is the degree to which a job requires a variety of challenging skills and abilities; *task identity* is the degree to which a job requires completion of a whole and identifiable piece of work; *task significance* is the degree to which the job has a perceivable impact on the lives of others, either within the organization or the world at large; *autonomy* is the degree to which the job gives the worker freedom and independence in scheduling work and determining how the work will be carried out; and *feedback* is the degree to which a worker gets information about the effectiveness of his or her efforts, either directly from the work itself or from others (Hackman and Oldham 1980). These core job characteristics influence three *critical psychological states*—i.e., *experienced meaningfulness of work*, *experienced responsibility for work outcomes*, and *knowledge of the results*—that in turn influence *affective personal work outcomes*—i.e., high internal work motivation, high growth job satisfaction, high general job satisfaction, high work effectiveness (i.e., job performance), and low absenteeism rates.

### 2.2. Technology and JCM

The relationship between organizational technologies and job characteristics, as noted earlier, has been a topic of interest for many years (Dewett and Jones 2001, Gaimon 1997, Gephart 2002, Hulin and Roznowski 1985). Although there is research suggesting that job characteristics can influence technology (Slocum and Sims 1980, Thompson 1967), much research suggests that technology influences employees' job characteristics (see Morris and Venkatesh 2010), which is our stand as well. On the one hand, some technologies can constrain a job by standardizing and structuring work processes, limiting the number of ways an employee can perform his or her job, and restricting the information and resources required to perform the job (Boudreau and Robey 2005, Hackman and Oldham 1980, Morris and Venkatesh 2010, Orlikowski 1996, Rousseau 1977). On the other hand, technologies can increase uncertainty in the work environment, particularly if a technology is radically different from those to which employees are accustomed. This, in turn, can positively influence some aspects of job characteristics (e.g., skill variety and task significance) as employees will need to develop a variety of skills for handling unpredictable job situations and may perceive their job as highly significant (Brass 1985, Morris and Venkatesh 2010). Our position in this paper is consistent with the latter theoretical argument as we suggest that enterprise-level ICTs will have a positive influence on employees' job characteristics and job outcomes in a service organization in India.

### 2.3. STS Theory

We draw on STS theory (Avgerou et al. 2004, Bostrom and Heinen 1977) to explain how an ICT implementation in a service organization in India influences employees' job characteristics and job outcomes. STS theory offers a framework to help understand the interdependencies between the human and technology factors of modern organizations (e.g., Bostrom and Heinen 1977). The STS theoretical perspective was developed in response to findings that organizations were not attaining expected benefits from new technology implementations. STS theory notes that organizations comprise two sub-systems—namely, a social system and a technical system (Cherns 1976, Mumford 2000). The social sub-system comprises the structural and human elements in an ICT, while the technical sub-system includes the technology and tasks that individuals will perform using the ICT (Avgerou et al. 2004). Technical systems typically seek to maximize task accomplishment, while social systems focus on improving quality of work life. STS theory posits that, EA while implementing technologies, the goal should be the joint optimization of the social and technical systems. The joint optimization or the fit between the

social and technical systems can only be achieved when human needs are faithfully considered during the implementation of a technology. It is the fit between these two sub-systems that influences the success of an implementation. Fit occurs when a design process optimizes both subsystems. Imbalance in the two systems leads to negative outcomes, such as reduced effectiveness (Holman et al. 2005). Bostrom and Heinen (1977) showed how the theory could be applied to ICT implementation in an organization. Appendix SA1 presents a pictorial representation of STS theory. The figure in the appendix illustrates the interactions among social structure, people, technology, and tasks. It shows how introduction of a new technology can influence other subsystems. Technology is used to perform tasks and when there is a new technological system, employees must not only learn how to communicate with the system but also learn how to perform old tasks using the new technology. Organizational structure is often influenced by new technology implementations, in so much as a new technology can alter organizational form and functions.

STS theory has been used at the individual, group, and organizational levels to study various phenomena, such as job satisfaction (Rousseau 1977), innovation (Geels 2004), and the development and design of a wide range of organizational systems (Walker et al. 2008). It has been applied in a myriad of settings, such as industrial organizations, hospitals, and institutions of higher education (Briggs 1993). This theory is particularly suited to the context of an ICT implementation in a service organization in India. Before the implementation, there is no higher technology (i.e., ICT) element in the service organization—i.e., a bank—whereas the other three elements (i.e., structure, people, and task) are in place. Implementation of an ICT can have significant influence, altering the structure of work employees perform through new business processes, work flows, reporting relationships (e.g., Carrillo and Gaimon 2002, Lapointe and Rivard 2005) and the way in which customers are served (Venkatesh 2006). Given that such new business processes, work flows, changing reporting relationships, and customer service interactions are expected to fundamentally alter employees' jobs in a service organization in India, this theory is well suited to understand the impacts, especially on job characteristics and job outcomes (Holman et al. 2005), of an ICT implementation. Our focus is on how the introduction of an ICT may have ramifications for the structure, people, and tasks that in turn influence employees' job characteristics in a service organization in India.

#### 2.4. Generalizability of JCM to Service Organizations in India

Generalizability (or external validity) and replicability are two important cornerstones of scientific inquiry

(Shadish et al. 2002). Theoretical models, research designs, and findings that are generalizable and replicable are critical to advance scientific knowledge. A theory that is not generalizable is considered less useful (Lee and Baskerville 2003). However, building on Hume's truism, Lee and Baskerville (2003, p. 240) noted, "A theory may never be scientifically generalized to a setting where it has not yet been empirically tested and confirmed." They argued that the commonly held assumption and expectation that findings from one context will generalize to a different context are not reasonable. They further argued that it is inappropriate to criticize a theory for a lack of generalizability. Instead, a study may be criticized for a lack of *particularizability*. The notion of particularizability is similar to the concept of *contextualization*—"linking observations to a set of relevant facts, events, or points of view that make possible research and theory that form part of a larger whole"—that has been suggested as an important element of scientific inquiry that can inform theory development and interpretation of results (Rousseau and Fried 2001, p. 1). Johns (2006) argued that the impact of context on organizational behavior has not been sufficiently recognized or appreciated by researchers. Likewise, discovering boundary conditions of existing theories, here JCM, and engaging in inductive theory development has the potential to make theoretical contributions both to ICT implementation and job characteristics literatures (see Alvesson and Karreman 2007, Locke 2007 for a general discussion). Building on the arguments discussed above, replicating JCM in a context where JCM has not been tested is an important scientific contribution.

Our work specifically addresses key aspects related to generalizability of JCM. First, we extend the JCM by adding ICT implementation, with context-specific theoretical arguments to explain how an ICT enhances job characteristics of employees in service organizations, particularly banks, in India. We draw from the STS theory (e.g., Avgerou et al. 2004) and develop theoretical mechanisms to delineate why an ICT implementation can positively influence job characteristics in this context. Second, we test a scientific model that was developed based on theory and data from western contexts in the new context of a service organization, i.e., a bank, in a developing country, i.e., India. As noted by Johns (2006) and Lee and Baskerville (2003), a context can inform a theory by offering additional mechanisms and insights that were not part of the original theory (see also Alvesson and Karreman 2007, Locke 2007). While Sankar and Yeong (1997) examined the impacts of several job characteristics on job satisfaction in India, to the best of our knowledge, there was no study that tested the full JCM in India or any other developing countries. Consequently, we test the

full JCM in a service organization in India. The JCM is a complex model with three mediators (i.e., psychological states) and five moderators (GNS and four context satisfactions). These moderators are theorized to influence all the theoretical relationships in the JCM: (1) job characteristics → psychological states; and (2) psychology states → job outcomes. A test of the full JCM is rare even in the organizational behavior (OB) literature. For example, the study by Tiegs et al. (1992) was the only study that we found that examined the moderating effects of context satisfactions on job characteristics → psychology states and psychological states → job outcomes relationships. In sum, our study empirically examines the full JCM in a developing country context during an ICT implementation in a bank in India.

### 2.5. Hypothesis Development

Figure 1 presents a conceptual model of the influence of ICT on employees' jobs and the rest of the JCM. In this section, we discuss the new hypotheses regarding the influence of ICT on employees' job characteristics in developing countries in general and India in particular. In developing our theoretical arguments, we further delve into the rationale related to service organizations.

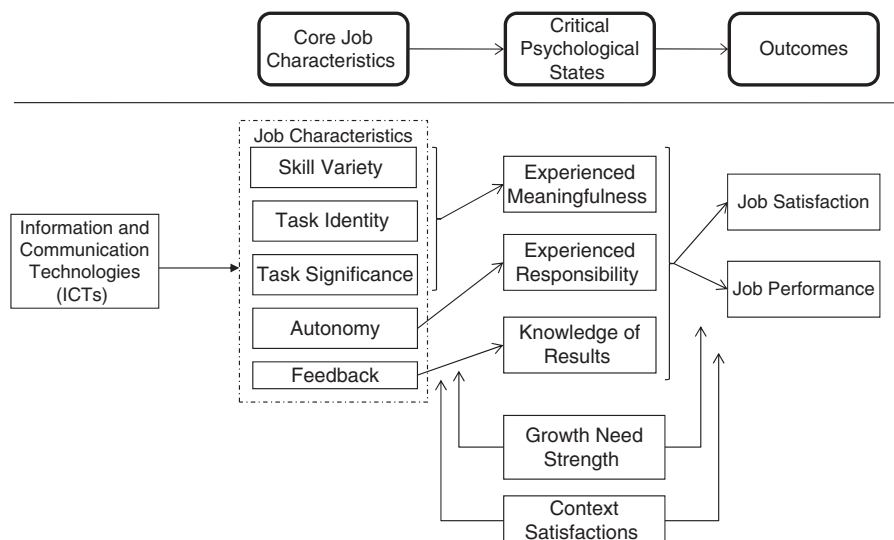
*Skill variety* will be enhanced due to job enlargement that occurs after an ICT is introduced in a service organization in India. Research on STS theory has suggested that new technology tends to stimulate job enlargement, defined as the increasing scope of a job through extending the range of job duties and responsibilities (Steers and Porter 1991). Job enlargement operates by influencing the structures found in the social sub-system, as well as the people–structure

relationship, the people–task relationship, and tasks directly in the technical sub-system. Molleman and Broekhuis (2001) have shown that new ICT contributes to skill variety through increasing job enlargement. In the case of traditional (pre-ICT) banking practices in India, tellers are able to help customers with only one type of bank account (e.g., checking accounts only) and only a subset of available services because of the bulky paper ledgers that they need to have to access information at their desks. Further, banking services in India are more complex than what is typically found in the United States and other western countries due to the tight governmental regulations, including foreign exchange, with several layers of oversight and a multi-level hierarchy of managers that must approve different types of transactions (Keniston and Kumar 2004). For example, an ICT implementation will automate some aspects of an Indian bank teller's work processes and simplify the workflow but, at the same time, reduce the amount of specialization needed for each teller, instead allowing them to become responsible for many new customer-facing transactions. This will necessitate the teller becoming capable of using the ICT effectively, increase the extent of customer interactions for each teller, and increase the scope of banking practices with which a teller must be familiar. Thus, we hypothesize:

H1: *ICT implementation in a service organization in India will positively influence employees' skill variety.*

The principle of *whole tasks* from STS theory helps explain why ICT implementations will lead to greater *task identity* in service organizations in India. A whole task involves a small group or an individual being

Figure 1 Conceptual Model



responsible for the entire cycle of operations. Holman et al. (2005) suggest that ICT implementations tend to allow users a wider compass in terms of business processes. One reason for this is the automation provided by ICTs. When portions of a job are automated, employees are freed up to participate in new (to the employees) areas of the business process (Morgenson and Campion 2003). A second reason that ICTs provide opportunities for employees to work on whole tasks is that in complex environments, such as seen in the banking industry with globalization, an organization can pursue two paths to keep up when they implement ICTs: (1) they can choose to simplify jobs that each employee performs, thus making employees responsible for less than before an ICT implementation and increase the organizational complexity to handle the many new levels and jobs that will be required following the implementation; or (2) the organization can choose to simplify its internal structure by having fewer levels of employees, with each performing more complex and complete portions of the business process (Sitter et al. 1997). As Sitter et al. (1997) also note, the second option is much more feasible than the first option and is typically believed to be the more effective solution. The second option is consistent with job enlargements or horizontal loading in which employees are allowed to perform a greater number and variety of tasks (Campion et al. 2005). In banks in India, extensive managerial oversight is essential to ensure conformance to regulations and to ensure employees are doing their duties as managers are equally responsible for violation of rules. After an ICT is implemented, much of the auditing and oversight responsibilities can be automated through the system, thus freeing up the managers to a great extent to focus on exceptions and other managerial tasks, including greater participation in planning (Keniston and Kumar 2004). Given greater efficiencies and effectiveness generated for tellers due to reduced interactions with managers after an ICT implementation, tellers will be able to perform a larger piece of the business process. Thus, we hypothesize:

H2: *ICT implementation in a service organization in India will positively influence employees' task identity.*

While ICT implementation has a positive influence on skill variety and task identity through the mechanism of job enlargement, we argue that it will have a positive influence on employees' *task significance* through the mechanism of job enrichment or vertical loading. Job enrichment or vertical loading occurs when an employee's job is expanded to include a higher degree of responsibility and authority; it is the authority that separates enrichment from enlargement (Campion et al. 2005). An employee's job can be

enriched by increasing the significance of the tasks that he or she performs (Morgenson and Campion 2003). After an ICT implementation in an organization in India, the interactions between people and structure change to include new enriched job positions, and the people–task interaction also changes to include more responsibility and authority; these interactions should reinforce, to the employees at least, how their job has grown since the ICT implementation. In a bank in India, when a teller uses ICTs on the job and performs tasks that were previously performed by managers (e.g., he or she can approve check payments at his or her desk), the job tasks increase in significance, relative to pre-implementation task significance. The skill set that employees develop due to working with technology increases the meaningfulness of the job and tasks in that technology-related skills are seen as more valuable than non-technology-related skills in a country that is pursuing advanced development (UNDP 2004), and employees who gain such skills can pass such skills on to others, which increases their relative value within their organization and within the community. Thus, we hypothesize:

H3: *ICT implementation in a service organization in India will positively influence employees' task significance.*

An ICT implementation in a bank in India will increase employees' *autonomy*. STS theory has shown that increasing the complexity of one's job while simplifying the hierarchy of management levels is a viable method of creating benefits for the organization (Sitter et al. 1997). Indian organizations, especially banks, tend to be much more hierarchical (more levels, greater conformance to duties within levels, and many social and professional rules governing interactions across levels) than their western counterparts. The flattening of the hierarchy that comes with an ICT implementation is one method of increasing employees' *autonomy*, with less reporting to various supervising agents necessary than before the implementation (Appelbaum 1997). As noted earlier, one way that a new ICT can flatten the managerial hierarchy for an employee is by creating an audit trail. If an ICT is recording every work action a bank employee takes throughout the day and offers step-by-step aid throughout all the processes, it lessens the bank's need to closely monitor its employees with managers and, consequently, this will increase an employee's sense of autonomy. Thus, we hypothesize:

H4: *ICT implementation in a service organization in India will positively influence employees' autonomy.*

An ICT implementation in an Indian organization can have a positive impact on employees' perceptions

of *feedback* received. STS theory suggests that organizations and employees benefit the most when the social and technical sub-systems of an ICT are in balance with one another (Molleman and Broekhuis 2001, Trist and Bamforth 1951). Balance between these sub-systems involves recognizing that both sub-systems affect one another and by redressing imbalance when it occurs. As the economy continues to grow, Indian banks continue to struggle to keep up with the substantially increased volume of transactions. This creates an imbalance between the sub-systems as the people have greater volume of tasks that they need to perform. Although in the absence of an ICT there is a great deal of interaction with managers (e.g., tellers at banks have to constantly interact with managers to get transactions approved), there is little or no systematic feedback to employees about their performance on an ongoing basis (e.g., error rate, transaction processing time, customer satisfaction). An ICT will allow the easy creation of reports that will provide greater feedback to tellers on their activities and performance (e.g., service time, number of customers served). Further, specific customers' satisfaction ratings can be quickly and readily associated with a specific teller, thus also providing feedback from customers. The system can also help employees through various steps in a business process and provide them feedback via error messages and chronographs, which detail how long a process is taking, and in fast communication with management through electronic means when an employee either asks for it (in the case of a question or problem) or needs it (in the case of outstanding or substandard performance). It is worth noting that increased customer interactions expected in this context (as mentioned in the justification for H1) will also contribute positively to feedback. In sum, an ICT can provide the means through which balance is restored and bank employees are helped in dealing with the substantial increase in volume of activities. Thus, we hypothesize:

*H5: ICT implementation in a service organization in India will positively influence employees' perceptions of feedback received.*

Consistent with the JCM, we expect that job characteristics will have positive effects on psychological states. In particular, skill variety, task identity, and task significance will influence experienced meaningfulness, autonomy will influence experienced responsibility, and feedback will influence knowledge of results. According to JCM, these effects will be moderated by growth need strength (GNS) and context (i.e., pay, job security, coworker, supervision) satisfaction. Growth needs are defined as strong desires for personal challenge and accomplishment, for

learning, and for professional development (Graen et al. 1986, Hackman and Oldham 1980). JCM posits that psychological states will have a stronger effect on job outcomes in the presence of high GNS. We have no theoretical or empirical reasons to believe that the effects of GNS and context satisfactions will be any different in the context of an ICT implementation in a bank in India from what has been theorized in JCM.

### 3. Study 1

#### 3.1. Method

We conducted a study over a period of 32 months to examine the impact of an ICT implementation on employees' core job characteristics and job outcomes at a large bank in India, referred to hereafter as BANK. BANK was upgrading to a new ICT-based banking system from their previously manual, paper-based system, thus allowing us to study an ICT implementation in a bank in India.

**3.1.1. Setting and Participants.** BANK randomly selected 100 of its more than 5000 full-service branches in which to implement the new ICT. Fifty of these 100 branches (henceforth, ICT branches) and 19 non-implementing branches (henceforth, non-ICT branches) were randomly selected for this study. At the time of our study, most of BANK's full-service branches were open to the public from 9:00 AM to 1:00 PM Monday through Friday. They offered multiple services, such as personal banking, corporate banking, non-resident Indian banking, and international banking. Before the new ICT, all transactions were processed manually that required employees to record transaction-specific information in large physical ledgers. Each transaction typically involved many employees, from the tellers who interacted with the customers, peons who moved documents from one location in the building to another for signatures and authorizations, and managers who provided the authorizations and signatures and oversaw the process. It is important to note that because of India's labor economy, i.e., large surplus of workers of lower educational levels (UNESCO 2002), it is economically feasible to hire employees (peons) for the sole purpose of moving papers throughout a building, as was the case for tens of years of using a manual system at BANK. In order to modernize its current operations and to compete with western financial organizations that had begun doing business in India, BANK chose to implement the new ICT to streamline and automate many of the old manual processes.

We chose to focus our attention on the line employees (e.g., tellers and other employees whose responsibility was to record transactions in the

ledgers) as they were most affected by the new ICT. Line employees from the randomly selected branches were asked to voluntarily fill out a survey at three points in time: 8 months before the new ICT roll-out ( $T_1$ ), 12 months after the initial rollout ( $T_2$ ), and 24 months after initial rollout ( $T_3$ ). Only those who responded at all points of measurement were included in the study. At  $T_1$ , of the nearly 4500 employees across 50 ICT branches, 2995 provided usable responses (response rate: 66%). Of those, 1375 provided responses both at  $T_2$  and  $T_3$  (response rate: 46% relative to  $T_1$ ). From the 19 non-ICT branches, 368 employees out of 648 employees provided responses at all points of data collection. Therefore, our total sample size was 1743, with 990 and 261 women in the ICT and non-ICT branches, respectively, which was just over 70% in both cases. The average age of the respondents in both ICT and non-ICT branches was about 33 years, with a standard deviation close to 9. The average organizational tenure of employees was approximately 10 years. The organizational position was captured using the employee grade (level) information, ranging from 1 to 40. The employee grade captures finer grain detail about seniority within the same organizational position. The average grade of employees was about 16 with a standard deviation close to 8. BANK advised us that all of these sample demographics were fairly similar to the demographic profile of the entire organization. We compared the demographic variables of the participants who responded at all measurement points to non-respondents and found no significant differences. There were also no differences in the demographic characteristics of the respondents across the three waves of data collection.

**3.1.2. Measures.** All constructs were measured using validated items from prior research. The constructs were measured on a seven-point Likert type scale. Job satisfaction was measured by adapting an established three-item scale from O'Reilly and Caldwell (1981). Job performance was obtained from the archives of BANK's annual performance evaluations. Using a 10-point scale from very poor to excellent, the supervisors provided an evaluation of employees on several dimensions, such as effectiveness, ability to meet the job requirements, and ability to fulfill responsibilities required by one's job. This was aggregated to create an index measure on a 10-point scale. Employee perceptions of job characteristics were measured via 15 items adapted from Hackman and Oldham (1980). These items were used and validated in much prior research (e.g., Morris and Venkatesh 2010). Fried and Ferris (1987) examined over 200 studies and found that the JCM's

internal and construct validities were generally supported. In addition, demographic data, such as age, gender, organizational position, and tenure, were collected.

**3.1.3. Procedure.** At  $T_1$ , perceptions of employees' job characteristics, job satisfaction, job performance, and demographic data were collected. Twenty months after  $T_1$ , i.e., at  $T_2$ , data about job characteristics, job satisfaction, and job performance were collected. The same data were collected again a year after  $T_2$ , i.e., at  $T_3$ . Although many participants were proficient in English, we provided surveys in both English and the applicable local language. We followed the translation procedures recommended by Brislin et al. (1973). Two professional translators proficient in both languages (i.e., the applicable local language and English) were employed. One person translated the survey from English to the local language and the second person translated the local language survey back to English. Any discrepancies were resolved by a discussion between the two translators. We compared the demographic and outcome variables of the participants who responded in English with those who responded in the local languages and found no statistically significant differences.

## 3.2. Results

We examined bivariate correlations and descriptive statistics of the study variables at all points of measurement.<sup>2</sup> Significant correlations between dependent and independent variables and moderate correlations among the independent variables were found. Cronbach's  $\alpha$ s were  $>.68$  for all scales at all time periods, thus suggesting adequate reliability.

### 3.2.1. Pre- and Post-Implementation Comparison.

A group mean difference test was used to conduct the between-subjects comparisons between the ICT and non-ICT branches.<sup>2</sup> At  $T_1$ , there were no significant differences in job characteristics, job satisfaction, and job performance between the ICT and non-ICT branches. However, at  $T_2$  and  $T_3$ , we found that job characteristics were significantly higher in the ICT branches than they were in the non-ICT branches, suggesting that ICT implementation had a positive influence on employees' job characteristics. To test the mean differences of job characteristics within the ICT and non-ICT branches, we conducted a within-subject comparison using an ANOVA followed by a Scheffe's test. We found that the non-ICT branches experienced no significant changes in mean job characteristics across the three time periods. However, in the case of the ICT branches, we found that the mean job characteristics at  $T_2$  and  $T_3$  were significantly higher than that of  $T_1$ , suggesting that ICT implementation



had a positive influence on employees' job characteristics in these branches. We did not find any significant differences in mean job characteristics between  $T_2$  and  $T_3$ , suggesting that post-implementation job characteristics were stable. Overall, we found strong support for H1 through H5 that predicted that ICT had a positive influence on employees' job characteristics—i.e., post-implementation job characteristics were higher. Despite the positive influence of ICT on job characteristics, surprisingly, we found that job satisfaction and job performance were significantly lower at  $T_2$  and  $T_3$  at the ICT branches relative to  $T_1$ . Further, while job satisfaction and job performance were not significantly different at  $T_1$  between the ICT and non-ICT branches, they were significantly lower at  $T_2$  and  $T_3$  at the ICT branches relative to the non-ICT branches. Job satisfaction and job performance remained stable (i.e., differences were not statistically significant) in the non-ICT branches across all time periods. Overall, after the implementation of the new ICT, while employees at the ICT branches reported higher levels of skill variety, task identity, task significance, autonomy and feedback, they were less satisfied and had lower job performance.

**3.2.2. Structural Model Results.** We conducted our analyses using both structural equation modeling (SEM) and hierarchical regression analysis to test our hypotheses. We used AMOS 7.0 to run the structural models for JCM at each of the three time periods for ICT and non-ICT branches. Overall, we ran a total of six SEM models (three models each for ICT and non-ICT branches). We used the following four widely used and recommended fit indices to assess model fit (see Hu and Bentler 1999 for more details): (a) the non-normed fit index (NNFI), which is equivalent to the Tucker–Lewis index; (b) the comparative fit index (CFI); (c) the root mean square error of approximation (RMSEA); and (d) the standardized root mean square residual (SRMR). The models had acceptable fit indices across all time periods for both ICT and non-ICT branches (e.g., Hu and Bentler 1999). The range of values for NNFI and CFI was between .91 and .94, RMSEA was between .06 and .09, and SRMR was between .04 and .06. We used hierarchical regression analysis to test for moderation and mediation. In particular, we followed Aiken and West (1991) to test for moderation and Baron and Kenny (1986) to test for mediation. The data were mean centered to reduce potential multi-collinearity among main effect terms and interaction effect terms. The variance inflation factors in all cases were well under 5, thus suggesting that multi-collinearity was not a problem in our analyses. We ran hierarchical regression models for data from each time period to test the entire JCM in the ICT and non-ICT branches, respectively. We did

not find any significant interaction effects in the regression models. The mediation test results shown in Tables 1 and 2 suggest that, consistent with JCM, the effects of job characteristics on job outcomes were mediated by the critical psychological states.

The structural model results for ICT branches are shown in Table 3. When we examine the post-implementation results, i.e.,  $T_2$  and  $T_3$ , for the data gathered in the ICT branches, there were a few interesting patterns that disconfirm JCM and point to the limits of JCM in explaining key job outcomes following an ICT implementation in a bank in India. First, we see from Table 3 that, while the control variables continued to be modest predictors of the various dependent variables, the constructs from JCM played a fairly small role in predicting the outcomes, namely job satisfaction and job performance. When compared with the variance explained pre- vs. post-implementation ( $T_1$  vs.  $T_2$  and  $T_3$ ), it is clear that the job characteristics are far less predictive of the various critical psychological states that in turn are only minimally predictive of job outcomes.

The contrast is most stark when the results from the non-ICT branches from  $T_2$  and  $T_3$ , shown in Table 4, are examined and contrasted with the  $T_2$  and  $T_3$  results from the ICT branches. The basic main effects of the JCM appear to operate in quite the same way in  $T_2$  and  $T_3$  as it did in  $T_1$  in the non-ICT branches. In sum, the results from the ICT branches in  $T_1$  and the non-ICT branches in  $T_1$ – $T_3$  are quite similar. This suggests that JCM loses its predictive and nomological validity in  $T_2$  and  $T_3$  in the ICT branches, i.e., in the aftermath of the new ICT implementation. This further suggests that there must be other important variables not included in the model that could explain job satisfaction and job performance in the ICT branches at  $T_2$  and  $T_3$ . The limitations of JCM are particularly apparent given that, in the case of the non-ICT branches, we found a consistent pattern of relationships among JCM constructs, control variables, and dependent variables, with the variance explained remaining stable over time.

### 3.3. Discussion

Study 1 results indicated that the implementation of the new ICT had a strong positive influence on job characteristics, as hypothesized. Particularly, employees reported a substantial increase in all the five job characteristics during the post-implementation periods ( $T_2$  and  $T_3$ ). However, we found no statistically significant changes in the job characteristics of employees working at the non-ICT branches of BANK. This clearly suggests that the new ICT positively influenced employees' job characteristics at the ICT branches. Nevertheless, our findings regarding job

**Table 1** Mediation Test (Study 1, ICT branches,  $N = 1375$ )

Independent variables	Dependent variable: Job satisfaction															
	T <sub>1</sub>				T <sub>2</sub>				T <sub>3</sub>							
	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4
Gender	.14**	.05	.11*	.06	.18**	.12*	.16**	.02	.17**	.13*	.15**	.03	.17**	.13*	.15**	.03
Age	.17**	.03	.16**	.03	-.15**	-.10	-.14**	-.04	-.14**	-.13*	-.14**	-.01	-.14**	-.13*	-.14**	-.01
Organization tenure	.04	.03	.02	.00	-.14**	-.08	-.12*	-.03	-.14**	-.02	-.12*	.03	-.14**	-.02	-.12*	.03
Organization position	.19**	.15**	.12*	.04	.13*	.02	.12*	.02	.13*	.04	.13*	.02	.13*	.04	.13*	.02
Skill variety		.13*		.02	.16**			.03		.13*		.02		.13*		.02
Task identity		.13*		.04	.08			.05		.04		.04		.04		.04
Task significance		.15**		.05	.08			.02		.03		.02		.03		.02
Autonomy		.16**		.02	.07			.01		.02		.01		.02		.01
Feedback		.12*		.04	.02			.04		.01		.01		.01		.01
Expected meaningfulness			.20***	.17**			.17**	.14**			.15**	.13*			.15**	.13*
Expected responsibilities			.21***	.18**			.10	.03			.04	.02			.04	.02
Knowledge of results			.23***	.20***			.05	.02			.03	.02			.03	.02
R <sup>2</sup>	.09	.15	.26	.31	.10	.13	.13	.19	.09	.14	.15	.16	.09	.14	.15	.16
ΔR <sup>2</sup>	.06*		.17***	.05*		.03	.03	.06*		.05*	.06*	.01		.05*	.06*	.01

Independent variables	Dependent variable: Job performance															
	T <sub>1</sub>				T <sub>2</sub>				T <sub>3</sub>							
	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4
Gender	.14**	.03	.10	.04	.13*	.05	.10	.03	.12*	.02	.02	.02	.12*	.02	.02	.02
Age	.16**	.08	.12*	.04	.14**	.12*	.03	.03	.08	.04	.03	.03	.08	.04	.03	.03
Organization tenure	.13*	.02	.15**	.02	.12*	.08	.04	.04	.15**	.13*	.06	.03	.15**	.13*	.06	.03
Organization position	.16**	.05	.18**	.10	.11*	.01	.09	.01	.08	.02	.02	.05	.08	.02	.02	.05
Skill variety		.13*		.03	.03			.02		.04		.03		.04		.03
Task identity		.13*		.04	.02			.04		.02		.04		.02		.04
Task significance		.14**		.02	.04			.04		.05		.04		.05		.04
Autonomy		.13*		.01	.19**			.02		.16**		.02		.16**		.02
Feedback		.17**		.00	.03			.01		.05		.01		.05		.01
Expected meaningfulness			.28***	.21***			.02	.03			.10	.01			.10	.01
Expected responsibilities			.25***	.20***			.25***	.18**			.23***	.16**			.23***	.16**
Knowledge of results			.07	.03			.04	.02			.09	.03			.09	.03
R <sup>2</sup>	.14	.22	.24	.29	.08	.13	.13	.19	.05	.11	.10	.16	.05	.11	.10	.16
ΔR <sup>2</sup>	.08*		.10***	.05*		.05*	.05*	.06*		.06*	.05*	.01		.06*	.05*	.06*

Notes. ΔR<sup>2</sup> for model 2 is the one between models 1 and 2; for model 3, it is the difference between models 3 and 1; and for model 4, it is the difference between models 4 and 2.  
 \*  $p < .05$ ; \*\*  $p < .01$ ; \*\*\*  $p < .001$ .

**Table 2** Mediation Test (Study 1, non-ICT branches, *N* = 368)

Independent variables	Dependent variable: Job satisfaction											
	T <sub>1</sub>				T <sub>2</sub>				T <sub>3</sub>			
	1	2	3	4	1	2	3	4	1	2	3	4
Gender	.15**	.05	.13*	.03	.14**	.05	.12*	.02	.16**	.04	.14*	.02
Age	.19**	.03	.16**	.02	.18**	.03	.15**	.03	.21***	.02	.17**	.01
Organization tenure	.03	.03	.03	.02	.06	.08	.04	.03	.02	.07	.04	.03
Organization position	.20**	.13*	.11*	.05	.21***	.14**	.12*	.02	.21***	.13*	.12*	.04
Skill variety		.12*		.02		.12*		.05		.14**		.01
Task identity		.12*		.03		.12*		.02		.11*		.02
Task significance		.14**		.01		.13*		.05		.12*		.05
Autonomy		.14**		.02		.17**		.02		.14**		.04
Feedback		.11*		.02		.12*		.05		.11*		.03
Expected meaningfulness			.22***	.16**			.23***	.20***			.23***	.17**
Expected responsibilities			.20***	.15**			.19**	.17**			.21***	.15**
Knowledge of results			.24***	.13*			.22***	.17**			.25***	.22***
<i>R</i> <sup>2</sup>	.10	.21	.25	.32	.11	.20	.26	.33	.11	.20	.27	.34
$\Delta R^2$		.11*	.15***	.07*		.09*	.15***	.07*		.09*	.16***	.07*

Independent variables	Dependent variable: Job performance											
	T <sub>1</sub>				T <sub>2</sub>				T <sub>3</sub>			
	1	2	3	4	1	2	3	4	1	2	3	4
Gender	.15*	.08	.07	.03	.14*	.07	.06	.02	.16**	.02	.05	.05
Age	.16**	.05	.11*	.03	.17**	.04	.13*	.04	.17**	.03	.13*	.04
Organization tenure	.14*	.04	.14*	.02	.14*	.03	.14*	.05	.14*	.04	.14*	.03
Organization position	.17**	.03	.19**	.07	.16**	.03	.19**	.05	.15*	.02	.19**	.04
Skill variety		.13*		.02		.13*		.02		.13*		.02
Task identity		.12*		.01		.12*		.03		.12*		.04
Task significance		.14**		.03		.13*		.04		.14*		.03
Autonomy		.12*		.02		.13*		.02		.12*		.01
Feedback		.08		.03		.05		.01		.04		.03
Expected meaningfulness			.27***	.21***			.25***	.21***			.27***	.21***
Expected responsibilities			.26***	.20***			.26***	.20***			.23***	.17**
Knowledge of results			.08	.02			.04	.03			.09	.02
<i>R</i> <sup>2</sup>	.14	.22	.25	.32	.15	.23	.26	.33	.13	.22	.24	.31
$\Delta R^2$		.08*	.11***	.07*		.08*	.11***	.07*		.09*	.11***	.07*

Notes:  $\Delta R^2$  for model 2 is the one between models 1 and 2; for model 3, it is the difference between models 3 and 1; and for model 4, it is the difference between models 4 and 2. \**p* < .05; \*\**p* < .01; \*\*\**p* < .001.

**Table 3** Structural Model Results (Study 1, ICT branches,  $N = 1,375$ )

Independent variables	Dependent variables								
	Experienced meaningfulness			Experienced responsibility			Knowledge of results		
	T <sub>1</sub>	T <sub>2</sub>	T <sub>3</sub>	T <sub>1</sub>	T <sub>2</sub>	T <sub>3</sub>	T <sub>1</sub>	T <sub>2</sub>	T <sub>3</sub>
Gender	.08	.05	.11*	.14*	.12*	.10	.12*	.10	.13*
Age	.04	.04	.04	.16**	.12*	.12*	-.14*	-.12*	-.12*
Organization tenure	.03	.03	.05	.14*	.13*	.04	.14*	.04	.04
Organization position	.08	.01	.15**	.15**	.14*	.02	.14*	.07	.12*
Skill variety	.22***	.21***	.19**						
Task identity	.21***	.02	.01						
Task significance	.24***	.01	.04						
Autonomy				.21***	.03	.03			
Feedback							.19**	.08	.05
$R^2$	.20	.12	.13	.23	.13	.10	.22	.07	.12

Independent variables	Dependent variables					
	Job satisfaction			Job performance		
	T <sub>1</sub>	T <sub>2</sub>	T <sub>3</sub>	T <sub>1</sub>	T <sub>2</sub>	T <sub>3</sub>
Gender	.11*	.15**	.14**	.08	.07	.01
Age	.16**	-.13*	-.14**	.12*	.03	.02
Organization tenure	.01	-.12*	-.12*	.14**	.04	.05
Organization position	.13*	.12*	.13*	.17**	.05	.01
Expected meaningfulness	.21***	.16**	.14**	.26***	.02	.07
Expected responsibilities	.20***	.08	.03	.25***	.25***	.23***
Knowledge of results	.22***	.04	.02	.06	.02	.08
$R^2$	.26	.13	.15	.24	.12	.09

Note: Separate structural models were run for each time period.

\* $p < .05$ ; \*\* $p < .01$ ; \*\*\* $p < .001$ .

satisfaction and job performance appeared contrary to the vast body of research related to JCM. Specifically, we found that, despite marked increase in job characteristics, employees at the ICT branches reported a significantly lower job satisfaction and had lower job performance during the post-implementation periods (T<sub>2</sub> and T<sub>3</sub>). We found that job satisfaction and job performance in the ICT branches was in fact lower than the non-ICT branches. The results suggested that in the post-implementation periods (T<sub>2</sub> and T<sub>3</sub>), JCM lacked the predictive validity that it possessed pre-implementation (T<sub>1</sub>). In order to better understand these findings, we conducted a qualitative study at BANK. Our goal was to discover underlying contextual factors that would explain the findings from Study 1—specifically, we sought to understand *why* the ICT implementation at BANK did not ultimately have a positive influence on job satisfaction and job performance. The importance of using qualitative data to contextualize research findings has recently been underscored by Johns (2006). Particularly, Johns (2006, p. 402–404) suggested that qualitative research

has “great potential to illuminate context effects” and augment findings from quantitative research that focuses primarily on “generic phenomena and constructs” (see also Alvesson and Karreman 2007, Locke 2007).

## 4. Study 2

### 4.1. Method

We employed a qualitative approach to gain insights into the findings from Study 1. Deductive approaches to theory development dominate the literature. However, when assumptions and propositions of existing models are not supported, this presents an opportunity not only for inductive theory development but also for new theory development that pushes the envelope (Alvesson and Karreman 2007, Locke 2007). Consistent with Dubé and Paré (2003) and recent exemplars from ICT implementation research (e.g., Bala and Venkatesh 2007, Sherif et al. 2006), we followed the positivist perspective. A qualitative approach is particularly suitable for a situation where the extant

**Table 4** Structural Model Results (Study 1, Non-ICT Branches, *N* = 368)

Independent variables	Dependent variables								
	Experienced meaningfulness			Experienced responsibility			Knowledge of results		
	T <sub>1</sub>	T <sub>2</sub>	T <sub>3</sub>	T <sub>1</sub>	T <sub>2</sub>	T <sub>3</sub>	T <sub>1</sub>	T <sub>2</sub>	T <sub>3</sub>
Gender	.04	.03	.04	.15*	.14*	.13*	.13*	.13*	.11*
Age	.03	.01	.03	.16**	.15*	.16**	-.13*	-.12*	-.12*
Organization tenure	.06	.02	.05	.14*	.13*	.17**	.14*	.16**	.17**
Organization position	.04	.03	.06	.16**	.15*	.13*	.14*	.13*	.15*
Skill variety	.24***	.21***	.27***						
Task identity	.21***	.23***	.24***						
Task significance	.24***	.23***	.22***						
Autonomy				.23***	.24***	.22***			
Feedback							.21***	.22***	.22***
<i>R</i> <sup>2</sup>	.20	.21	.21	.26	.27	.28	.23	.20	.23

Independent variables	Dependent variables					
	Job satisfaction			Job performance		
	T <sub>1</sub>	T <sub>2</sub>	T <sub>3</sub>	T <sub>1</sub>	T <sub>2</sub>	T <sub>3</sub>
Gender	.13*	.12*	.14*	.07	.06	.05
Age	.16**	.15*	.17**	.11*	.13*	.13*
Organization tenure	.03	.04	.04	.14*	.14*	.14*
Organization position	.11*	.12*	.12*	.19**	.19**	.19**
Expected meaningfulness	.22***	.23***	.23***	.27***	.25***	.27***
Expected responsibilities	.20***	.19**	.21***	.26***	.26***	.23***
Knowledge of results	.24***	.22***	.25***	.08	.04	.09
<i>R</i> <sup>2</sup>	.25	.26	.27	.25	.26	.24

Note: Separate structural models were run for each time period.  
 \**p* < .05; \*\**p* < .01; \*\*\**p* < .001.

theories and constructs may be inadequate to explain the phenomenon of interest (Yin 2002). We conducted interviews of randomly selected BANK employees to understand how they interpreted, used, and were affected by the ICT.

**4.1.1. Sample and Data Collection.** We conducted semi-structured interviews of line employees of ICT branches after we finished collecting and analyzing data for Study 1. BANK randomly selected 160 employees for the interviews. We asked employees about their general reactions to the new ICT, the ICT implementation process, whether and how the ICT was helping them perform their jobs, and challenges and difficulties associated with using the new ICT. We used a semi-structured interviewing approach, with 15 standard questions, shown in Appendix SA3, and in some cases, we asked additional questions based on the answers to the initial questions. Such a combination of both structured and unstructured approaches allowed for a meaningful comparison across interviews and allowed greater depth in each

interview. Interviews took about 30 minutes on average per employee. We tape recorded the interviews. These were then transcribed by a professional transcription agency. Interviews were conducted in the local language(s) of the region in which the branches were located. Two professional translators proficient in both languages (i.e., the local language and English) were employed consistent with interview translation procedures (Brislin et al. 1973). One person translated the text from the local language to English and the second person translated the English text back to the local language. Any discrepancies were resolved by a discussion between the translators.

**4.1.2. Data Analysis.** We analyzed about 800 pages of interview transcripts. We followed a two-step approach to analyze the data. First, we conducted an exploratory analysis to identify patterns from the qualitative data. The interview transcripts were read by one of the authors who used a data reduction and presentation technique for analyzing, triangulating,

and documenting the contents of the transcripts (Krippendorff 1980, Miles and Huberman 1984) to identify and group similar quotes. For example, if there were repeated quotes on “power failure,” these quotes were identified and “power failure” was noted as a first-order concept. A group of similar first-order concepts were categorized as a second-order theme or theoretical categories. Finally, a group of similar second-order themes were aggregated to create a higher-level theoretical dimension. The entire coding process was repeated by a graduate student who was not aware of the research objectives of this work. The coders compared their codes and no significant differences were identified. Minor disagreements were discussed and resolved. Figure 2 illustrates the coding procedure in step 1 and different themes that emerged from the coding procedure.

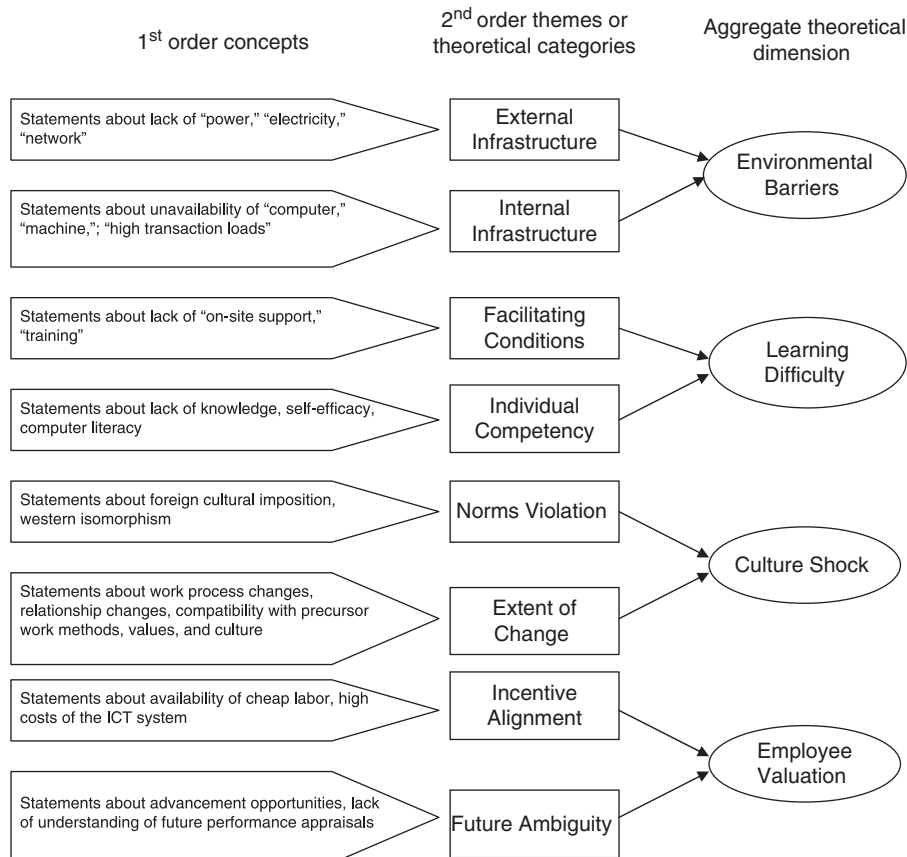
Second, we conducted a content analysis of the qualitative data using the NUD\*IST software. Nodes were created in the software to represent the coding categories identified in the process described above. Our objective was to identify the number of employees who mentioned a particular first-order

concept to understand the importance of each of these concepts. For example, the software gave us the count of 111 employees who mentioned “power failure” in their interviews. We identified a total of 41 first-order concepts in the first step. However, as we did the content analysis using NUD\*IST, we found that many of these first-order concepts were mentioned by only a few informants. Therefore, we decided to include only those first-order concepts that were mentioned by at least 20% of the respondents. This approach helped us concentrate on a core set of factors that BANK employees felt important to them. Table 5 presents details of our codes and theoretical dimensions and the results from the content analysis.

**4.2. Results**

From the coding process described above, we identified four overarching theoretical dimensions: *environmental barriers*, *learning difficulty*, *culture shock*, and *employee valuation*. These theoretical dimensions are derived based on sensemaking and coping theories that offer insights on how individuals react to change

**Figure 2 Overview of the Data Structure (Study 2)**



**Table 5 Study 2 Results**

Aggregated theoretical dimensions	Second-order themes or theoretical categories	First-order concepts	Number of informants	Proportion of informants (%)
Environmental barriers	External infrastructure	1. Power, electricity unavailability	111	69.38
		2. Network down	120	75.00
	Internal infrastructure	3. Computer, machine, system unavailability	66	41.25
		4. Slow response from computer	42	26.25
		5. Transaction load	71	44.38
Learning difficulty	Facilitating conditions	6. Training effectiveness	35	21.88
		7. Lack of on-site support	88	55.00
	Individual competency	8. Self-efficacy	122	76.25
		9. Computer literacy	109	68.13
Culture shock	Norms violation	10. Improvised learning	65	40.63
		11. Alien cultural norms	140	87.50
	Extent of change	12. Cultural imposition	121	75.63
		13. Work process, workflow changes	110	68.75
		14. Relationship changes	82	51.25
Employee valuation	Incentive alignment	15. Role changes	65	40.63
		16. Labor economy	103	64.38
	Future ambiguity	17. Incentive ambiguity	91	56.88
		18. Advancement opportunities	64	40.00
		19. Job security	77	48.13

in their workplace (e.g., Griffith 1999, Lazarus and Folkman 1984, Weick 1995). Sensemaking theory suggests that implementation of a new technology can create three trigger conditions: (1) novelty (i.e., new ways of performing tasks); (2) discrepancy (i.e., use of inappropriate methods while performing tasks); and (3) deliberate initiative (i.e., thinking of something in a new way). The theory further suggests that implementation of new technology is a shock and an occasion for sensemaking when users appraise the situation with respect to whether: (1) the situation is threatening to their well-being; and (2) they have control over the situation. Based on these cognitive appraisals, individuals will invoke different coping behaviors (e.g., Lazarus and Folkman 1984).

We argue that an ICT implementation in India represents a novel situation and an occasion for sensemaking for BANK employees who will attempt to cope in a radically new work environment caused by the new ICT. Environmental barriers and learning difficulty represent the factors that suggest whether BANK employees felt they had enough control over the work conditions enabled by the new ICT (e.g., Lazarus and Folkman 1984). Environmental barriers are barriers external to employees, largely beyond an individual's control, that create a first-degree barrier to successful use of the new ICT to accomplish tasks. Learning difficulty relates to an employee's ability to

understand and perform their jobs with the ICT. Culture shock and employee valuations represent whether the new ICT was threatening to their well-being or not. Culture shock deals with apparent misfit between existing societal norms and the norms imposed by the new ICT as perceived by the employees. Finally, employee valuation deals with employees' perceptions of how BANK valued their work and being part of the community.

Environmental barriers were grouped into two sub-categories—namely, *external infrastructure* (e.g., availability of electricity) and *internal infrastructure* (e.g., system hardware, transaction load). The environmental barriers not only hindered employees doing their jobs, but were also a source of frustration for them, frustration that could have been exacerbated as these barriers were beyond their control. In the case of unreliable electric power (about 70% of employees mentioned it), it is likely that this particular barrier is unique to some developing countries, including India (Gupta 2005). While slow computer speeds due to high transaction loads may occur everywhere (about 75% of employees mentioned it), it is particularly pertinent in India as there are more resource constraints that limit purchase of computer equipment as often as necessary and the transaction volume, especially for personal banking, is rather high in any bank in India because of the population compared with

many developed countries. BANK employees expressed their frustration regarding both external and internal infrastructural barriers. While the ICT implementation enriched their job characteristics as evidenced in Study 1, the infrastructural barriers prevented them from performing their tasks efficiently and made them increasingly frustrated with the new ICT, thus likely leading to lower job satisfaction and job performance.

Learning difficulty relates to an employee's ability to perform their jobs with the ICT. It comprises two sub-categories—namely, *facilitating conditions* (e.g., on-site support, training) and *individual competency* (e.g., employee's computer self-efficacy, computer literacy). Adequate training and post-training support have been shown to be critical success factors in ICT implementations and important determinants of ICT use (Venkatesh 2000, Venkatesh and Speier 1999, Venkatesh et al. 2008). Some employees (about 22%) commented that the training was not adequate to handle different situations that occurred during their use of the new ICT. Inadequate training is a major issue in India due to the low average computer literacy and computer self-efficacy levels, especially among employees in banks. Therefore, it is likely that what constitutes adequate training in more computer-savvy cultures would be insufficient in banks in India. Also, many employees (about 55%) felt that there was inadequate on-site support for the ICT. The perceived lack of support and training was further aggravated by the general low levels of computer literacy and computer self-efficacy (UNDP 2004). BANK's employees had to learn many ICT features by themselves and had to find "shortcuts" and "workarounds" to battle the ICT's complexity. This improvisation took place over time as employees realized that there would be no on-site support. Overall, learning difficulties adversely affected employees' views of the new ICT and their jobs, and hampered their performance. One employee commented:

Three days of training for this new job is all I got. I had never used a computer before in my life. At least I had a typing course but my supervisor didn't even know how to type. There was no technician stationed in our office to help with questions and problems.

The two sub-categories of culture shock were *norm violation* (e.g., feeling outside norms being forced upon one) and *extent of change*. In many developing countries, change is perceived with suspicion because of the conservative nature of the society (Hofstede 2003). Conservative beliefs and norms lead to change being viewed unfavorably in India. Employees commented on how BANK's change to a

computer system seemed lacking in reason, and done only to "pander to the Americans." The ICT was seen not as a means for the organization to innovate and be competitive but as a wasteful exercise in trying to be like western organizations (about 88% employees mentioned this). The unwillingness to change on the part of the employees (about 41% were concerned about change in role, 51% about change in relationships with supervisor and co-workers, and 69% change in workflow), a derivative of conservative social norms that are typical of traditional Indian banks and its employees, intensified due to other problems, such as environmental barriers and learning difficulty. Such feelings led to frustration and demoralization. For example, one employee mentioned:

Why is it that we have to do everything like they do in the West? What was wrong with [BANK] that we needed this system? Things were fine and now, we have to use a system because banks in the West use computer systems.

Employee valuation was categorized further as *incentive alignment* and *future ambiguity*. Being a labor economy, India has a huge source of labor (skilled and unskilled workers) and jobs are scarcer than in developed countries. As such, an important consideration for employees is future employment and stability. The implementation of a new enterprise-wide ICT is not only a change, but also one that offers the possibility of streamlining business processes that could lead to employee layoffs. Employees worried about being able to use the new ICT well enough to keep their jobs (48% were worried about job security) or being able to be promoted in the future (40% were worried about advancement opportunities). It is expected that Indian organizations will keep hiring, as opposed to firing, as many people as they can to support the labor economy (Gupta 2005). In a recent interview, the Indian Prime Minister commented that Indian organizations should not practice the western organizational culture of "hiring and firing" employees (Gupta 2005). Nearly two of three employees (approximately 64%) noted that this made the ICT a bad fit in an Indian firm. Two employees commented:

I don't understand why we even need the system. We have so many people working. Our salaries are not very high. Now, we have a computer system to do our job and this cost lakhs<sup>3</sup> of rupees. I don't have the skills and I can never learn the computer system like some of these younger people who have taken computer courses growing up. I could lose my job.



### 4.3. Discussion

The results of Study 2 pointed out several critical aspects of ICT implementation that, we believe, shed light on the puzzling findings of Study 1. First, employees faced insurmountable environmental barriers that hampered the use of the new ICT to accomplish their tasks. In many cases, employees had to use both the ICT system and paper-based system to complete a transaction in order to make sure that there was no data loss due to power or computer failure. This indicated that the ICT implementation, due to environmental barriers, increased both quantitative and qualitative workload on employees' that in turn led to lower job performance and job satisfaction. Employees noted the difficulty associated with learning the new system. There was limited on-site support to help them solve system-related problems. This is an important issue, particularly in the context of developing countries where computer literacy is low. Learning difficulty in the context of BANK represented a vicious cycle. On the one hand, the lack of employees' computer knowledge and skills caused improper use of the system that led to myriad system-related problems. On the other hand, there was limited on-site support available to promptly resolve these problems. As a result, in many cases, employees were not able to perform their portfolio of tasks using the new ICT. In the case of a power or computer failure, employees had to record all transactions manually and when the power or system-related problems were resolved, they had to record the same data on the new ICT. We believe that the learning difficulty regarding the new ICT and associated problems greatly affected employees' job satisfaction and job performance. Further, many employees perceived that the implementation of the ICT was an act of imposing western culture and values on them. They found that the system changed their relationships with customers and coworkers. We believe that such a culture shock was responsible for lower job satisfaction and job performance. Finally, employee valuation in terms of incentive alignment and future ambiguity negatively affected job satisfaction and job performance, as employees feared that they might not get appropriate incentives for using the new ICT that substantially increased their workload. They were also concerned about whether there would be any changes in organizational policies regarding promotion, transfer, and other career advancement and development programs due to the implementation of the new ICT.

## 5. General Discussion

The objective of this work was to understand the effect of a major ICT implementation on employees' job characteristics and job outcomes in the context of a

service organization in a developing country. Through a 32-month longitudinal field study in a bank in India, we found that the new ICT had a positive effect on job characteristics, but the effects on psychological states and psychological states on job outcomes were weak (Study 1). Specifically, after an ICT implementation, we found that contrary to the JCM, job characteristics were not as predictive of psychological states and job outcomes. Given the overall fall in the predictive validity of JCM (Study 1), we conducted a qualitative study (Study 2) to gain insights and unearth explanations for the erosion of job satisfaction and job performance. Qualitative data analysis revealed four contextual forces pertinent to developing countries—i.e., environmental barriers, learning difficulty, culture shock, and employee valuation—that explained why post-implementation job satisfaction and job performance were lower and why JCM was not as predictive following the ICT implementation.

### 5.1. Theoretical Contributions and Implications

This work makes several important contributions. This is one of the first studies that we are aware of that examines the validity of JCM during a major organizational change intervention driven by an ICT implementation in a developing country. The use of two studies with two different methodologies, i.e., quantitative and qualitative, is an important strength of this work that not only helps accomplish the main objective of understanding the impact of ICT on jobs in a bank in India but also goes a step further in providing a rich, contextual explanation for observed findings (Alvesson and Karreman 2007, Johns 2006, Locke 2007). Through the testing of a baseline model with pre-implementation data, JCM's predictive validity was examined in a specific organizational setting in an Indian bank before the ICT-driven change. While prior research has examined the impact of job characteristics on job outcomes in developing countries, including India (e.g., Sankar and Yeong 1997), a test of full JCM and the evidence of its validity during times of organizational change were nearly absent and this work contributes by filling this void. Demonstrating the boundary conditions of JCM's predictive validity during times of change and the identification of potential explanations and constructs makes a substantial contribution to our knowledge of the impacts of ICT on jobs in service organizations in India and, possibly, other developing countries with somewhat similar cultural profiles. The findings and model that emerged, particularly the inductive theory development in Study 2 and the critical role of the ICT implementation context in a developing country, represent an important contribution to the JCM literature.

This research has implications for the productions and operations management literature, particularly for research on service operations management (e.g., Heineke and Davis 2007, Machuca et al. 2007, Roth and Menor 2003, Schmenner 2004) and the role of technology in this context (Froehle and Roth 2004). This work also complements prior research on technology innovation and diffusion in the operations management field (Gaimon 2008) by focusing not only on both macro and micro issues but also on white-collar workers (Hopp et al. 2009). Our findings suggest that implementation of ICTs to automate service processes in developing countries may not be as fruitful without considering contextual barriers that may inhibit the successful implementation and utilization of the new ICT. Prior research has suggested the importance of ICTs in services context (e.g., Parasuraman and Colby 2000) and how technology characteristics positively moderate the effect of service personnel characteristics on customer satisfactions (e.g., Froehle 2006). We believe that in a service context where employees are reluctant to use and appreciate the role of technology while delivering services, such as the one found in our studies, it is more likely that implementation of a service technology may not yield positive outcomes (e.g., improved customer satisfaction and quality of service). While our findings do not directly indicate this, given the critical relationships between employees' attitude and behavior and the quality of service they provide (e.g., Hays and Hill 2001), we believe that if the employees are reluctant to use a new ICT and their job outcomes (i.e., job satisfaction and job performance) are unfavorably affected by the new ICT, it is more likely that their overall service performance and organizational service quality will be affected.

Our findings suggest that an ICT implementation that was expected to improve overall service quality of an organization in a developing country had a negative impact on employees' job characteristics and job outcomes. The comparison between ICT and non-ICT branches revealed a strong moderating effect of ICT implementation on the well-established relationships in the JCM between (a) job characteristics and critical psychological states and (b) critical psychological states and job outcomes. In particular, the effects of (a) job characteristics on critical psychological states and (b) critical psychological states and job outcomes (i.e., job satisfaction and job performance) diminished after the implementation of the ICT. Our qualitative findings offer explanations for this moderating effect of ICT on JCM relationships. Our findings indicate that important contextual factors, such as environmental barriers, learning difficulty, and culture shock, can inhibit the successful use of ICTs in service contexts in developing countries and

unfavorably affect employee attitudes and behaviors. Hence, these factors can be incorporated in research and theories in service operations management to develop a better understanding of how service technologies can impact the quality of services rendered by organizations in developing countries.

Our research makes important contributions to ICT implementation research conducted in developing countries. We found empirical support for Dewan and Kraemer's (2000) suggestion that deployment of ICT in developing countries must be preceded by investment in other resources (e.g., infrastructure, human capital). Further, this research contributes to innovation implementation research (e.g., Damanpour 1991) by underscoring a set of contextual barriers to and catalysts of innovation implementations relevant to developing countries. Many of these factors have not been identified in much prior research on organizational innovation. Scientific research on change hinges on our ability to collect meaningful longitudinal data, preferably with pre-change data. Such efforts are, therefore, rare due to severe practical constraints in being able to gather such data. This work is an important contribution because of the extensive longitudinal data gathered. While some of the lessons learned here point to challenges during organizational change activities in general, the qualitative data revealed substantial problems related to challenges in implementing ICTs in India. This work thus contributes to the literature bases on organizational change and resistance (e.g., Armenakis et al. 1993, Kotter 2007, Kotter and Schlesinger 2008) by offering a set of context-specific factors that are critical for change implementations in service organizations in developing countries. Our work is in keeping with views expressed in prior change management research that suggests that organizations should not apply one-size-fits-all approaches while implementing change initiatives (Kotter 2007, Kotter and Schlesinger 2008).

Change management research has received a good bit of attention in the context of developed countries (e.g., Greve and Taylor 2000). Further, ICT implementation and associated change management practices are widely researched and discussed in the trade press in developed countries (e.g., Markus and Robey 1988). However, such work in developing countries is limited. While some of the mechanisms that drive job outcomes down parallel what has been found in research in developed countries (e.g., Brass 1985), there are some factors unique to India identified in Study 2—i.e., environmental barriers, learning difficulty, culture shock, and employee valuation—that present key leverage points to successfully manage ICT implementations in India in particular and developing countries in general. Some of these issues could have

substantial implications for research on organizational change management, particularly in developing countries. Also, the JCM literature has generally assumed and found various job characteristics to contribute favorably to job outcomes. In contrast, our work finds that this is certainly not the case in our context, thus providing an advance to the body of knowledge both on change management and job design.

### 5.2. Limitations and Future Research

We expect that the findings and limitations of our work will stimulate future research. One limitation of this study is that we only collected data in India. While we did not seek generalizability, it is important to conduct similar research in other developing countries, such as Brazil, China, Malaysia, and Thailand, to understand the generalizability of our findings. Another limitation related to generalizability is that we collected data only from one bank in India. The demographic profile is somewhat unique in that a large percentage of the employees were women. While this is characteristic of many other types of organizations (e.g., call centers, insurance, and apparel) in developing countries, especially India, the findings here may not generalize to other types of organizations and industries (e.g., heavy manufacturing) and this requires further study. It is possible that employees in other types of organizations may face different challenges pertinent to ICT implementations. However, we believe that the contextual factors that we identified in Study 2 would generalize across a majority of the organizations in India because of the socio-economic fabric of the country and even many other developing countries, e.g., China, due to cultural similarities. Further, studies of the differences in barriers across different countries and cultures will be key to promoting ICT implementation success throughout the developing world.

Another limitation is that we interviewed only the line employees whose jobs were most affected by the new ICT. Future research can include other stakeholders (e.g., top management, customers) to understand the broad impact of technology in organizations in developing countries. An interesting future research endeavor would be to design and test interventions, beyond training and change support, that help proactively manage changes in developing countries (Sykes et al. 2009). It is clear that in determining job satisfaction and job performance in times of change in India, it is indeed not all about the job characteristics as theorized in JCM. In fact, the findings here suggest that too much of an emphasis on the job might be misleading. The factors identified from the qualitative data present important pointers for future research. Future research should not only build more holistic models of job outcomes in times of

change, particularly ICT-driven change, but also test the relative predictive validity of job-related factors vs. other factors, such as the ones identified here, in predicting job outcomes in times of ICT-driven change.

### 5.3. Implications for Practice

ICTs have been suggested as a key factor in attaining UN Millennium development goals in developing countries by increasing the overall technology level in those countries (UN Millennium Project 2005). But ICTs are also a means to improve and modernize business practices that in turn create greater opportunities for organizations in developing countries to partner and do business with organizations in developed countries. Such interactions can lead to greater income for developing countries that in turn can improve income and standards of living for employees who, with greater purchasing power, can put more money into the local economy by purchasing more goods that in turn increases other businesses' incomes, and the cycle continues. Further, greater FDIs that can help improve economies of developing countries are believed to hinge on successful ICT implementations. Our examination of how an ICT implementation influenced job outcomes at a bank in India is a step toward determining the impacts of such implementations. If job satisfaction and job performance were negatively influenced due to the new ICT, then the predicted positive development outcomes would be unlikely to occur.

Our study found that job satisfaction and job performance decreased after an ICT implementation, whereas the job characteristics in JCM increased during the same data collection period. Not only does this illustrate our contention that developing countries are significantly different from developed countries, but also it demonstrates that ICTs are tools for development (UNCTAD 2005, UN Millennium Project 2005) and not solutions in themselves. In fact, our qualitative study pointed to several interesting attitudes and beliefs among workers in India that would suggest that perhaps ICTs are not necessarily the right answer for labor economies. One reason that job outcomes were negatively influenced by the ICT is that employees could not see logical reasons for implementing the ICT—the use of which tends to streamline organizations through automation—when there were so many citizens in need of work. Also, due to the infrastructure issues—e.g., lack of reliable power—the ICT was actually creating more stress and problems for the employees than it was solving—as illustrated by the company needing to have the old manual system running in parallel for the full 2 years of the study. If an ICT is unreliable, its use is also unreliable and thus stressful to employees. This, in turn, lowers its value

as an organizational innovation. As we noted earlier, many large organizations from developed countries are now creating a physical presence in developing countries, such as India and China (Zakaria 2006). It is likely that these organizations will implement the same set of ICTs in their offices in developing countries that they use in their locations in developed countries. Our results indicate that managers of these organizations need to be more mindful while implementing these technologies and take proactive measures to resolve the potential challenges and issues faced by employees in developing countries.

Finally, the ICT implementation had a negative impact on employees' job satisfaction in an Indian service organization where literacy in general and computer literacy in particular is higher than the national average. The banking industry is the leader in terms of ICT implementations in India and, thus, the findings here point to the many and likely more grave challenges that will be encountered in organizations in other industries and non-organizational settings throughout India. Therefore, policy makers will be well served to pursue small-scale projects and understand the considerations of the local community, its value system, and people's reactions before investing large sums of money on ICT implementations in India.

## 6. Conclusions

Our objective was to investigate the effect of ICT implementation on employees' jobs in India. We argued that there is need for such research, as developing countries are now important frontiers for economic activities and development. We conducted two studies to accomplish this objective. We found that, while the ICT had a significant positive influence on employees' job characteristics, employees were less satisfied with their job and had lower job performance following the ICT implementation. Qualitative data indicated that there were four unique contextual forces, namely environmental barriers, learning difficulty, culture shock, and employee valuation, that, we believe, were responsible for lower job satisfaction and job performance. These findings have important implications for theory and practice related to job characteristics and ICT implementations in India in particular and developing countries in general.

## Notes

<sup>1</sup>Enterprise-level ICTs are software packages that provide seamless integration of all the information flowing through a company across different work-units and business processes (Davenport 1998). Examples of enterprise-level ICTs include enterprise resource planning (ERP) systems,

supply chain management systems and customer relationship management systems.

<sup>2</sup>Because of space constraints, the correlation matrixes are provided in Appendix SA2.

<sup>3</sup>A lakh is a unit in the Indian numbering system equal to 100,000 (<http://en.wikipedia.org/wiki/Lakh>).

## References

- Aiken, L. S., S. G. West. 1991. *Multiple Regression: Testing and Interpreting Interactions*. Sage, Thousand Oaks, CA.
- Alvesson, M., D. Kärreman. 2007. Constructing mystery: Empirical matters in theory development. *Acad. Manage. Rev.* 32(4): 1265–1281.
- Appelbaum, S. H. 1997. Socio-technical systems theory: An intervention strategy for organizational development. *Manage. Dec.* 35(6): 452–463.
- Armenakis, A. A., S. G. Harris, K. W. Mossholder. 1993. Creating readiness for organizational change. *Hum. Relat.* 46(6): 681–703.
- Avgerou, C., C. Ciborra, F. F. Land. 2004. *The Social Study of Information and Communications Technology: Innovation, Actors and Context*. Oxford University Press, Oxford, UK.
- Bala, H., V. Venkatesh. 2007. Assimilation of interorganizational business process standards. *Informat. Syst. Res.* 18(3): 340–362.
- Banker, R. D., R. J. Kauffman, R. C. Morey. 1990. Measuring gains in operational efficiency from information technology: A study of the Positran Deployment at Hardee's, Inc. *J. Manage. Informat. Syst.* 7(2): 29–54.
- Barley, S. R. 1986. Technology as an occasion for structuring: Evidence from observation of CT scanners and the social order of radiology departments. *Admin. Sci. Quart.* 31(1): 78–108.
- Baron, R. M., D. A. Kenny. 1986. The moderator-mediator variable distinction in social psychological research: Conceptual, strategic and statistical considerations. *J. Pers. Soc. Psychol.* 51: 1173–1182.
- Birnbaum, P. H., J. L. Farh, G. Y. Y. Wong. 1986. The job characteristics model in Hong Kong. *J. Appl. Psychol.* 71(4): 598–605.
- Bostrom, R., J. S. Heinen. 1977. MIS problems and failures: A socio-technical perspective. *MIS Quart.* 1(3): 17–32.
- Boudreau, M., D. Robey. 2005. Enacting integrated information technology: A human agency perspective. *Organ. Sci.* 16(1): 3–18.
- Brass, D. J. 1985. Technology and structuring of jobs: Employee satisfaction, performance, and influence. *Organ. Behav. Hum. Decis. Process.* 35(2): 216–240.
- Briggs, J. B. 1993. Technological differences in job characteristics, employee satisfaction, and motivation: A synthesis of job design research and sociotechnical systems theory. *High. Educ. Res. Dev.* 12(1): 73–85.
- Brislin, R. W., W. J. Lonner, R. M. Thorndike. 1973. *Cross-Cultural Research Methods*. John Wiley and Sons, New York, NY.
- Burkhardt, M. E. 1994. Social interaction effects following a technological change: A longitudinal investigation. *Acad. Manage. J.* 37(4): 869–898.
- Campion, M. A., T. V. Mumford, F. P. Morgeson, J. D. Nahrgang. 2005. Work redesign: Eight obstacles and opportunities. *Hum. Resour. Manage.* 44(4): 367–390.
- Carrillo, J., C. Gaimon. 2002. A framework for process change. *IEEE Trans. Eng. Manage.* 49(4): 409–427.
- Chakravarty, A. K., K. Ferdows, K. Singhal. 1997. Global operations and technology management: A note from the editors of the special issue. *Prod. Oper. Manag.* 6(2): 99–101.
- Cherns, A. 1976. The principles of socio-technical design. *Hum. Relat.* 29(8): 783–792.

- Cotteleer, M. J. 2006. An empirical study of operational performance parity following enterprise system deployment. *Prod. Oper. Manag.* 15(1): 74–87.
- Cotteleer, M. J., E. Bendoly. 2006. Order lead-time improvement following Enterprise Information Technology implementation: An empirical study. *MIS Quart.* 30(3): 643–660.
- Damanpour, F. 1991. Organizational innovation: A meta-analysis of effects of determinants and moderators. *Acad. Manage. J.* 34(3): 555–590.
- Davenport, T. H. 1998. Putting the enterprise into the enterprise system. *Harvard Bus. Rev.* 76(4): 121–131.
- Dewan, S., K. Kraemer. 2000. Information technology and productivity: Evidence from country-level data. *Manage. Sci.* 46(4): 548–562.
- Dewett, T., G. R. Jones. 2001. The role of information technology in the organization: A review, model, and assessment. *J. Manage.* 27(3): 313–346.
- Dubé, L., G. Paré. 2003. Rigor in information systems positivist case research: Current practices, trends, and recommendations. *MIS Quart.* 27(4): 597–636.
- Edmondson, A., R. Bohmer, G. Pisano. 2001. Disrupted routines: Team learning and new technology implementation in hospitals. *Admin. Sci. Quart.* 46(4): 685–716.
- Fried, Y., G. R. Ferris. 1987. The validity of the job characteristics model: A review and meta-analysis. *Person. Psychol.* 40(2): 287–322.
- Froehle, C. M. 2006. Service personnel, technology, and their interaction in influencing customer satisfaction. *Decis. Sci.* 37(1): 5–38.
- Froehle, C. M., A. V. Roth. 2004. New measurement scales for evaluating perceptions of the technology mediated customer service experience. *J. Oper. Manage.* 22(1): 1–22.
- Fung, M. K. 2008. To what extent are labor-saving technologies improving efficiency in the use of human resources? Evidence from the banking industry. *Prod. Oper. Manag.* 17(1): 75–92.
- Gaimon, C. 1988. The acquisition of new technology and its impact on a firm's competitive position. *Ann. Oper. Res.* 15(1–4): 37–63.
- Gaimon, C. 1997. Planning information technology: Knowledge worker systems. *Manage. Sci.* 43(9): 1308–1328.
- Gaimon, C. 2008. The management of technology: A production and operations management perspective. *Prod. Oper. Manag.* 17(1): 1–11.
- Geels, F. W. 2004. From sectoral systems of innovation to socio-technical systems: Insights about dynamics and change from sociology and institutional theory. *Res. Pol.* 33(6–7): 897–920.
- Gephart, R. P. 2002. Introduction to the brave new workplace: Organizational behavior in the electronic age. *J. Organ. Behav.* 23(4): 327–344.
- Graen, G. B., T. A. Scandura, M. R. Graen. 1986. A field experimental test of the moderating effects of GNS on productivity. *J. Appl. Psychol.* 71(3): 484–491.
- Greve, H. R., A. Taylor. 2000. Innovations as catalysts for organizational change: Shifts in cognition and search. *Admin. Sci. Quart.* 45(1): 54–80.
- Griffith, T. L. 1999. Technology features as triggers for sensemaking. *Acad. Manage. Rev.* 24(3): 472–488.
- Gupta, R. K. 2005. India's economic agenda: An interview with Manmohan Singh. *McKinsey Quart.* (Special Edn) 122–132.
- Hackman, J. R., G. R. Oldham. 1975. Development of job diagnostic survey. *J. Appl. Psychol.* 60(2): 159–170.
- Hackman, J. R., G. R. Oldham. 1980. *Work Redesign*. Addison-Wesley, Reading, MA.
- Hays, J. M., A. V. Hill. 2001. A preliminary investigation of the relationships between employee motivation/vision, service learning, and perceived service quality. *J. Oper. Manage.* 19(3): 335–349.
- Heineke, J., M. M. Davis. 2007. The emergence of service operations management as an academic discipline. *J. Oper. Manage.* 25(2): 364–374.
- Hofstede, G. 2003. *Culture's Consequences: Comparing Values, Behaviors, Institutions and Organizations Across Nations*. Sage Publications, Thousand Oaks, CA.
- Holman, D., S. Wood, T. Wall, A. Howard. 2005. Introduction to the essentials of the new workplace. Holman, D., T. D. Wall, C. W. Clegg, P. Sparrow, A. Howard eds. *The Essentials of the New Workplace: A Guide to the Human Impact of Modern Working Practices*. John Wiley and Sons, New York, NY, ii–xi.
- Hopp, W. J., S. M. R. Irvani, F. Liu. 2009. Managing white-collar work: An operations-oriented survey. *Prod. Oper. Manag.* 18(1): 1–32.
- Hu, L., P. M. Bentler. 1999. Cutoff criteria for fit indexes in covariance structure analysis: Conventional criteria versus new alternatives. *Struct. Equat. Model.* 6(1): 1–55.
- Hulin, C. L., M. Roznowski. 1985. Organizational technologies: Effects on organizations' characteristics and individuals' responses. Staw, B. M., L. L. Cummings eds. *Research in Organizational Behavior*. Vol. 7. JAI Press, Greenwich, CT, 39–85.
- Jacobs, F. R., E. Bendoly. 2003. Enterprise resource planning: Developments and directions for operations management research. *Eur. J. Oper. Res.* 146(2): 233–240.
- Johns, G. 2006. The essential impact of context on organizational behavior. *Acad. Manage. Rev.* 31(2): 386–408.
- Keniston, K., K. Kumar. 2004. *IT Experience in India: Bridging the Digital Divide*. Sage Publications, New Delhi, India.
- Kirkman, B. L., D. L. Shapiro. 1997. The impact of cultural values on employee resistance to teams: Toward a model of globalized self-managing work team effectiveness. *Acad. Manage. Rev.* 22(3): 730–757.
- Kotter, J. P. 2007. Leading change: Why transformation efforts fail. *Harvard Bus. Rev.* 85(1): 96–103.
- Kotter, J. P., L. A. Schlesinger. 2008. Choosing strategies for change. *Harvard Bus. Rev.* 86(7/8): 130–139.
- Kraut, R., S. Dumais, S. Koch. 1989. Computerization, productivity, and quality of work life. *Commun. ACM* 32(2): 220–238.
- Krippendorff, K. 1980. *Content Analysis: An Introduction to its Methodology*. Sage Publications, Beverly Hills, CA.
- Lachman, R., A. Nedd, B. Hinings. 1994. Analyzing cross-national management and organizations: A theoretical framework. *Manage. Sci.* 40(1): 40–55.
- Lapointe, L., S. Rivard. 2005. A multilevel model of resistance to information technology implementation. *MIS Quart.* 29(3): 461–491.
- Lazarus, R. S., S. Folkman. 1984. *Stress, Appraisal, and Coping*. Springer, New York, NY.
- Lee, A. S., R. L. Baskerville. 2003. Generalizing generalizability in information systems research. *Informat. Syst. Res.* 14(3): 221–243.
- Locke, E. A. 2007. The case for inductive theory building. *J. Manage.* 33(6): 867–890.
- Mabert, V. A., A. Soni, M. A. Venkataraman. 2000. Enterprise resource planning survey of US manufacturing firms. *Prod. Invent. Manage. J.* 41(2): 52–58.
- Machuca, J. A. D., M. González-Zamora, V. G. Aguilar-Escobar. 2007. Service operations management research. *J. Oper. Manage.* 25(3): 585–603.
- Markus, M. L., D. Robey. 1988. Information technology and organizational change: Causal structure in theory and research. *Manage. Sci.* 34(5): 583–598.

- McAfee, A. 2002. The impact of enterprise information technology adoption on operational performance: An empirical investigation. *Prod. Oper. Manag.* **11**(1): 33–53.
- Miles, M. B., A. M. Huberman. 1984. *Qualitative Data Analysis: A Sourcebook of New Methods*. Sage Publications, Newbury Park, CA.
- Molleman, E., M. Broekhuis. 2001. Socio-technical systems: Towards an organizational learning approach. *J. Eng. Technol. Manage.* **18**(2): 271–293.
- Morgenson, F. P., M. A. Campion. 2003. Work design. Borman, W. C., D. R. Ilgen, R. J. Klimoski eds. *Handbook of Psychology*. Vol. 12. John Wiley and Sons, New York, NY, 423–452.
- Morris, M. G., V. Venkatesh. 2010. Enterprise resource planning systems implementation and organizational change: Impacts on job characteristics and job satisfaction. *MIS Quart.* **34**(1): 143–161.
- Mumford, E. 2000. Socio-technical design: An unfulfilled promise or a future opportunity. Baskerville, R., J. Stage, J. I. DeGross eds. *Organizational and Social Perspectives on Information Technology*. Kluwer Academic Publications, Boston, MA, 33–46.
- Napoleon, K., C. Gaimon. 2004. The creation of output and quality in services: A framework to analyze information technology-worker systems. *Prod. Oper. Manag.* **13**(3): 245–259.
- O'Reilly, C. A. I., D. F. Caldwell. 1981. The commitment and job tenure of new employees: Some evidence of post decisional justification. *Admin. Sci. Quart.* **26**(4): 597–616.
- Orlikowski, W. J. 1996. Improvising organizational transformation over time: A situated change perspective. *Informat. Syst. Res.* **7**(1): 63–92.
- Parasuraman, A., C. L. Colby. 2000. Technology Readiness Index (TRI): A multiple-item scale to measure readiness to embrace new technologies. *J. Service Res.* **2**(4): 307–320.
- Rajat, R. G. 2005. Making India a global hub. *McKinsey Quart. (Special Edn)* 112–121.
- Roberts, D., M. Arndt. 2005. It's getting hotter in the east. *Bus. Week (Asian Edn)* August 22: 64–67.
- Rosenzweig, P. M. 1994. When can management science research be generalized internationally? *Manage. Sci.* **40**(1): 28–39.
- Roth, A. V., L. J. Menor. 2003. Insights into service operations management: A research agenda. *Prod. Oper. Manag.* **12**(2): 145–163.
- Rousseau, D. M. 1977. Technological differences in job characteristics, employee satisfaction, and motivation: A synthesis of job design research and sociotechnical systems theory. *Org. Behav. Hum. Perf.* **19**(1): 18–42.
- Rousseau, D. M., Y. Fried. 2001. Location, location, location: Contextualizing organizational research. *J. Organ. Behav.* **22**(1): 1–13.
- Rubery, J., D. Grimshaw. 2001. ICTs and employment: The problem of job quality. *Int. Lab. Rev.* **140**(2): 165–92.
- Sankar, C. S., W. Y. Yeong. 1997. Factors influencing job satisfaction of technical personnel in the U.S., Singapore, and India. *Eng. Manage. J.* **9**(1): 15–21.
- Schmenner, R. W. (2004). Service businesses and productivity. *Decis. Sci.* **35**(3): 333–347.
- Shadish, W. R., T. D. Cook, D. T. Campbell. 2002. *Experimental and Quasi-Experimental Designs for Generalized Causal Inference*. Houghton-Mifflin, Boston, MA.
- Sherif, K., R. W. Zmud, G. J. Browne. 2006. Managing peer-to-peer conflicts in disruptive information technology innovations: The case of software reuse. *MIS Quart.* **30**(2): 339–356.
- Sitter, L. U., J. F. Hertog, B. Dankbaar. 1997. From complex organizations with simple jobs to simple organizations with complex jobs. *Hum. Relat.* **50**(5): 497–536.
- Slocum, J. W. Jr., H. P. Jr. Sims. 1980. A typology for integrating technology, organization, and job design. *Hum. Relat.* **33**(3): 193–212.
- Smith, W., M. Hallward-Driemeier. 2005. Understanding the investment climate. *Fin. Dev.* **42**(1): 40–43.
- Steers, R. M., L. W. Porter. 1991. *Motivation and Work Behavior*. Sage Publications, New York, NY.
- Sykes, T. A., V. Venkatesh, V. S. Gosain. 2009. Model of acceptance with peer support: A social network perspective to understand employees' system use. *MIS Quart.* **33**(2): 371–393.
- Thompson, J. D. 1967. *Organizations in Action*. McGraw-Hill, New York, NY.
- Tiegs, R. B., L. E. Tetrick, Y. Fried. 1992. Growth need strength and context satisfaction and moderators of the relations of the job characteristics model. *J. Manage.* **18**(3): 575–593.
- Trist, E., K. Bamforth. 1951. Some social and psychological consequences of the longwall method of coal getting. *Hum. Relat.* **4**(1): 3–38.
- UN Millennium Project. 2005. *Investing in Development: A Practical Plan to Achieve the Millennium Development Goals—Overview*. United Nations, New York, NY.
- UNCTAD. 2005. *The Digital Divide: ICT Development Indices 2004*. United Nations Conference on Trade and Development, Geneva, Switzerland.
- UNDP. 2004. *Monitoring Human Resources and Enlarging People*. United Nations Development Program, New York, NY.
- UNESCO. 2002. *UNESCO: Education for all 2000 Assessment Report, 2001*. United Nations Educational, Scientific and Cultural Organization (UNESCO), Paris, France.
- Venkatesh, V. 2000. Determinants of perceived ease of use: Integrating perceived behavioral control, computer anxiety and enjoyment into the technology acceptance model. *Informat. Syst. Res.* **11**(4): 342–365.
- Venkatesh, V. 2006. Where to go from here? Thoughts for future directions for research on individual-level technology adoption with a focus on decision-making. *Decis. Sci.* **37**(4): 497–518.
- Venkatesh, V., H. Bala. 2008. Technology acceptance model 3 and a research agenda on interventions. *Decis. Sci.* **39**(2): 273–315.
- Venkatesh, V., S. A. Brown, L. M. Maruping, H. Bala. 2008. Predicting different conceptualizations of system use: The competing roles of behavioral intention, facilitating conditions, and behavioral expectation. *MIS Quart.* **32**(3): 483–502.
- Venkatesh, V., F. D. Davis, M. G. Morris. 2007. Dead or alive? The evolution, trajectory, and future of technology adoption research. *J. AIS* **8**(4): 267–286.
- Venkatesh, V., M. G. Morris, F. D. Davis, G. B. Davis. 2003. User acceptance of information technology: Toward a unified view. *MIS Quart.* **27**(3): 425–478.
- Venkatesh, V., C. Speier. 1999. Computer technology training in the workplace: A longitudinal investigation of the effect of mood. *Org. Behav. Hum. Decis. Process.* **79**(1): 1–28.
- Walker, G. H., N. A. Stanton, P. M. Salmon, D. P. Jenkins. 2008. A review of sociotechnical systems theory: A classic concept for new command and control paradigms. *Theor. Iss. Ergonom. Sci.* **9**(6): 479–499.
- Weick, K. 1995. *Sensemaking in Organizations*. Sage Publications, Thousand Oaks, CA.
- Yin, R. K. 2002. *Case Study Research: Design and Methods*. Sage Publications, Newbury Park, CA.
- Zakaria, F. 2005. Does the future belong to China? *NewsWeek* **145**: 25–40.
- Zakaria, F. 2006. India rising. *NewsWeek* **147**: 32–42.

## Supporting Information

Additional supporting information may be found in the online version of this article:

**Appendix SA1.** Socio-technical Systems Theory.

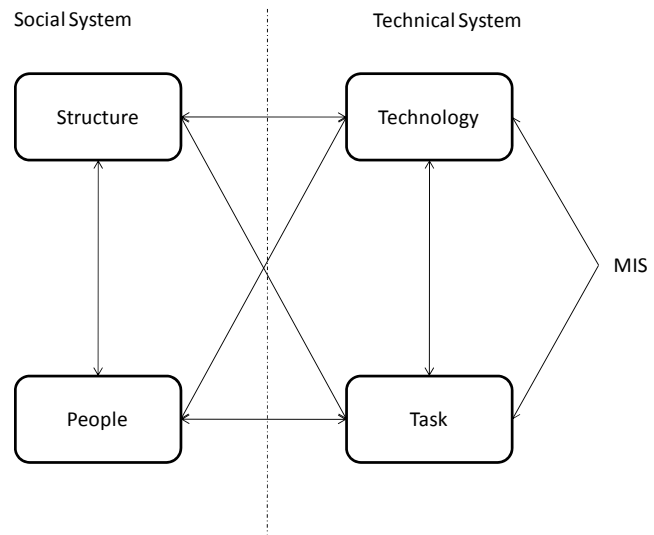
**Appendix SA2.** Descriptive Statistics, Reliability, and Correlations.

**Appendix SA3.** Standard Interview Questions.

Please note: Wiley-Blackwell is not responsible for the content or functionality of any supporting materials supplied by the authors. Any queries (other than missing material) should be directed to the corresponding author for the article.

# Online Supplements

## Appendix 1: Socio-technical Systems Theory





## APPENDIX 2

**TABLE A1: Descriptive Statistics, Reliability and Correlations (Study 1, pre-implementation, T<sub>1</sub>)**

	ICT Branches		Non-ICT Branches		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19
	Mean	S.D.	Mean	S.D.																			
1. Gender (1= male)	.28	.45	.27	.45	-	.16**	.23***	.47***	.05*	.15**	-.17**	.04	.08	.25***	.23***	.25***	.24***	-.22***	.17**	-.25***	-.22***	.24***	.20***
2. Age	32.9	8.98	32.4	8.79	.17***	-	.28***	.38***	.17**	.05	.13*	.16**	.17**	.28***	.27***	-.23***	-.20***	.21***	.28***	.22***	.20***	.25***	.20***
3. Org. tenure	9.71	3.99	10.21	4.20	.24***	.30***	-	.30***	.16**	.20***	.15**	.10*	.10*	.20**	.25***	.24***	.15**	.19***	.20***	.17**	.17**	.17**	.25***
4. Org. position	16.42	7.72	16.01	7.88	.49***	.34***	.29***	-	.18***	.20***	.25***	.20***	.04	.30***	.23***	.31***	.12*	.22***	.19***	.12*	.24***	.29***	.24***
5. Skill variety	3.22	1.07	3.19	1.09	.07	.13*	.15**	.17**	.77\72	.08	.15**	.02	.07	.24***	.32***	.22***	.09*	.04	.02	.11*	.15**	.44***	.40***
6. Task identity	4.17	1.10	4.14	1.07	.13*	.07	.17**	.19***	.09*	.75\70	.18***	.04	.10*	.28***	.29***	.27***	.12*	.15**	.14*	.04	.09*	.34***	.33***
7. Task significance	3.87	1.08	3.90	1.10	-.14*	.09*	.14*	.22***	-.14*	.15**	.81\75	.15**	-.20***	.30***	.31***	.29***	.01	.05	.04	.07	.15**	.28***	.32***
8. Autonomy	4.25	1.12	4.21	1.11	.05	.10*	.07	.18***	.05	.09*	.13*	.77\72	-.22***	.21***	.28***	.30***	.07*	.07	.19***	.10*	.10*	.17**	.38***
9. Feedback	3.10	1.24	3.13	1.20	.04	.14*	.08	.05	.04	.08	-.18***	-.20***	.70\72	.23**	.24***	.28***	.13*	.10*	.20***	.20***	.21***	.29***	.38***
10. Exp. meaningfulness	4.01	1.11	4.02	1.13	.23***	.20**	.20**	.19**	.25***	.23***	.27***	.19**	.19**	.71\74	.21***	.23***	.17**	.19**	.20***	.23***	.25***	.28***	.29***
11. Exp. responsibility	4.44	1.22	4.40	1.20	.20**	.21**	.17**	.19**	.23***	.25***	.28***	.20**	.18**	.20**	.74\75	.22***	.25***	.21***	.22***	.21***	.29***	.21***	.22***
12. Knowledge of results	4.18	1.10	4.11	1.12	.20***	-.25***	.21***	.22***	.25***	.29***	.21***	.25***	.31***	.24***	.22***	.73\74	.22***	.17**	.21***	.25***	.23***	.28***	.30***
13. Growth need strength	4.01	1.38	4.00	1.35	.21***	-.17**	.12*	.12*	.08	.12*	.02	.12*	.12*	.18**	.18**	.21***	.80\84	.12*	.13*	.10*	.18***	.13*	.17**
14. Pay satisfaction	4.41	1.10	4.50	1.15	-.21***	.20***	.17**	.20***	.01	.13*	.09*	.11*	.10*	.17*	.19**	.24***	.10*	.82\75	.10*	.14*	.10*	.20***	.19***
15. Job security satisfaction	4.72	1.07	4.79	1.10	.15**	.19***	.24***	.24***	.04	.15**	.05	.17**	.17**	.19**	.24***	.23***	.07	.14*	.79\82	.05	.14*	.20***	.21***
16. Co-worker satisfaction	4.33	1.42	4.41	1.45	-.22***	.20***	.15**	.10*	.10*	.07	.10*	.10*	.19***	.24***	.23***	.22***	.13*	.12*	.09*	.79\77	.13*	.17**	.20***
17. Supervision satisfaction	5.01	1.27	5.10	1.32	-.25***	.21***	.14*	.22***	.13*	.04	.13*	.14*	.20***	.28***	.22***	.27***	.15**	.10*	.13*	.12*	.72\75	.20***	.17**
18. Job satisfaction	4.50	1.10	4.40	1.11	.21***	.22***	.12*	.25***	.42***	.30***	.24***	.14*	.24***	.30***	.25***	.29***	.12*	.19***	.17***	.15**	.18***	.88\84	.33***
19. Job performance	7.14	2.87	7.10	2.94	.19***	.18***	.24***	.21***	.35***	.28***	.39***	.32***	.35***	.26***	.27***	.31***	.14*	.21***	.20***	.19***	.15**	.31***	.82\85

**Notes:**

1. N = 1,375 from ICT branches and N = 368 from non-ICT branches.
2. Cronbach alpha reliability coefficients appear on the diagonal. The first number is for the ICT branches.
3. The top half of the matrix shows correlations for the non-ICT branches and the bottom half shows correlations for the ICT branches.
4. Job performance was measured with a 10-point scale. Other constructs were measured with a 7-point scale.
5. \* p < .05, \*\* p < .01, \*\*\* p < .001.

TABLE A2: Descriptive Statistics, Reliability and Correlations (Study 1, post-implementation, T<sub>2</sub>)

	ICT Branches		Non-ICT Branches		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19
	Mean	S.D.	Mean	S.D.																			
1. Gender (1= male)	.28	.45	.27	.45	-	.20***	.25***	.50***	.08	.20***	-.20***	.09*	.10*	.24***	.23***	.25***	.24***	-.25***	.19***	-.27***	-.25***	.26***	.23***
2. Age	33.9	8.98	33.4	8.79	.22***	-	.30***	.41***	.20***	.09*	.15**	.14*	.20***	.29***	.28***	-.24***	-.22***	.20***	.28***	.20***	.21***	.27***	.24***
3. Org. tenure	10.71	3.99	11.21	4.20	.25***	.32***	-	.33***	.17**	.22***	.17**	.19***	.13*	.21**	.24***	.23***	.17**	.14*	.24***	.19***	.19***	.20***	.29***
4. Org. position	17.32	7.77	17.34	7.49	.51***	.35***	.30***	-	.19***	.22***	.24***	.24***	.07	.29***	.22***	.30***	.14*	.25***	.20***	.14*	.28***	.32***	.28***
5. Skill variety	4.35	0.92	3.33	1.10	.10*	-.15**	.12*	.20***	.79\75	.10*	.20***	.07	.10*	.23***	.31***	.22***	.02	.08	.05	.14*	.16**	.46***	.42***
6. Task identity	4.91	0.87	4.09	1.21	.14*	-.10*	.10*	.22***	.10*	.72\70	.21***	.05	.04	.29***	.28***	.27***	.10*	.02	.19***	.13*	.05	.37***	.30***
7. Task significance	4.70	0.84	4.09	1.10	-.15**	.10*	.17**	.24***	-.08	.19***	.68\70	.18***	-.24***	.31***	.30***	.28***	.06	.09*	.07	.09*	.17**	.30***	.37***
8. Autonomy	4.88	0.91	4.10	1.17	.08	.13*	.09*	.20***	.10*	.12*	.15**	.71\68	-.25***	.22***	.29***	.31***	.13*	.08	.20***	.10*	.11*	.21***	.39***
9. Feedback	4.11	0.88	3.29	1.33	.10*	.17**	.08	.07	.07	.14*	-.22***	-.22***	.75\74	.24***	.24***	.25***	.10*	.11*	.22***	.14*	.24***	.32***	.40***
10. Exp. meaningfulness	3.75	0.89	4.05	1.20	.20***	.18**	.13*	.20***	.13*	.14*	.10	.14*	.13*	.72\73	.22***	.24***	.18**	.20***	.21***	.24***	.25***	.26***	.28***
11. Exp. responsibility	4.01	1.20	4.41	1.17	.22***	.19**	.12*	.21***	.11*	.10	.14*	.11*	.16**	.12*	.75\76	.21***	.24***	.22***	.23***	.26***	.30***	.23***	.23***
12. Knowledge of results	3.55	1.05	4.13	1.20	.21***	.20***	.10	.22***	.15*	.14*	.13*	.10	.12*	.13*	.14*	.73\74	.22***	.17**	.23***	.25***	.23***	.25***	.27***
13. Growth need strength	4.11	1.35	4.10	1.38	.20***	-.20***	.07*	.10*	.10*	.15**	.04	.13*	.19***	.14*	.15*	.17**	.72\78	.02	.15**	.17**	.19***	.14*	.19***
14. Pay satisfaction	4.50	1.12	4.47	1.21	-.27***	.15**	.13*	.22***	.04	.12*	.03	.14*	.05	.08	.03	.13*	.07	.80\82	.13*	.18***	.13*	.24***	.24***
15. Job security satisfaction	3.91	1.13	4.81	1.12	.15**	.17**	.20***	.27***	.07	.19***	.13*	.07	.19***	.08	.05	.03	.02	.17**	.78\72	.04	.17**	.21***	.20***
16. Co-worker satisfaction	4.32	1.41	4.47	1.39	-.23***	.24***	.18***	.07	.13*	.10*	.09*	.19***	.22***	.05	.07	.05	.19***	.18***	.10*	.74\79	.05	.14*	.22***
17. Supervision satisfaction	4.60	1.35	5.07	1.33	-.29***	.21***	.12*	.13*	.17**	.07	.17**	.09*	.17**	.13*	.12*	.14*	.18***	.08	.17**	.17**	.70\69	.20***	.18***
18. Job satisfaction	3.50	1.21	4.50	1.20	.26***	-.22***	-.21***	.20***	.22***	.17**	.18***	.10*	.11*	.13*	.15*	.14*	.13*	.20***	.26***	.14*	.21***	.85\83	.34***
19. Job performance	7.18	2.92	7.17	3.01	.25***	-.20***	-.20***	.24***	.12*	.18***	.19***	.20***	.19***	.14*	.13*	.12*	.12*	.17**	.28***	.15**	.18***	.19***	.82\84

Notes:

1. N = 1,375 from ICT branches and N = 368 from non-ICT branches.
2. Cronbach alpha reliability coefficients appear on the diagonal. The first number is for ICT branches.
3. The top half of the matrix shows correlations for the non-ICT branches and the bottom half shows correlations for ICT branches.
4. Job performance was measured with a 10-point scale. Other constructs were measured with a 7-point scale.
5. \* p < .05, \*\* p < .01, \*\*\* p < .001.
6. Gender, age, and organizational tenure were measured in T<sub>1</sub>.

TABLE A3: Descriptive Statistics, Reliability and Correlations (Study 1, post-implementation, T<sub>3</sub>)

	ICT Branches		Non-ICT Branches		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19
	Mean	S.D.	Mean	S.D.																			
1. Gender (1= male)	.28	.45	.27	.45	-	.22***	.28***	.52***	.10*	.21***	-.22***	.13*	.12*	.23***	.24***	.24***	.27***	-.24***	.22***	-.24***	-.29***	.25***	.21***
2. Age	34.9	8.98	34.4	8.79	.21***	-	.32***	.44***	.23***	.13*	.18***	.19***	.22***	.27***	.27***	-.25***	-.25***	.17***	.33***	.21***	.17**	.28***	.28***
3. Org. tenure	11.71	3.99	12.21	4.20	.25***	.30***	-	.37***	.19***	.27***	.19***	.24***	.18***	.23**	.25***	.22***	.20***	.17***	.31***	.21***	.17**	.22***	.30***
4. Org. position	17.80	7.70	17.88	7.64	.50***	.36***	.32***	-	.22***	.24***	.29***	.29***	.10*	.30***	.23***	.28***	.07	.28***	.17**	.17**	.21***	.31***	.31***
5. Skill variety	4.28	1.04	3.17	0.99	.10*	-.17**	.12*	.22***	70/69	.10*	.24***	.13*	.12*	.24***	.28***	.21***	.04	.10*	.04	.09*	.12*	.45***	.45***
6. Task identity	4.80	0.99	4.10	1.17	.14*	-.15**	.15**	.24***	.13*	72/75	.22***	.10*	.09*	.29***	.28***	.25***	.07	.04	.20***	.10*	.12*	.40***	.37***
7. Task significance	4.63	1.01	3.99	1.01	-.19***	.12*	.17**	.21***	-.15**	.22***	80/72	.24***	-.27***	.30***	.28***	.28***	.08	.10*	.12*	.12*	.19**	.32***	.30***
8. Autonomy	4.71	1.08	4.14	1.19	.10*	.15**	.19***	.18***	.12*	.17**	.17**	75/74	-.29***	.23***	.30***	.30***	.12*	.10*	.23***	.14*	.14*	.19***	.40***
9. Feedback	3.89	1.14	3.01	1.07	.11*	.12*	.10*	.14*	.13*	.15**	-.25***	-.24***	72/70	.24***	.25***	.22***	.02	.12*	.25***	.10*	.27***	.30***	.41***
10. Exp. meaningfulness	3.74	0.85	4.01	1.17	.21***	.20***	.14*	.21***	.13*	.15*	.05	.16**	.14*	73/74	.23***	.23***	.19**	.20***	.22***	.25***	.27***	.25***	.28***
11. Exp. responsibility	3.89	1.23	4.33	1.14	.20***	.20***	.11*	.22***	.12*	.05	.15*	.11*	.15*	.12*	76/77	.20***	.23***	.21***	.24***	.27***	.28***	.24***	.24***
12. Knowledge of results	3.49	1.03	4.01	1.18	.21***	.22***	.08	.21***	.14*	.13*	.14*	.10	.13*	.15*	.09	73/71	.21***	.15**	.22***	.26***	.21***	.24***	.26***
13. Growth need strength	4.05	1.30	4.17	1.35	.22***	-.17**	.02	.07	.06	.16**	.05	.14*	.22***	.13*	.14*	.16**	68/70	.04	.08	.19***	.20***	.17**	.20***
14. Pay satisfaction	4.47	1.18	4.51	1.28	-.29***	.14*	.08	.18***	.08	.13*	.04	.18***	.07	.07	.04	.12*	.04	69/71	.10*	.22***	.14*	.21***	.21***
15. Job security satisfaction	3.97	1.24	4.80	1.10	.13*	.22***	.18***	.29***	.15**	.20***	.17**	.02	.23***	.03	.03	.07	.08	.16**	80/74	.05*	.12*	.20***	.20***
16. Co-worker satisfaction	4.28	1.35	4.42	1.37	-.22***	.27***	.14*	.10*	.19***	.13*	.15**	.24***	.19**	.04	.05	.04	.24***	.24***	.13*	72/75	.02	.17**	.23***
17. Supervision satisfaction	4.66	1.30	5.01	1.33	-.24***	.20***	.15**	.14*	.25***	.09*	.20***	.03	.14*	.12*	.11*	.13*	.23***	.01	.17**	.14*	72/78	.21***	.20***
18. Job satisfaction	3.80	1.04	4.40	1.18	.28***	-.20***	-.22***	.22***	.21***	.16**	.19***	.12*	.13*	.12*	.16*	.13*	.15**	.22***	.29***	.12*	.20***	83/85	.34***
19. Job performance	7.15	2.89	7.21	3.00	.26***	-.19***	-.21***	.23***	.17**	.15**	.20***	.19***	.20***	.13*	.12*	.12*	.10*	.18***	.29***	.15**	.20***	.15**	80/77

Notes:

1. N = 1,375 from ICT branches and N = 368 from non-ICT branches.
2. Cronbach alpha reliability coefficients appear on the diagonal. The first number is for the ICT branches.
3. The top half of the matrix shows correlations for the non-ICT branches and the bottom half shows correlations for the ICT branches.
4. Job performance was measured with a 10-point scale. Other constructs were measured with a 7-point scale.
5. \* p < .05, \*\* p < .01, \*\*\* p < .001.
6. Gender, age, and organizational tenure were measured in T<sub>1</sub>.

## APPENDIX 3

### Standard Interview Questions

1. Please tell me about the organizational culture at BANK.
2. Please tell me about the organizational culture in the particular branch of BANK in which you work.
3. Please tell me about the organizational environment that brought about the need to implement the system.
4. Comment on the training that you were given to teach you about usage of the system.
5. Comment on the support in the organization made available to you after the roll-out of the system.
6. Has the working of BANK changed after the implementation of the system?
7. How has your job been affected by the system?
8. What challenges do you encounter in doing your job now (after the implementation of the system)?
9. How have work processes and activities changed after the implementation of the system?
10. Comment on what you like and dislike about the system.
11. What do you think can be done to make your work and job easier?
12. Comment on the role of management in the system design process.
13. Comment on the role of management in the system implementation process.
14. Comment on the role of employees, especially those in your job role, in the system design process.
15. Comment on the role of employees, especially those in your job role, in the system implementation process.