INDUSTRIAL MANAGEMENT & DATA SYSTEMS

HOW DOES AN ENTERPRISE SYSTEM IMPLEMENTATION CHANGE INTERPERSONAL RELATIONSHIPS IN ORGANIZATIONS

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Abstract

Purpose – Although research has suggested that enterprise system (ES) implementations have major impacts on employee job characteristics and outcomes, there has been limited research that has examined the impacts of ES implementations on interpersonal relationships over time. Building on and extending recent studies that have examined changes in employee job characteristics and outcomes during an ES implementation, this research examined the nature, extent, determinants, and outcomes of changes in an important interpersonal relationship construct—coworker exchange (CWX)—following an ES implementation. CWX is considered a critical aspect of employees' job and an important determinant of their success in the workplace. Drawing on social exchange theory, we theorize that employees will perceive a change in CWX following an ES implementation.

Design/methodology/approach – A longitudinal field study over a period of 6 months among 249 employees was conducted. Latent growth modeling was used to analyze the data.

Findings – We found that employees' work process characteristics, namely perceived process complexity, perceived process rigidity, and perceived process radicalness, significantly explained change, i.e., decline in our case, in CWX during the shakedown phase of an ES implementation. The decreasing trajectory of change in CWX led to declining job performance and job satisfaction.

Originality – The role of CWX and its importance in the context of ES implementations is a key novel element of this work.

Keywords enterprise systems; work process; process characteristics; latent growth modeling; coworker exchange (CWX); job performance; job satisfaction

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1. Introduction

Organizations implement enterprise systems (ESs) to enable and support their operations and processes (Berente *et al.*, 2019; Greenwood *et al.*, 2019; Sykes, 2015; Sykes and Venkatesh, 2017). Although ES implementations generally have a positive impact on organizational and individual outcomes (Greenwood *et al.*, 2019; Staehr *et al.*, 2012; Tian and Xu, 2015), there are considerable challenges associated with these implementations that are typically considered complex and susceptible to cost overruns, time delays, and scope creep (Berente *et al.*, 2019; Markus and Tanis, 2000; Seddon *et al.*, 2010). In fact, notwithstanding decades of collective experience, knowledge, and best practices related to ES implementations in organizations, implementation failures and numerous post-implementation challenges are still highly prevalent (e.g., Tamturk, 2017). One key challenge is associated with organizations' struggle to manage changes to and/or disruptions in organizational processes and structures following these implementations (Bala and Venkatesh, 2013; Boudreau and Robey, 2005; Strong and Volkoff, 2010). Prior studies have found that employees experience significant changes and/or disruptions in various aspects of their job and associated outcomes following an ES implementation (Bala and Venkatesh, 2013; Boudreau and Robey, 2005; Davis and Hufnagel, 2007; Sykes *et al.*, 2014; Volkoff *et al.*, 2007). A comprehensive understanding of these changes is likely to help organizations manage these changes effectively during ES implementations.

There has been a rich tradition of research focusing on the impact of system implementations[1] on employees' work and work-related outcomes. Much of this research has

[1] There has been a rich body of research focusing on the impact of communication technologies and various forms of ubiquitous computing and/or digital platforms such as email, personal messaging, instant messaging, social media, and wearable devices and smartphones, on employee work stress, workloads, work-family conflict, goal progress, and burnout (e.g., Barley *et al.*, 2011; Butts *et al.*, 2015; Cascio and Montealegre, 2016; Gupta *et al.*, 2013; Ou and Davison, 2011). Although we recognize and acknowledge the contributions of this stream of research, we did not include a detailed review of this stream because of our focus on enterprise-level systems that are designed and deployed to support enterprise business processes such as procurement, production, sales and distribution, human resources, and product development.

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focused on the nature of work that employees perform—i.e., job characteristics—and associated job outcomes. Two early studies, Majchrzak and Cotton (1988) and Millman and Hartwick (1987), have found that some employees perceived an increase in their levels of job characteristics (e.g., task identity, feedback, significance, autonomy, and variety) and outcomes (e.g., job satisfaction, work commitment) following a system implementation. Later studies (e.g., Ahearne *et al.*, 2008; Boudreau and Robey, 2005; Davis and Hufnagel, 2007; Lapointe and Rivard, 2005; Morris and Venkatesh, 2010; Volkoff *et al.*, 2007) continued the tradition and examined the impacts of ESs implementations on employees' jobs, routines, and roles, and provided insights on mechanisms through which ESs impacted these aspects of employees' job. For instance, Morris and Venkatesh (2010) and Venkatesh *et al.* (2010) found that although an ES implementation had a positive effect on job characteristics, i.e., skill variety, task identity, task significance, autonomy, and feedback, it changed the known relationships between job characteristics and job outcomes, e.g., job characteristics failed to explain job outcomes following an ES implementation.

More recently, several studies (Bala, 2013; Bala and Bhagwatwar, 2018; Bala and Venkatesh, 2013, 2016; Sykes *et al.*, 2014; Sykes and Venkatesh, 2017; Wu, 2013; Zhang and Venkatesh, 2013, 2017) examined various factors and mechanisms (e.g., process characteristics, system characteristics, social networks, system use and adaptation) through which different systems (e.g., ESs, functional systems, knowledge management systems, and social media) had an effect on employees' job characteristics and job outcomes. In a related stream of research, studies have focused on how these systems induce stress in employees' work life (i.e., technostress) and subsequently affect their job outcomes (e.g., Ayyagari *et al.*, 2011; Ragu-Nathan *et al.*, 2008; Srivastava and Shainesh, 2015; Tarafdar *et al.*, 2019).

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Although prior research has focused extensively on the effects of ESs on job characteristics and outcomes, there has been limited research on how ESs affect an important facet of interpersonal relationships—*coworker exchange* (CWX).[2] CWX represents the quality of relationship between an employee and his or her coworkers. Prior work demonstrated that the role of peer support can help in promoting favorable outcomes in the shakedown phase of an ES implementation, with outcomes ranging from simple conceptualizations of use (e.g., Sykes *et al.*, 2009) to more complex conceptualizations of use (e.g., Robert Jr. and Sykes, 2017) to job outcomes such as job satisfaction and job stress (e.g., Sykes, 2015, 2020) to system- job-related outcomes (e.g., Sykes *et al.*, 2014; Sykes and Venkatesh, 2017). However, these works focused on how peer support helps specifically with system-related challenges and coping with problems connected with effective use of the system and changes associated with and caused by the implementation of the ES. CWX provides a complementary perspective to peer support constructs. Understanding the impact of ESs on CWX is highlighted by the important role of this construct. Specifically, CWX has been theorized and found to be a key antecedent of work attitudes, stress, and performance (e.g., Kamdar and Van Dyne, 2007; Liden *et al.*, 2000). A high-quality relationship with coworkers (i.e., CWX) is important from both the employee and organizational points of view (Sherony and Green, 2002). From an employee's point of view, amicable relationships between employees and their coworkers are critical for initial adjustment, socialization, and subsequent survival in an organization. From an organizational point of view, these relationships could be important to reduce interpersonal conflicts and to improve organizational productivity. Hence, if employees experience a substantial change (e.g., a decline)

[2] Prior research has underscored that various types of workplace technologies affect relationships (e.g., Barley, 1986, 1990; Lapointe and Rivard, 2005; Robey *et al.*, 2002) and vice versa—relationships affect technology implementation and use (e.g., Robert Jr. and Sykes, 2017; Sykes and Venkatesh, 2017; Zhang and Venkatesh, 2017). Although these studies have established an important link between technology and relationships in organizations, they did not specifically focus on coworker exchange (CWX), an important aspect of interpersonal relationships widely used in organizational studies.

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in the quality of relationships with their coworkers due to any event, here, an ES implementation, it is more likely that they will develop unfavorable reactions toward the ES that will have severe ramifications including not being able to reap the benefits from the implementation.

Building on and extending prior studies on the effects ESs have on employee job outcomes, this research examines the nature, magnitude, and impact of change in CWX during an ES implementation, and the predictors and outcomes of such change. In particular, we examine intraindividual change in CWX, i.e., whether employees felt a change in CWX during an ES implementation, interindividual differences in this change, i.e., whether different employees felt different levels of change, and the effect of this change on employee outcomes. We build on Bala and Venkatesh (2013) who found that employees' perceptions of three characteristics of their work processes, i.e., *complexity*, *rigidity*, and *radicalness*, explained changes in their job characteristics following an ES implementation. ES implementations typically come with two major changes through the introduction of new processes and new software (see Sykes and Venkatesh, 2017). Existing business processes are replaced with new, standardized process that are typically accompanied by detailed and standardized documentation and these processes are tightly intertwined with new software systems that are implemented. At the broadest level, these systems lead to changes in people's job roles, as noted earlier (see Morris and Venkatesh, 2010). Aside from this, due to the new processes and software systems, the changed jobs can be expected to cause changes in working relationships and interactions. We extend this and other relevant works by offering theoretical mechanisms related to how and why these three work process characteristics would predict change in CWX following an ES implementation. We examine the nature and magnitude of this change using a latent growth modeling (LGM) approach, an

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integrative approach to analyze longitudinal change,[3] and also study the impact of this change on two key job outcomes: *job performance* and *job satisfaction*.

This research will contribute to the IS literature by offering theoretical insights and mechanisms related to why and how an ES implementation may lead to change in relationships among employees. Thus, this work extends the rich stream of research that focuses on the impact of ES implementations on job characteristics and outcomes (e.g., Bala and Venkatesh, 2013; Morris and Venkatesh, 2010). This research further extends the technostress literature (e.g., Tarafdar *et al.*, 2019) by providing theoretical insights on how change in relationships due to an ES implementation may be manifested as technostress that leads to negative job outcomes. Further, our findings extend prior research that examined how interpersonal relationships (e.g., support network, advice network) affect the success of ES implementations (e.g., Sykes and Venkatesh, 2017; Zhang and Venkatesh, 2017) by offering theoretical mechanisms related to how ES implementations may alter interpersonal relationships, which is related to employee networks, at the workplace.

2. THEORY DEVELOPMENT

Our research model, as illustrated in Figure 1, focuses on change in CWX up to the shakedown phase of an ES implementation, a post-implementation phase that has received much attention in the ES implementation literature due to the severity of disruptions, user resistance, and system abandonment that usually happen during this phase leading to implementation failure (Bala and Bhagwatwar, 2018; Markus and Tanis, 2000; Sykes and Venkatesh, 2017; Tong *et al.*, 2015). This phase "refers to the period from which the system becomes functional and accessible to users until

[3] Our approach complements more traditional approaches to conceptualizing and understanding time, both in IS (e.g., Morris and Venkatesh, 2010; Venkatesh et al., 2021) and organizational behavior (e.g., Venkatesh, Brown, and Maruping, 2006).

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normal or routine use is reached" (Markus and Tanis, 2000; Tong *et al.*, 2015, p. 418).[4] The model posits that employees will perceive change (increase or decrease) in CWX during the shakedown phase, i.e., intraindividual changes, and the change in CWX will be explained by employees' perceptions of the three key characteristics of their work processes, i.e., interindividual differences. It further posits that the change in CWX will lead to changes in job outcomes.

----- Insert Figure 1 about here -----

2.1 Explaining Perceptions of Change in CWX

The theoretical underpinning for CWX comes from social exchange theory (SET) that posits that employees develop relationships with their immediate coworkers or team members based on the principle of role expectations, social exchange, and reciprocation (Seers, 1989; Seers *et al.*, 1995; Sherony and Green, 2002). According to SET (Blau, 1964) and the norm of reciprocity (Gouldner, 1960), employees should maintain a good relationship with coworkers or team members to make sure that they receive the support that they need from them. Employees develop a sense of their own and others' roles in their workplace and believe that if they fulfill their role expectations, others will follow suit. The quality of relationship with coworkers depends on mutual respect, trust and obligation between employees and their coworkers (Seers *et al.*, 1995; Sherony and Green, 2002). The core of this relationship is thus the expectation of reciprocity between employees and their immediate peer group (Seers, 1989).

We argue that an ES implementation may affect reciprocal working relationships among peers by enhancing (or limiting) the objects that can be exchanged and reciprocated. According to SET, in a high-quality coworker relationship, employees are expected to assist their peers in accomplishing their tasks, share ideas and provide feedback, and in turn, receive information, help,

[4] Markus and Tanis (2000) proposed an ES experience cycle capturing both pre- and post-implementation phases of an ES implementation. The four phases that they proposed are: chartering, the project, shakedown, and onward and upward.

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and recognition from coworkers (Seers, 1989). During the shakedown phase, employees will spend a substantial amount of time coping with the new system and associated processes, learning the modified sequence of tasks, and locating information and resources that are required to execute the new work processes (Bala and Venkatesh, 2013; Sykes, 2015). During this period, some employees might not be able to assist their peers in accomplishing their tasks using the new ES or receive assistance from them, as they are also trying to cope with the demands of the new ES and processes (e.g., Sarker and Valacich, 2010). In contrast, other employees who have a better understanding of the new system and associated changes may be able to assist their coworkers to meet the demands of the new work processes (e.g., Sarker *et al.*, 2011). Further, some employees may not be able to exchange work-related information or data, expertise, feedback, resources, and support as they did in the past because the changed work processes may nullify the domain knowledge that they and their peers possess (Sykes *et al.*, 2014). Consequently, they will not be able to maintain healthy work-related exchange relationships. On the contrary, some employees may still be able to maintain and improve the quality of exchange relationship by helping their peers understand and execute new work processes. Role-making, i.e., taking the initiative to modify an assigned role by assuming additional responsibilities, is a central component of coworker relationships (Seers *et al.*, 1995). As noted earlier, employees' roles may be redefined following changes in work processes (Volkoff *et al.*, 2007). This may make role-making (i.e., how an employee plays a role in his or her workplace and behaves following expectations associated with the role) difficult (or easy) for some employees, as they try to cope with their new roles. Overall, we suggest that the quality of the relationship among coworkers will change (increase or decrease) during the shakedown phase of an ES implementation and concomitant changes in organizational processes.

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Prior research has suggested that during the shakedown phase when employees first start using an ES, they immediately develop perceptions of changes in their work processes caused by the new ES. An employee's work process can be defined as a sequence of interrelated and coordinated activities or tasks bounded by rules and norms, and performed by the employee to achieve a predefined objective (Bala and Venkatesh, 2013). Although work process is a broad multi-level and multi-faceted concept (see Pentland, 2003a, 2003b), consistent with prior research, we focus on individual-level work processes that employees experience and execute as part of their job responsibilities (e.g., Bala, 2013; Bala and Venkatesh, 2013). We focus on three characteristics of work processes that were theorized to be salient during the shakedown phase of ES implementation—complexity, rigidity, and radicalness (Bala and Venkatesh, 2013).

Effects of Perceived Process Complexity. Perceived process complexity is defined as the "degree to which an employee believes that elements of his or her work processes (i.e., activities or actions, information and resource requirements) are difficult to understand and act upon" (Bala and Venkatesh, 2013, p.1118; Gebauer and Schober, 2006; Pentland, 2003a, 2003b). We argue that perceptions of work process complexity will have an effect on employees' change (increase or decrease) in the quality of CWX during the shakedown phase. The increased complexity of a work process will lead to change in CWX in two ways. First, there are certain role expectations that employees have about their coworkers, i.e., the number of tasks accomplished by coworkers. An employee who perceives that his or her work processes have become complex may feel that these expectations are not met because coworkers have easier work processes. Given the central roles of fairness, equity, and reciprocity in developing CWX (Seers, 1989), perceptions of unfairness or psychological contract violation will lead to a declining CWX.

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Second, a complex work process may require employees to get extra support and guidance from coworkers to perform their task sequences. Following the implementation of new work processes, it is possible that many employees will seek support and guidance. When work processes become complex, coworkers may be able to provide task-related support and express empathic concerns as they may be proficient in the new work processes and may appreciate the complexity of work processes that an employee has to execute. The increased role ambiguity that accompanies such systemic changes make it more difficult for team members to exchange critical information needed to adapt to the new work environment. As Man and Lam (2003) demonstrated, increased complexity leads to greater interdependence, which negatively affects the quality and frequency of team member communications. Given that a high level of support and guidance is a hallmark of high-quality CWX (Seers, 1989), we suggest that a potential increase in (lack of) support and guidance (or lack thereof) following an ES implementation and concomitant changes in organizational processes can lead to an increase (or decrease) in CWX over time. Although it is possible that some employees will be able to improve relationship quality over time through increasing relational coordination (e.g., Gittel *et al.*, 2010), we suggest that perceived work process complexity will have a negative effect on relationship quality during the early phases of a change initiative as employees try to understand various elements of their work processes and establish relational coordination mechanisms that fit their new work processes.

Hypothesis 1 (H1): *During the shakedown phase of an ES implementation, an increase in perceived work process complexity will lead to a decrease in CWX.*

Effects of Perceived Process Rigidity. Perceived process rigidity is defined as the "degree to which an employee believes that elements of his or her work processes (i.e., activities, information and resource requirements) cannot be modified or circumvented during the course of executing the work processes" (Bala and Venkatesh, 2013, p. 1118; Boudreau and Robey, 2005;

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Gebauer and Schober, 2006; Robey *et al.*, 2002; Soh *et al.*, 2000, 2003; Volkoff *et al.*, 2007). We suggest that the two mechanisms—namely, fairness and support—that explain the effects of process complexity on the decreasing trajectory of change in CWX will also explain the effects of process rigidity on change in CWX. Because of the variability of human needs, employees may perceive that only their own work processes have become more rigid, whereas others still have relatively flexible work processes. Further, when employees are unable to execute certain tasks in their rigid work process and cannot move forward to complete a task on their own, they may need support or guidance from their coworkers, e.g., navigating features of a complex ES. Because the system and associated work processes are new, coworkers may not possess the necessary skills to support or guide an employee to perform his or her work process tasks. Further, a rigid process may not allow employees to maintain and exchange the level and quality of communication and reciprocal relationships that they used to have before an ES implementation. Consistent with SET, when one member experiences difficulty in providing the expected information and assistance necessary to another team member, the reciprocity inherent in social exchange is damaged, thus degrading the overall quality of CWX. As Cropanzano and Mitchell (2005) noted in their review of SET, "because individuals return the benefits they receive, they are likely to match goodwill and helpfulness toward the party with whom they have a social exchange relationship" (p. 883). When members perceive that there is insufficient helpfulness, this should then lead to a declining CWX during the shakedown phase. In addition to these two mechanisms, we offer a third related mechanism—coordination conflict—to explain why work process rigidity may lead to decrease in CWX. Successful execution of work processes depends on concerted efforts by employees and their coworkers. A rigid work process can increase conflicts among employees and coworkers—i.e., coordination complexity (Wood, 1986)—because employees may (may not) be able to execute

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their tasks due to improper execution of work processes by a coworker (e.g., Sarker *et al.*, 2011). This conflict can also lead to a change (e.g., decrease) in CWX.

Hypothesis 2 (H2): *During the shakedown phase of an ES implementation, an increase in perceived work process rigidity will lead to decrease in CWX.*

Effects of Perceived Process Radicalness. Perceived process radicalness is defined as the "extent to which an employee believes that there is a certain degree of newness in the elements of his or her work processes (i.e., activities, information, and resource requirements)" (Bala and Venkatesh, 2013, p.1118; Hong and Kim, 2002; Pentland, 2003a, 2003b; Stoddard and Jarvenpaa, 1995; Volkoff *et al.*, 2007). Consistent with our previous arguments, a radically new work process can lead to significant change in CWX during the shakedown phase. Employees may not have the necessary knowledge and experience to deal with the radicalness and novelty of their work processes following an ES implementation (Boudreau and Robey, 2005; Carlile, 2004; Carlile and Rebentisch, 2003). This may impede their ability to perform tasks successfully. They are likely to need support from their coworkers to be able to understand the requirements for their tasks (or actions) as they execute their work processes using a new ES. However, coworkers may not be able to provide necessary support because they may not have the necessary knowledge and skills to understand the new system and associated changes in work processes themselves. Therefore, perceived process radicalness will lead to a greater decrease in the quality of CWX. Given the importance of role-making and role expectations in CWX, we suggest that employees who feel that their work processes have become radically different may feel a violation of reciprocity in the working relationship. Consequently, their relationship with coworkers will change (e.g., decline).

Hypothesis 3 (H3): *During the shakedown phase of an ES implementation, an increase in perceived work process radicalness will lead to a decrease in CWX.*

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2.2 Impacts of Change in CWX

Prior research suggests that strong coworker relationships (i.e., CWX) are associated with job performance and job satisfaction (Liden *et al.*, 2000; Seers *et al.*, 1995). If employees have a high-quality relationship with their coworkers, they will be able to get work-related assistance, information, support, and feedback from their coworkers that in turn will enhance their job performance. Besides, coworkers will be able to offer emotional support and guidance that will assist an employee in attaining a higher level of job performance (Liden *et al.*, 2000). A high-quality relationship with coworkers will have a positive effect on job satisfaction as employees in such a relationship will develop a strong sense of belonging with their job and organization because of their liking for their coworkers. We thus suggest that, if the quality of CWX increases (decreases) following an ES implementation and associated changes in organizational work processes, employees' job performance and job satisfaction will also increase (decrease).

Hypothesis 4 (H4): *During the shakedown phase of an ES implementation, a decrease in CWX will lead to a decrease in (a) job performance and (b) job satisfaction.*

2.3 Mediating Effects of Change in CWX

We hypothesize that change in CWX will partially mediate the effects of employee work process characteristics on their job outcomes during the shakedown phase. Work process characteristics, such as complexity, rigidity, and radicalness, are likely to directly affect job outcomes because employees enact their work processes to fulfill their job responsibilities. If employees perceive that their individual work processes have become complex, rigid, and radically different following an ES implementation, they are likely to experience a decline in their job performance as they struggle to execute their work processes to fulfill their job duties. Likewise, they may develop negative reactions toward their jobs (i.e., declining job satisfaction), as they may feel that they have to work more and/or work harder to fulfill their tasks because previous successful work

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processes have become somewhat obsolete due to the new ES (Boudreau and Robey, 2005; Lapointe and Rivard, 2005). We suggest that part of the effects of work process characteristics on job outcomes will be channeled through change in CWX because relationships with coworkers may capture aspects of how employees negotiate their job responsibilities using the new ES. For example, an employee may feel that she is unable to fulfill her job duties, i.e., declining job performance, because the complexity of her work processes following an ES implementation makes it difficult for her to get the right support from her coworkers that is crucial for employee success in the new environment with an ES, particularly during the shakedown phase when employees do not have much experience with the new ES (Markus and Tanis, 2000; Sykes, 2015). In other words, during the shakedown phase, employees may not be able to figure out the type of support they need from their coworkers to accomplish their job duties because of the complexity, rigidity, and radicalness of their work processes.

Hypothesis 5 (H5): *During the shakedown phase of an ES implementation, the effects of work process characteristics (i.e., complexity, rigidity, and radicalness) on changes in job performance and job satisfaction will be partially mediated by change in CWX.*

3. METHOD

A longitudinal field study spanning over 6 months with measurements at four points in time was conducted to test our hypotheses. Data were collected from a mid-sized electronic components manufacturer, which supplies components to large telecommunication firms. The manufacturer was implementing two modules of the SAP ERP system, i.e., Human Capital Management (HCM) and Financials, and changing organizational work processes related to human resources and financial management.

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3.1 Participants and Study Procedure

We collected data from employees who used the SAP HCM and/or Financials modules and executed the associated work processes on a daily basis as a major part of their jobs. These employees were from multiple business units and were primarily accountants, account managers responsible for supply chain activities, and HRM employees. Employees were primarily at the operational level of the organizational hierarchy, except for supervisors who were mid-level managers and provided job performance ratings for the operational level employees. We requested the project leader to provide us a schedule of system deployment, training programs, and a list of participating employees. We requested business unit managers to send an initial e-mail to employees about the survey. Following this e-mail, a customized invitation e-mail was sent to each employee with a link to the online survey. When an employee clicked the link, the survey software detected the employee and generated a unique ID for the employee. This ID and the employee's e-mail address were used to match the responses with the subsequent surveys using a Microsoft Excel-based tool. Each survey was accompanied by a cover letter describing the purpose of the study and details regarding confidentiality. A reminder was sent to each participant after 7 days from the initial invitation day. Employees were given 15 days to participate in each of the surveys.

Figure 2 presents the data collection process. At T_0 (pre-implementation), invitations were sent to 837 employees to participate in the survey. These employees were going to participate in a 5-day onsite training conducted by the consulting firm that implemented the SAP modules. Of the 837 employees, 767 participated in the T_0 survey (91% response rate). A total of 611 (80% response rate) of the T_0 respondents participated in the T_1 (1 month after the training) survey. We received 403 responses (66% response rate) at T_2 (2 months after T_1) and 249 usable responses (62% response rate) at T_3 (3 months after T_2). We excluded employees who were promoted and/or

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transferred during our study. These response rates were consistent with studies that had a similar research design (e.g., Bentein *et al.*, 2005). Of the respondents, 63% (N=171) were men. The average age of the respondents was 44.18 with a standard deviation of 13.01.

------ Insert Figure 2 about here -----

Two sets of analysis were conducted to determine possible attrition effects. First, demographic differences (i.e., age and gender) were tested among employees who participated (a) only at T_0; (b) only at T_1; (c) only at T_2; (d) only at T_3; and (e) at T_0, T_1, T_2, and T_3. Second, mean differences in CWX were tested within each point of measurement between those who participated at the next measurement point and those who did not participate at the next point of measurement. For example, we compared the mean difference in CWX at T_0 between those who only participated at T_0 and those who participated at T_2. These analyses revealed no significant differences. Hence, there appeared to be no significant attrition biases. Further, we tested for demographic differences (i.e., age and gender) and mean differences in CWX between early and late responses to check for response bias, and did not find any significant differences.

3.2 Measures

We used previously validated items to operationalize the constructs. Work process characteristics were measured using the items from Bala and Venkatesh (2013) immediately before and after the implementation of new work processes, i.e., at T_0 and T_1, to capture employees' perceptions of old and new work processes (except for radicalness). Given that perceived work process radicalness reflects the extent of change in work processes experienced by employees, it was measured only at T_1, after the implementation of the new ES, to capture employees' assessment of how different the post-implementation work processes were relative to the pre-implementation work processes. CWX was measured using 4 items from Seers (1989), Seers *et al.* (1995), and (Farmer *et al.*,

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2015)—i.e., ("My coworkers/other team members let me know when I do something that makes their work easier (or harder)," "I often let my coworkers/other team members know when they have done something that makes my job easier (or harder)," "In busy situations, my coworkers/other team members often ask me to help out," and "In busy situations, I often volunteer my efforts to help my coworkers/other team members"). These items capture employees' evaluations of the quality of relationships with their coworkers (reliability = .91, .89, and .90 at T_0, T_2, and T_3, respectively). Job performance was assessed with 4 items from Bala and Venkatesh (2016) and Janssen and Van Yperen (2004). These items were rated by supervisors and indicated whether employees were able to fulfill their job responsibilities effectively (reliability = .87 and .89 at T_0, and T_3, respectively). Job satisfaction measures were adapted from Camman *et al.* (1983) and Bala and Venkatesh (2013), an established, extensively used 3-item measure of employee satisfaction with their job (reliability = .84 and .81 at T_0, and T_3, respectively).

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3.3 Data Analysis Strategy

We conducted the data analysis using a structural equation modeling (SEM)-based LGM approach (Chan, 1998; Duncan *et al.*, 2006; Lance, Meade, *et al.*, 2000). LGM has gained widespread acceptance in recent years as an integrative approach to measure change in a latent variable over time and validate causal models that predict the change and assess the effect of change on one or more outcome variables. LGM overcomes many of the problems associated with traditional approaches to studying change such as repeated measures, regression, and difference scores.[5] It captures intra-individual change by developing a trajectory of change in each of the focal constructs for each individual across time. It also provides each individual's initial status on the

[5] Details on how LGM differs from and overcomes the limitations of other traditional approaches of measuring change are provided elsewhere (e.g., Chan, 1998; Duncan *et al.*, 2006; Lance, Meade, *et al.*, 2000).

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constructs (Willett and Sayer, 1994). LGM requires that the data be collected in at least three time periods in order to estimate higher-order latent constructs to represent the initial status and change in focal constructs. We closely followed the guidelines of Chan (1998) and Lance, Meade, *et al.* (2000), and exemplars from prior research (e.g., Bala and Venkatesh, 2013; Bentein *et al.*, 2005; Lance, Vandenberg, *et al.*, 2000) to conduct the LGM analysis.

In the first step, we conducted a series of SEM-based confirmatory factor analysis (CFA) nested model comparisons to evaluate measurement invariance of the focal construct—i.e., CWX. Following Bala and Venkatesh (2013) and Chan (1998), we compared five nested models to establish measurement invariance across time and identify boundaries for possible functional forms of change trajectories in CWX. We found support for measurement invariance for CWX and found a set of model constraints in place for the analysis in step 2. In step 2, we conducted LGM analyses to assess intraindividual change in CWX by fitting no growth, linear growth, and quadratic growth models—to understand the functional form of change in CWX. Finally, in step 3, we added the predictors and outcomes of the latent change constructs to the model.

4. RESULTS

4.1 Measurement Model Validation

Following Podsakoff *et al.* (2003), we employed both procedural and statistical remedies to address common method bias and did not find any significant indicators of common method bias. Table II presents the correlation matrix and descriptive statistics. All constructs had strong reliabilities—i.e., internal consistency reliabilities (ICRs) were greater than .70 for all constructs. The square roots of the shared variance between the constructs and their measures were higher than the correlations across constructs, supporting convergent and discriminant validity. The factor loadings were greater than .70 for all constructs at all time.

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----- Insert Table II about here -----

4.2 Predicting Intra-individual Changes in Interpersonal Relationships

In order to predict intra-individual change in CWX, we first needed to establish if employees indeed felt a change in CWX following the ES implementation. To determine the intra-individual change in CWX, we checked the functional form of the growth trajectory and growth parameter estimates for CWX.[6] We used a chi-square difference test (ΔX^2) to compare the fit of two nested models. If the difference is not significant (i.e., there is no significant reduction in fit), the nested model is accepted because it is more parsimonious.

As shown in Table III, the linear growth model had the best fit, suggesting that there were indeed intra-employee changes in CWX following the implementation of the ES modules. The growth parameter estimates—i.e., factor means, variances, and covariances—for CWX are presented in Table IV. The mean initial status (i.e., intercept) suggests that, on average, employees had CWX of 4.26 ($p < .001$). The initial status variances for CWX were statistically significant (.50, $p < .001$), indicating that systematic individual differences in CWX before the implementation (pre-implementation measurement), i.e., some employees had higher levels of CWX than others. The change (i.e., slope) factor mean for CWX was negative and statistically significant (-.15, $p < .001$), suggesting a decreasing trajectory of change in CWX following the implementation of the new work processes. Thus, there were significant intra-individual changes, i.e., decrease, in CWX. Further, the change (slope) variances in both variables were statistically significant (.10, $p < .01$), suggesting that some employees felt a greater rate of change, i.e.,

[6] We used the following five widely used and recommended fit indexes to assess model fit (Hu and Bentler, 1999): (a) chi-square (X^2) goodness of fit test; (b) non-normed fit index (NNFI), which is equivalent to Tucker-Lewis index (TLI); (c) the comparative fit index (CFI); (d) the root mean square error of approximation (RMSEA); and (e) the standardized root mean square residual (SRMR).

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decrease, in CWX than did others. The covariance between initial status and change was not significant for either variable.

----- Insert Tables III and IV about here -----

We hypothesized that, after controlling for pre-implementation perceived process complexity, post-implementation perceived process complexity would have a positive effect on the decreasing trajectory of change in CWX (H1). This hypothesis was supported (β = -.29, p <.001; see Table V). Note that the negative coefficients are actually denoting positive associations because CWX had a *decreasing* trajectory of change. Similarly, pre-implementation perceived process complexity had a significant positive effect on the decreasing trajectory of change in CWX (β = -.22, p <.05), suggesting that employees with a higher level of pre-implementation process complexity perceived a greater rate of decrease in CWX. We predicted that perceived process rigidity would have a significant effect on the change in CWX (H2). We found support for this hypothesis (β = -.33, p <.001). Finally, perceived process radicalness was theorized to have a significant effect on employees' changes in CWX (H3). This hypothesis was supported (β = -.26, p <.001). Overall, process characteristics explained 33% of the variance in changes in CWX.

----- Insert Table V about here -----

4.3 Impacts of Intra-individual Changes on Job Outcomes

We predicted that the greater the employee's change in CWX, the greater the change in his/her job performance (H4a) and job satisfaction (H4b). Results, shown in Table VI, indicate that change in CWX had a positive effect on job performance and job satisfaction, controlling for pre-implementation job performance and job satisfaction. Controlling for the pre-implementation measures of job performance and job satisfaction helped us interpret the results as a lagged regression analysis to study change in a dependent variable (Lance, Vandenberg, *et al.*, 2000).

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Given that CWX decreased over time, the positive sign associated with the effect of change in CWX on job performance and job satisfaction indicates that the rate of decrease in CWX had a negative effect on job performance and job satisfaction. Thus, H4a and H4b were supported.

H5 predicted that changes in CWX would partially mediate the effects of process characteristics on job outcomes. Table VI (model 4) shows that changes in CWX partially mediated the effects of work process characteristics on job outcomes after controlling for pre-implementation job outcomes, thus supporting H5. This result suggests that although employees perceive changes in their work process characteristics following an ES implementation, these changes have an effect on their job outcomes through interpersonal relationships that are more proximal (than work process characteristics) determinants of job outcomes. The models explained 24% of the variance in job performance and 29% of the variance in job satisfaction.

----- Insert Table VI about here -----

5. DISCUSSION

The objective of this research was to understand the change in an important aspect of employees' jobs—CWX—following an ES implementation. Our research model posits that three key aspects of employees' perceptions of their work process characteristics—i.e., complexity, rigidity, and radicalness—explain change in CWX. We found that 6 months after the implementation of an ES, employee perceptions of CWX declined. Decrease in CWX was significantly explained by employees' perceptions of their individual work process characteristics, with perceived work process rigidity being the strongest predictor of change in CWX. Finally, decrease in CWX had a significant negative impact on job performance and on job satisfaction.

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5.1 Theoretical Contributions

This research makes several important theoretical contributions. First, it contributes to an important stream of research related to the impacts of IT on employees' jobs and job outcomes and employees' perceptions of changes following an IT implementation and associated behavioral responses (e.g., Bala and Venkatesh, 2013; Beaudry and Pinsonneault, 2005; Boudreau and Robey, 2005; Davis and Hufnagel, 2007; Lapointe and Rivard, 2005; Morris and Venkatesh, 2010; Sykes *et al.*, 2014). We draw on extensive prior research on organizational work processes and conceptualize individual-level work processes that, we suggest, employees produce, enact, and sustain over time to fulfill their job responsibilities. Although employees typically perform tasks (or actions) as part of one or more organizational business processes, prior research has indicated that they develop perceptions of individual work processes (Becker, 2005; Betsch *et al.*, 2004). We theorize how employees' perceptions of work process characteristics will explain their assessment of change in their relationship with coworkers and job outcomes, i.e., job performance and job satisfaction. This work thus extends prior research by linking individual-level work processes with interpersonal relationships and employee job outcomes, and complements prior work on peer support in the context of ES implementations, as such prior work did not consider the role of work processes and treated ES implementations as a blackbox (e.g., Sykes, 2015, 2020; Sykes and Venkatesh, 2017) or only considered job characteristics (e.g., Morris and Venkatesh, 2010). We also contribute by focusing on individual work processes that employees produce and evolve as they experience a new ES and associated changes in organizational processes. Our findings indicate that there are indeed differences in individuals' appraisals of work processes in the context of a given ES implementation designed to achieve change in the set of organizational processes.

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Second, we contribute to the literature by offering insights on how and why characteristics of employee work processes influence interpersonal relationships in the context of an ES implementation. Interpersonal relationships, particularly the quality of social exchange relationships with coworkers, are critical for employees to be able to survive in a rapidly changing work environment. If an ES implementation, which is supposed to help employees excel in their work, degrades the quality of relationships with coworkers, it is reasonable to expect that such an implementation will not lead to successful employee and organizational outcomes. In fact, our findings reinforce the findings of Barley (1986), Burkhardt (1994), Lapointe and Rivard (2005), and Leonardi (2011) that implementation of technologies and new organizational work processes can indeed change the pattern of relationships and social interactions in the workplace. Our research goes beyond their findings by identifying important contextual variables—employees' perceptions of their work process characteristics—that predict changes in important interpersonal relationships.

Although we found a significant decreasing trajectory of change in CWX during the time of our data collection (6 months after the implementation of new work processes), it is possible that there will be learning effects (e.g., employees will become proficient with the new ES and work processes) and the quality of relationships will go back to pre-implementation levels. Indeed, research on organizational work processes or routines has highlighted that learning is a critical element of organizational routines because actors learn various aspects of their routines (e.g., ostensive, performative, material), especially as they internalize routines over time (e.g, Becker, 2005). However, from a change management perspective, it is important to understand and manage employees' perceptions of changes immediately after the implementation—i.e., the shakedown

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phase—of a change initiative. If employees develop negative attitudes toward a change during this time, it is difficult to gain long-term support for and acceptance of the change.

We found perceived work process rigidity to be the strongest predictor of the decreasing trajectory of change in coworker relationship. CWX depends on expectations employees have with respect to the reciprocal relationships with their coworkers. If work processes become rigid following an ES implementation (e.g., employees must follow a rigid set of steps while executing their work processes using the newly implemented ES), employees will not be able to sustain the reciprocal relationships that were developed and optimized before the ES implementation. Much prior research has examined the role of leadership and relationship quality in the context of organizational change (e.g., Herold *et al.*, 2008; Kamdar and Van Dyne, 2007; Zhao *et al.*, 2019), and our work goes beyond this prior research by focusing on a different issue—the impact of a major organizational change (i.e., an ES implementation) on the relationship quality itself. Our findings suggest that the quality of interpersonal relationships is dynamic and will vary depending on the work environment in which employees perform their tasks.

Third, our findings contribute to the broad change management literature by linking characteristics of employee work processes to changes in an important aspect of employees' jobs. Although much is known about organizational change management (e.g., the role of communication, employee participation, managerial influence tactics, and leadership), organizations still fail to manage changes effectively, and a majority of organizational change efforts are not successful (Stouten *et al.*, 2018; Wee and Taylor, 2018). Therefore, there is a need to enrich our current understanding of change management by examining the change context and its characteristics. Our findings contribute to this literature by theorizing and testing the relationship between employee work processes and changes in interpersonal relationships

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following a major organizational change initiative (i.e., an ES implementation). Our model and findings offer contextual insights related to change management during large-scale system implementations. Herold *et al.* (2007) noted that prior research on organizational change failed to take into account the context of a change event. Hong *et al.* (2014), Johns (2006, 2017) and O'Reilly III (1991) in the IS and organizational behavior literatures have called for research on the influence of *context* on employees and organizations. We contribute by studying an important change context—an ES implementation—and highlighting how specific facets of employees' perceptions of change (i.e., work process characteristics) lead to change in their relationship with coworkers.

5.2 Limitations and Future Research

We note a few limitations of our study. First, we collected data from one organization in the high-tech industry. Although this allowed us to control for organizational variables (e.g., organizational culture), it limits the generalizability of our findings. Our model should be tested in other organizations and industries not only from the perspective of generalizability, but also, and more importantly, from the perspective of surfacing contextual differences. Second, we collected our data in an ES implementation context. There are many different types of ITs and it is possible that for other types of IT implementations that do not require substantial changes to organizational and employee processes, the results would be different. Therefore, future research should investigate the changes in interpersonal relationships in the context of other types of IT-induced organizational change. A third limitation is that we only collected data 6 months after the implementation of a new ES. Prior research has suggested that there is a lag before organizations can benefit from a new ES. Therefore, it is possible that the quality of relationship with coworkers would go back to pre-implementation levels after a more extended period of time. However, it is important to learn

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the effect of an ES implementation on interpersonal relationships soon after the implementation (i.e., the shakedown phase) because if organizations cannot manage the magnitude of change in employees' work lives immediately after the implementation, it is possible that employees will develop negative reactions toward the new ES and may not accept or use the system (Bala and Venkatesh, 2013; Lapointe and Rivard, 2005).

Another limitation of this research is that we examined just one aspect of interpersonal relationships—i.e., coworker relationship. There are other aspects of relationships (e.g., supervisor relationship, network ties, supervisor and coworker support, organizational support) that should be examined in future research to develop a comprehensive understanding of change in relationships following an ES and/or IT implementation. Research on social networks offers a set of theories, methods and tools that can be incorporated in future research to understand if there is any change in organizational network structure due to organizational change and predictors of this change (Sykes *et al.*, 2009, 2014). Multi-level investigations can be conducted to understand if certain types of leaders (e.g., transformational leader, transactional leader) experience less change in their relationships with subordinates. Finally, other predictors can be integrated into the model (e.g., individual differences, leadership style, psychological safety, organizational support) to understand why some employees perceived more changes than did others.

Partially offsetting these limitations, however, is the longitudinal nature of our design. By measuring constructs at four points in time, we were able to estimate the trajectory of change in CWX as it unfolded following the ES implementation. We still cannot make causal inferences with the level of confidence provided by an experimental design for we cannot rule out the possible effects of unmeasured variables. The longitudinal nature of our data, however, and our estimation

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of change trajectory significantly increase the confidence we have in the causal ordering of the constructs in our model.

5.3 Practical Implications

Our research has important implications for managers responsible for implementing ES and other types of complex ITs. First, they should be mindful about the process of implementation so that employees do not feel a high degree of complexity, rigidity, and radicalness in their work processes. In particular, managers need to think about interventions to mitigate the strong effects of rigidity and radicalness on employees' interpersonal relationships. Interventions, such as simulation-based training and user participation and involvement, can be developed and employed to influence such perceptions. Second, given that employees may feel a decrease in the quality of CWX following an ES implementation, managers should be aware of the possibility of deteriorating relationships among employees and take measures to avoid such a situation. They should clarify the expectations from employees before the implementation takes place and should be supportive of employees who are going through the implementation. In order to facilitate high quality coworker relationships, managers may create support groups where employees and their coworkers meet to discuss the impacts of organizational change in their jobs and to develop a clear understanding of their expectations from each other. Effective communication throughout the change implementation process can also help diminish the decreasing trajectory of change in CWX.

6. CONCLUSIONS

We set out to examine the impacts of an ES implementation on employee interpersonal relationships. Our results indicate that following an ES implementation, employees felt a decrease in the quality of relationships with their coworkers. We found that work process characteristics—

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i.e., complexity, rigidity, and radicalness—that were salient to the employees following the ES implementation predicted the change in coworker relationships. Our work goes beyond the current research on the impact of ES implementations on employees' jobs by focusing on ESs impacts on relationships with coworkers. Much prior research has focused on the effects of interpersonal relationships on successful change implementation and employee attitudes and behaviors. We examined these linkages from an opposite perspective by examining the effect of the change initiative itself (i.e., an ES implementation) on interpersonal relationships. We believe that this perspective suggests new avenues for future research on understanding the impacts of IT-enabled organizational changes on various aspects of employees' work life. From a practical perspective, our research suggests that managers should consider change in coworker relationship as an important outcome of ES implementation projects that warrant one or more formal and effective change management interventions.

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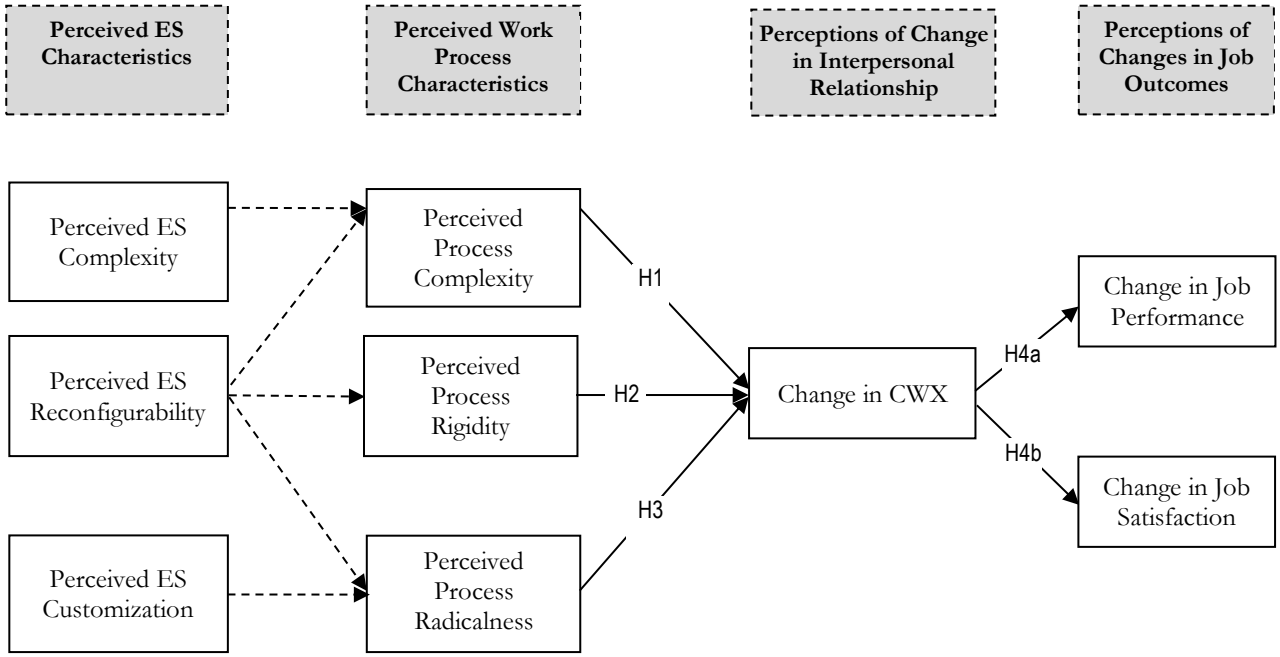
Figure 1: Research Model



Notes:

1. Dashed lines represent the relationships that are hypothesized and tested in Bala and Venkatesh (2013) and not hypothesized/tested in this paper.
2. Although perceived process complexity and perceived process rigidity were measured during both pre- and post-implementation stages, perceived process radicalness was measured only during post-implementation stage to capture employees' assessment of the extent of change in their work processes following the ES implementation. It was not measured during the pre-implementation stage because employees had no basis for comparison to assess the extent of radicalness of their pre-implementation work processes.

Figure 2: Data collection procedure

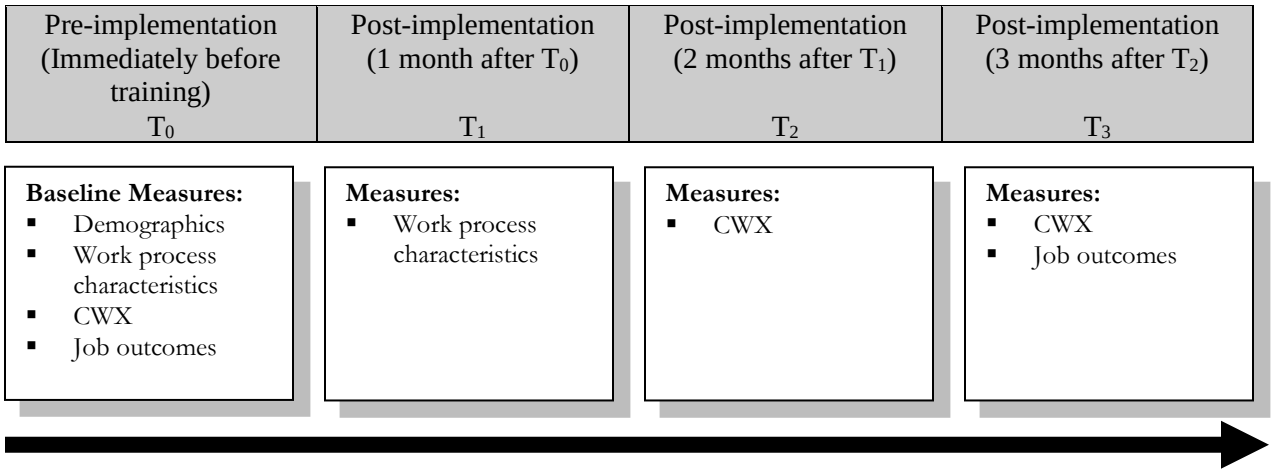


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Table I: List of items

Constructs	Measurement items*		Adapted source
Perceived work process complexity (COMP)	1	It is often difficult to understand what resources I may need to execute my core work processes.	(Bala and Venkatesh, 2013)
	2	There is no understandable sequence of steps that can be followed in doing my core work processes.	
	3	It is often difficult to understand what information I may need for my core work processes.	
	4	It is often difficult to predict the steps of my core work processes.	
Perceived work process rigidity (RGDT)	1	My core work processes are so inflexible that I have to follow a fixed set of steps.	(Bala and Venkatesh, 2013)
	2	There is no variation in sequence of my core work process tasks.	
	3	My core work processes are not flexible.	
	4	Overall, my core work processes are very rigid.	
Perceived workload radicalness (RDCL)	After the implementation of the new system…		(Bala and Venkatesh, 2013)
	1	…My core work process tasks are now very different from what I used to perform.	
	2	…The tasks of my current work processes are radically different.	
	3	…I need resources for my tasks that I never needed before.	
	4	…Overall, my work processes are now radically different.	
Coworker exchange (CWX)	1	My coworkers/other team members let me know when I do something that makes their work easier (or harder).	(Farmer *et al.*, 2015; Seers, 1989; Seers *et al.*, 1995)
	2	I often let my coworkers/other team members know when they have done something that makes my job easier (or harder).	
	3	In busy situations, my coworkers/other team members often ask me to help out.	
	4	In busy situations, I often volunteer my efforts to help my coworkers/other team members.	
Job performance (JPERF)	1	This worker always completes the duties specified in his/her job description.	(Bala and Venkatesh, 2016; Janssen and Van Yperen, 2004)
	2	This worker meets all the formal performance requirements of the job.	
	3	This worker fulfills all responsibilities required by his/her job.	
	4	This worker successfully performs essential duties.	
Job Satisfaction (JSAT)	1	All things considered, I am satisfied with my job.	(Bala and Venkatesh, 2013; Camman *et al.*, 1983)
	2	In general, I don't like my job. (Reverse coded).	
	3	In general, I like working here.	

Note: 7-point Likert agreement scale was used for all items.

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Table II: Correlation Matrix and Descriptive Statistics

Constructs	Mean	S.D.	ICR	1	2	3	4	5	6	7	8	9	10	11	12	13	14
1. Age	44.18	13.01	-	-													
2. Gender	.63	.48	-	-.07	-												
3. COMP T_0	3.78	1.02	.96	.09	-.03	.95											
4. COMP T_1	4.35	1.17	.93	.01	.10	.48***	.94										
5. RGDT T_0	3.19	1.01	.91	-.08	.04	.17**	.13*	.91									
6. RGDT T_1	4.23	1.13	.89	-.11	-.02	.17*	.19**	.49***	.89								
7. RDCL T_1	4.01	1.09	.91	-.11	.02	.05	.16*	-.10	.26***	.91							
8. CWX T_0	4.40	1.05	.91	.05	.10	-.36***	-.19**	-.31***	-.19**	-.12*	.91						
9. CWX T_2	3.82	1.11	.89	.06	-.02	-.31***	-.34***	-.25***	-.36***	-.32***	.49***	.89					
10. CWX T_3	4.07	1.14	.90	.07	-.03	-.33***	-.34***	-.18**	-.32***	-.26***	.33***	.60***	.88				
11. JPERF T_0	4.93	1.04	.87	-.14*	.12*	-.10	-.14*	-.13*	-.16*	-.14*	.14*	.10	.04	.88			
12. JPERF T_3	4.17	1.16	.89	-.11	.09	-.07	-.14*	-.15*	-.21***	-.19**	.08	.13*	.15*	.31***	.83		
13. JSAT T_0	5.14	1.06	.84	.12*	-.14*	-.19**	-.17**	-.19***	-.22***	-.20***	.17**	.08	.04	.29***	.25***	.86	
14. JSAT T_3	4.11	1.10	.81	.08	-.11	-.14*	-.24***	-.21***	-.29***	-.24***	.03	.15*	.19**	.27***	.30***	.32***	.87

Notes:

1. Gender is coded as 0 for women and 1 for men. COMP = perceived work process complexity; RGDT = perceived work process rigidity; RDCL = perceived workload radicalness; CWX = coworker exchange; JPERF: job performance; JSAT: job satisfaction.
2. T_0: immediately before training; T_1: 1 month after T_0; T_2: 2 months after T_1; T3: 3 months after T_2.
3. ICR: internal consistency reliability ($\rho_c = (\Sigma\lambda_i)^2 / [(\Sigma\lambda_i)^2 + \Sigma i var(\varepsilon i)]$ where λ_i is the component loading to an indicator and $var(\varepsilon_i) = 1-\lambda_i^2$). Diagonal elements are the square root of the shared variance between the constructs and their measures; off-diagonal elements are correlations between constructs. For discriminant validity, diagonal elements should be larger than off-diagonal elements.
4. $n = 249$.
5. * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$.

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Table III: Tests of Multivariate LGM Analysis

Models	X^2	df	Model comparison	ΔX^2	Δdf	NNFI	CFI	RMSEA	SRMR
Model 1: No growth	402.45***	245	-	-	-	.97	.97	.05	.09
Model 2: Positive linear growth	322.97***	236	1 vs. 2	-79.48***	9	.98	.98	.04	.07
Model 3: Positive accelerated quadratic growth	NA	NA	NA	NA	NA	NA	NA	NA	NA

Note: Model 3 failed to converge to a proper solution; * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$.

Table IV: Growth Parameter Estimates

Variables	Initial status (IS)			Change (CH)		Covariance (IS-CH)
	Mean	Variance		Mean	Variance	
CWX	4.26***	.50***		-.15***	.10**	-.02

Note: CWX = coworker exchange; * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$.

Table V: Predicting Change in CWX

		Change: CWX		
Predictors		Model 1	Model 2	Model 3
Control variables				
Age		.20*	.19*	.12
Gender		-.13	-.11	-.08
T_0 variables (prior to ES implementation)				
Perceived process complexity (T_0)			-.39***	-.22*
Perceived process rigidity (T_0)			-.07	-.06
Work process characteristics (after ES implementation)				
Perceived process complexity (T_1)				-.29***
Perceived process rigidity (T_1)				-.33***
Perceived process radicalness (T_1)				-.26***
R^2		.05	.20	.33
ΔR^2			.15***	.13***

Note: Standardized regression coefficients are shown; $n = 249$; * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$.

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Table VI: Predicting Changes in Job Outcomes

	Job performance (T_3)				Job satisfaction (T_3)			
Predictors	**Model 1**	**Model 2**	**Model 3**	**Model 4**	**Model 1**	**Model 2**	**Model 3**	**Model 4**
Control variables								
Age	-.07	-.10	-.08	-.06	-.13*	-.15*	-.11	-.05
Gender	.05	.06	.04	-.03	.12	.11	.07	-.06
T_0 variables (prior to ES implementation)								
Job performance (T_0)	.29***	.23***	.24***	.22**				
Job satisfaction (T_0)					.28***	.22**	.23***	.24***
Perceived work process characteristics (after ES implementation)								
…complexity (T_1)		-.07		-.05		-.08		-.03
…rigidity (T_1)		-.14*		-.12*		-.15*		-.11*
…radicalness (T_1)		-.13*		-.11*		-.14*		-.10
Changes in interpersonal relationships								
Coworker exchange (CWX)			.16*	.13*			.17**	.14**
R^2	.11	.16	.21	.24	.10	.14	.24	.29
ΔR^2		.05**	.10***	.08**		.04*	.14***	.15***

Note: Standardized regression coefficients are shown; n = 249; * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$.

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