Journal of the Association for Information Systems (2020) **21**(2), 364-387
doi: 10.17705/1jais.00605

RESEARCH ARTICLE

ISSN 1536-9323

Incumbent System Context and Job Outcomes of Effective Enterprise System Use

Rob Hornyak[1], Arun Rai[2], John Qi Dong[3]
[1]Independent Researcher, USA, robtgh@gmail.com
[2]Georgia State University, USA, arunrai@gsu.edu
[3]University of Groningen, Netherlands, john.dong@rug.nl

Abstract

Enterprise system (ES) implementations frequently fail to deliver job benefits for employees, many of whom are dissatisfied with these systems that were implemented to support them in their jobs. The literature is clear that the realization of job benefits depends on how these systems are used, motivating us to focus on the determinants and outcomes of effective ES use. Focusing on employees' use of systems to support their work processes, we examine how employees' pre-implementation context—specifically, the use of an incumbent system and the associated work processes—affects their performance expectancy of a new ES and, consequently, their effective use of the ES and the resulting job outcomes. Our results suggest that (1) employees' perceptions of two facets of information transparency based on incumbent system use, namely information visibility and information credibility, have different impacts on employees' performance expectancy of a new ES depending on their perceptions of process standardization in the incumbent system context, and that (2) effective ES use mediates the impact of pre-implementation performance expectancy on post-implementation user satisfaction and, consequently, job effectiveness. Our findings provide insights into the mechanisms linking the context of using an incumbent system to post-implementation effective ES use and job outcomes, thereby integrating perspectives from technology acceptance and use, IS success, and work design.

Keywords: Effective Use, Enterprise Systems, Incumbent Systems, Process Standardization, User Satisfaction, Job Effectiveness

Choon Ling Sia was the accepting senior editor. This research article was submitted on December 30, 2015, and underwent three revisions.

1 Introduction

The implementation of an enterprise system (ES) to redefine the work processes of employees has been one of the most prominent innovations undertaken by firms, with spending projections indicating that this pattern will continue (Jia, Rai, & Xu, 2019; Trantopoulos et al., 2017). Despite initially implementing these systems to automate and redesign back-office processes, firms have been focusing their efforts more recently on ES implementations to replace fragmented incumbent systems and on innovating employees' work processes (Davenport, Harris, & Cantrell, 2004; Polites & Karahanna, 2012; Sykes, Venkatesh, & Gosain, 2009). A work process organizes activities for which there is an expectation of and opportunity for value creation (Davenport et al., 2004). Despite managers' recognition that ES has significant potential to innovate employees' work processes, both industry and the research literature have reported poor results in firms garnering expected benefits from ES implementations (e.g., Karimi, Somers, & Bhattacherjee, 2007; Nah, Lau, & Kuang, 2001; Sykes et al., 2009).

One prominent explanation for these lackluster results is a lack of employee buy-in of an ES implementation and employees' underutilization of the system (Jasperson, Carter & Zmud, 2005; Venkatesh et al., 2008). To realize the potential benefits from an ES, employees need to effectively interact with the new system (DeLone & McLean, 1992; 2003; Devaraj & Kohli, 2003). Firms employ mandates to drive employees' use of the new system (Nah, Tan, & Teh, 2004), but despite these directives, employees often exhibit shallow use (Hsieh & Wang, 2007; Straub & del Guidice, 2012), employing the new system in a superficial way to comply with use mandates (Brown et al., 2002). Cursory or limited use, then, has been implicated in explaining the limited or nonexistent productivity gains from an ES implementation (Burton-Jones & Grange, 2013; Burton-Jones & Straub, 2006; Petter, DeLone, & McLean, 2008). To understand how employees' ES use in mandatory use settings leads to job benefits, we integrate and extend research streams in technology acceptance and use, IS success, and work design.

Prior research on acceptance and use of information systems (IS) has shown that user beliefs about a new system predict the behavioral intention to use the system and, in turn, system use (see Venkatesh et al., 2003 for a literature review). Recent work in this stream has adopted a longitudinal perspective, integrating the pre-implementation context to enrich our understanding of how technology acceptance and use unfold (Bala & Venkatesh, 2013; Bala & Venkatesh, 2015; Venkatesh, 2006). Building on this work, we focus on the role of employees' pre-implementation perceptions of the incumbent system context in influencing their beliefs, use, and benefits of a new ES. We employ this focus because an ES is typically implemented to replace an incumbent system (Polites & Karahanna, 2012).

The benefits of an ES implementation reside in deploying automation and standardization to integrate information across work processes and making this information transparent to relevant stakeholders in an organization (Davenport, 1998; Ross & Vitale, 2000). Accordingly, we draw on the information transparency literature to conceptualize information transparency of the work processes associated with using an incumbent system because incumbent system use is the baseline against which employees assess an ES implementation. This literature suggests two facets of information transparency—information visibility and information credibility (Granados & Gupta, 2013; Granados, Gupta, & Kauffman, 2010; Zhou & Zhu, 2010; Zhu, 2004)—that we use to conceptualize information transparency of work processes in the incumbent system context. Specifically, information visibility refers to the degree to which information for work processes is available to an employee based on incumbent system use, and information credibility is defined as the degree to which information for work processes is trustworthy to an employee based on incumbent system use. Thus, information visibility and information credibility based on incumbent system use capture important facets of the information transparency of work processes that employees consider to formulate their performance expectancy of a new ES.

In addition, we consider how employees' work processes in the incumbent system context moderate the influence of information visibility and information credibility on their performance expectancy of a new ES. We consider work processes in the incumbent system context because an ES is typically implemented to improve not only information transparency but also process standards (Davenport, 1998; Ross & Vitale, 2000). Drawing on the work design literature, in which the idea of process standardization is salient (Grant & Parker, 2009; Hackman & Oldham, 1976; Morgeson & Humphrey, 2006), we define process standardization as the degree to which an employee's work processes are standardized with respect to inputs, outputs, and activity sequences. A new ES is deployed to standardize the work processes, whereby automated and standardized processes configure workflows, cascade alerts, and manage exceptions (Beretta, 2002; Shehab et al., 2004). Therefore, how employees perceive the utility of transitioning from an incumbent system to a new ES should depend not only on the level of information transparency of work processes associated with the incumbent system context but also on the degree to which standards for inputs, outputs, and activity sequences of the work processes are established in this context (Law & Ngai, 2007).

We also examine the link between pre-implementation ES performance expectancy and job outcomes that accrue from ES use. Although system use is recognized as a key condition for realizing the benefits of a system (DeLone & McLean, 1992; Devaraj & Kohli, 2003), recent studies have underscored the need to depart from "lean" approaches to conceive system use because system use is a complex behavior requiring context-sensitive conceptualization and operationalization (Burton-Jones & Straub, 2006; Straub & del Guidice, 2012). Accordingly, to understand why employees performing the same work processes and using the same ES under the same use mandates might realize different job benefits, we draw on the effective use conceptualization (Burton-Jones & Grange, 2013) in theorizing ES use. To assess how effective ES use impacts job outcomes, we consider both job effectiveness as well as user satisfaction with the system because user satisfaction can play a critical role in mediating the impact of system use on job performance (Au, Ngai, & Cheng, 2008; Hsieh et al., 2012).

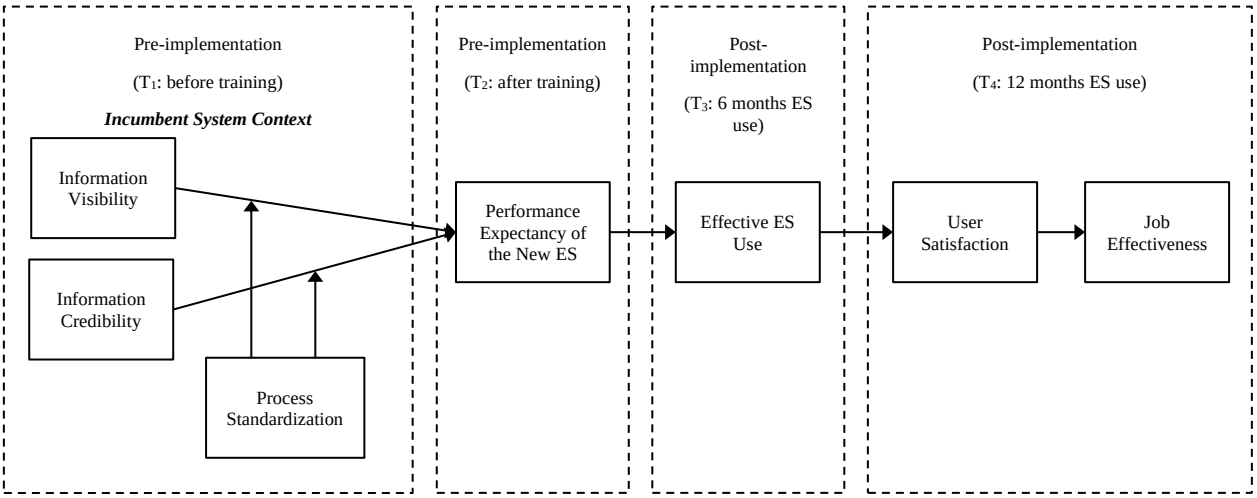

Figure 1. Research Model

2 Theoretical Background

Grounded in the understanding that job benefits from an ES implementation are realized through system use, we start with ES use as the focal point in our research model (see Figure 1). We propose that employees' pre-implementation ES performance expectancy significantly impacts how they use the system and that this performance expectancy is shaped by their perceptions of the incumbent system context, specifically information transparency of work processes and the standardization of work processes. We expect that how employees use the ES will, in turn, lead to user satisfaction and job effectiveness. Next, we describe the constructs in our research model across a temporal sequence of the implementation process.

2.1 Pre-Implementation Incumbent System Context

For work processes for which an ES implementation is undertaken, the incumbent system is typically fragmented. Such a fragmented system is unlikely to have automated procedures and standards to validate and pool data across a variety of sources, resulting in poor data integration across work processes. In contrast, an ES automates the capture and processing of large amounts of data and produces timely, accurate information about work processes, thereby eliminating manual data management and reducing the need to resolve data incompatibilities (Davenport, 1998). Given that a key goal in replacing an incumbent system with a new ES is to improve the information transparency of work processes, we draw on the information transparency literature to characterize the incumbent system context.

Information transparency has been defined as the degree of visibility and credibility of information (Granados & Gupta, 2013; Granados et al., 2010; Zhou & Zhu, 2010; Zhu, 2004). The information transparency literature has indicated that both the quantity of the information that is available and the quality of the information that is accessible are important because transparency cannot be achieved if the information is distorted, biased, or opaque. As such, the literature suggests that information visibility and information credibility are two necessary and sufficient facets of information transparency (e.g., Granados & Gupta, 2013; Granados et al., 2010; Zhou & Zhu, 2010; Zhu, 2004). We define information visibility as the degree to which information for work processes is available to an employee based on incumbent system use and information credibility as the degree to which information for work processes is trustworthy to an employee based on incumbent system use. How employees perceive information transparency of work processes when using an incumbent system is the baseline against which they formulate their performance expectancy of a new ES.

Employees' job characteristics related to adhering to standards for inputs, outputs, and activity sequences of work processes are particularly relevant to their appraisals of a new ES and are important to their job performance. A new ES can be implemented to standardize work processes (Cotteleer & Bendoly, 2006) by ensuring that data are collected using a data master (Brazel & Dang, 2008) and can also be used to integrate modules underlying work processes by employing a central database and standardized interfaces for data exchange and verification (Davenport, 1998; Barki & Pinsonneault, 2005; Weill & Ross, 2009). That is, a new ES can be deployed to standardize work processes, whereby automated and standardized protocols configure workflows, cascade alerts, and manage exceptions (Beretta, 2002; Shehab et al., 2004). How employees perceive the transition

from an incumbent system to a new ES not only depends on the information transparency associated with incumbent system use, but is also likely to be contingent on the degree to which standards have been established for work processes based on incumbent system use (Law & Ngai, 2007). Accordingly, we focus on understanding how employees' perceptions of information visibility and information credibility interact with their perceptions of process standardization in the incumbent system context to affect their pre-implementation performance expectancy of the new ES.

2.2 Pre-Implementation Performance Expectancy of the New ES

Performance expectancy is the degree to which an individual believes that using a system will lead to performance gains (Venkatesh et al., 2003). We expect employees' perceptions of information transparency and standards for work processes associated with the incumbent system context will jointly influence their pre-implementation performance expectancy of a new ES because employees evaluate a new ES in light of the incumbent system context.

2.3 Post-Implementation Effective ES Use

In conceptualizing effective use, Burton-Jones & Grange (2013) recognized that system use is a goal-directed behavior and noted that use may be insufficient to gain benefits from a system (Seddon, 1997). They shifted the emphasis from use to effective use, or using a system in a way that achieves the goals of the system. Drawing on Burton-Jones & Grange (2013), we define post-implementation effective ES use as using a new ES in a way that accomplishes the objectives of the system. In mandatory use settings, managers may require the use of certain features of a system, but employees have considerable discretion in how they use the system. For example, a sourcing organization might mandate that sourcing professionals use the ES e-auction feature for price discovery for all sourcing projects. However, given project characteristics (e.g., market power, good or service complexity, and supply base), a sourcing professional may use the system's features to access certain supplier information (e.g., supplier performance trends and aggregate spending on the supplier) and negotiate a sourcing agreement. Even though all sourcing professionals are in compliance with using the e-auction feature for price discovery, their use of the system for supplier negotiations might differ substantially.

2.4 Post-Implementation Job Outcomes

We consider two job outcomes: user satisfaction and job effectiveness. User satisfaction has figured prominently in the literature as a surrogate for IS success (Delone & McLean, 1992; Petter et al., 2008; Rai, Lang, & Welker, 2002). Research on users' overall reaction to a system has assessed users' holistic cognitive and affective reactions to the system (Bhattacherjee, 2001; Hsieh et al., 2012). Additionally, Au et al. (2008) advanced a needs-based conceptualization of user satisfaction as the degree to which a user's experience with a system fulfills certain needs, a perspective that Hsieh et al. (2012) adopted in their work on employee satisfaction with customer relationship management (CRM) system use in mandatory use settings. Drawing on these studies, we define post-implementation user satisfaction as a user's overall affective and cognitive appraisals of how well his or her job needs are fulfilled with system use.

Job performance can be conceptualized and measured from a procedural or effectiveness perspective (Campbell et al., 1990). From a procedural perspective, the focus is on assessing how well employees accomplish prescribed activities. In contrast, from an effectiveness perspective, the focus is on assessing how well employees achieve desired job outcomes. Because we are exploring ES use in support of employees' work processes where the employees possess valuable knowledge regarding these processes, we focus on job effectiveness, defined as an employee's achievement of desired job outcomes.

3 Hypotheses Development

Our theorization explains how employees' beliefs regarding information transparency moderated by the work process standardization in an incumbent system context impact expectations of the new ES. We are also guided by the literature on the development of contingency theories, which suggests that moderators can surface countervailing effects (Johns, 2006; Johns, 2017; Hong et al., 2013).[1]

To recap, information visibility refers to the degree to which information for work processes is available to an employee based on incumbent system use. We suggest that the impact of information visibility on ES performance expectancy is contingent on employees' work process standardization and is not

[1] There can be countervailing effects at different levels of moderators, even if the direct effect is not significant. Statistically, the direct effect of a variable *X* without a moderator *M* considered is the average effect of *X* on an outcome *Y* across all levels of *C* (in experimental research and econometrics, this is referred to as the average treatment effect). If the moderator *M* is countervailing, the direct effect of *X* on *Y* may not be significant.

always positive or negative. Specifically, we propose that employees' perceptions of information visibility based on incumbent system use have (1) a positive effect on their performance expectancy of using a new ES when perceptions of pre-implementation process standardization are low, and (2) a negative effect on their performance expectancy of using a new ES when perceptions of pre-implementation process standardization are high. We suggest that perceptions from using an incumbent system are the baseline against which employees evaluate the benefits of using a new ES, but pre-implementation process standardization plays a moderating role as it establishes rules for sharing and integrating information.

Process standardization reflects the degree to which inputs, outputs, and activity sequences of work processes are standardized. For employees, standardization requires the application of rules and procedures about how the work processes should be performed. Standards can lead to increased job performance because rules and procedures reduce errors, facilitate communication, and embed best practices into work processes (e.g., Davenport, 2005; de Toni & Panizzolo, 1993; Phelps, 2006; Ramakumar & Cooper, 2004). Taking the work processes of sourcing employees as an example, a new ES can establish standards for acquiring information (inputs), sharing information (outputs), and sequencing activities (i.e., ordering the execution of activities), thereby enforcing access to information (Davenport, 1998; Ross & Vitale, 2000). As such, when employees perceive that the pre-implementation work processes are highly unstandardized, achieving information visibility requires them to negotiate idiosyncratic protocols for sharing information across parties and to establish workarounds for the incumbent system's limitations, leading employees to have higher performance expectancy of a new ES. However, when employees perceive that the pre-implementation work processes are highly standardized, information visibility based on incumbent system use is achieved without the need for ongoing negotiations among parties related to information sharing, leading employees to have lower performance expectancy of a new ES. Thus, we propose the following hypothesis:

H1: At lower (higher) levels of perceptions of pre-implementation process standardization, employees' perceptions of information visibility based on incumbent system use have a positive (negative) relationship with their pre-implementation performance expectancy of using a new ES.

Information credibility refers to the degree to which information for work processes is trustworthy to an employee based on incumbent system use. Here again, we expect that its impact on employees' performance expectancy of using a new ES is specific to the work process standardization and is not always positive or negative. Specifically, we propose that employees' perceptions of information credibility based on incumbent system use have (1) a positive effect on their performance expectancy of using a new ES when perceptions of pre-implementation process standardization are low, and (2) a negative effect on their performance expectancy of using a new ES when perceptions of pre-implementation process standardization are high. For sourcing employees, ES can enforce standards through automated procedures to capture and authenticate information inputs and outputs and to manage data integrity as activities involving multiple users are executed (Davenport et al., 2004; Ross & Vitale, 2000). Therefore, when employees perceive that the pre-implementation work processes are highly unstandardized, achieving information credibility requires them to gather and cross-validate data that were fragmented in the incumbent system, leading employees to have higher performance expectancy of a new ES. However, when employees perceive that the pre-implementation work processes are highly standardized, information credibility is achieved through well-defined processes that integrate information from different systems, leading employees to have lower performance expectancy of a new ES. Thus, we propose the following hypothesis:

H2: At lower (higher) levels of perceptions of pre-implementation process standardization, employees' perceptions of information credibility based on incumbent system use have a positive (negative) relationship with their pre-implementation performance expectancy of using a new ES.

Furthermore, we propose that employees' performance expectancy of using a new ES will lead to user satisfaction if they effectively use the ES. Our logic is based on the chain of influence from motivation (performance expectancy of ES use) to use behaviors that accomplish the goals of the ES (effective use) to benefits (user satisfaction), as we explain next. Performance expectancy is the degree to which an individual believes that using a system will lead to performance gains (Venkatesh et al., 2003). A significant body of research has introduced similar constructs related to how the instrumental benefits of a technology lead to acceptance, adoption, and usage behaviors (e.g., Agarwal & Karahanna, 2000; Davis, 1989; Venkatesh & Bala, 2008). The dominant reasoning in technology acceptance research has been to view usefulness perceptions as an extrinsic motivator for usage behaviors (e.g., Davis, Bagozzi, & Warshaw, 1992; Venkatesh & Davis, 2000). Effective use refers to using a system in ways that attain the goals

of the system (Burton-Jones & Grange, 2013) [2]. Consistent with beliefs that system use will lead to job performance gains, employees will be motivated to use an ES in a way that enables the attainment of system goals. In particular, effective use will lead employees to use the features of an ES to support the activities in different phases of work processes. Gaining experience from using an ES over time, employees will accumulate cognitive and affective appraisals regarding how well the system use fulfills their job needs, leading to a certain level of user satisfaction. To the extent that this experience is derived from effective use in that employees use ES features to help them accomplish goals of the system, we expect employees' accumulated appraisals to be positive, leading to high user satisfaction. Thus, we propose the following hypothesis:

H3: Post-implementation effective ES use mediates the relationship between employees' pre-implementation performance expectancy of using a new ES and their post-implementation user satisfaction.

Additionally, we propose that user satisfaction mediates the influence of effective ES use on job effectiveness. Looking at the downstream impacts of usage behaviors on employees' performance, it is important to consider how satisfied employees are with their overall experience in terms of how well the system fulfills their job needs. Indeed, user satisfaction has been identified as an important mediator of the influence of usage behaviors on job effectiveness outcomes, as satisfaction captures the extent to which employees' job needs are fulfilled by use of system features (Gelderman 1998; Hsieh, Rai, & Xu, 2011).

While effective use captures how employees use a system to achieve system goals, user satisfaction reflects their accumulated cognitive and affective appraisals of how well the system fulfills their needs to do their jobs effectively (Wang & Liao, 2008). Even if employees use a system effectively with respect to system goals, there can be internal and external contingencies that lead them to find that the system does not adequately fulfill their needs to execute their jobs effectively. In the case of sourcing employees, the goal of the ES is to support them in end-to-end activities from capturing sourcing requirements to engaging potential suppliers to verifying contract adherence to collaborating with suppliers. While effective use captures whether the sourcing employees use system features for these activities and thereby exhibit usage behaviors to meet system goals, it does not capture how well the system fulfills the sourcing employees' cognitive and affective needs to accomplish their jobs effectively. Employees contend with a range of time-variant factors (e.g., market, supplier, and organizational) that influence the dynamic needs from a system to be effective in their jobs. To the extent that these needs are fulfilled through effective use, there is an alignment or fit between achieving system goals and meeting employees' cognitive and affective needs to perform their jobs successfully. However, if effective use does not lead to user satisfaction, there is a misalignment or misfit between employees' system usage behaviors to achieve system goals and their need for support from the system to be effective at their jobs. This logic corresponds to the notion of "fit as mediation" (Venkatraman, 1989), leading us to the following hypothesis:

H4: Post-implementation user satisfaction mediates the relationship between employees' post-implementation effective ES use and their job effectiveness.

4 Research Design

To empirically test our hypotheses, we conducted a longitudinal field study of an ES implementation as a replacement for incumbent personal productivity software (i.e., word processing, databases, and spreadsheets) and email in the strategic sourcing process at a large organization that manufactures paper, pulp, packaging materials, and related chemicals. Over an 18-month period, we observed the implementation of a sourcing ES that was mandated to be used by the sourcing professionals at the firm. During an exploratory stage of research, we observed project steering committee meetings and user training sessions as well as interviewed IS professionals, managers responsible for the sourcing process, and end users. We also studied project documents to develop a rich understanding of the work processes in which the ES was to be implemented and used. We collected survey data from sourcing professionals for the constructs in our research model at four points in time: during pre-implementation (pre-training T_1), immediately following training on the new ES (pre-implementation T_2), and after 6 and 12 months of post-implementation use of the new ES (T_3, T_4). Next, we describe the research setting, survey measures, research design, and data validation.

4.1 Research Setting

The employees comprising our sample were sourcing professionals—i.e., analysts and managers responsible for executing the strategic sourcing process. In general,

[2] Although similar to the earlier concept of rich use (Burton-Jones & Straub, 2006), effective use emphasizes use that enables users to attain system goals rather than use that enables users to perform one activity (Burton-Jones & Grange, 2013).

the strategic sourcing process includes a set of activities involving evaluating, selecting, developing, and aligning with a supply base to achieve not just operational targets but also strategic goals (Talluri & Narasimhan, 2004). Although the strategic sourcing process is organized differently across organizations, most processes include procedures for gathering requirements for requested goods or services; identifying and evaluating qualified suppliers; negotiating agreements or contracts; and managing a supply base, including verifying supplier performance. To fulfill these job responsibilities, sourcing professionals apply technical, analytical, and project management skills and rely on collecting, disseminating, and analyzing data and information for decision-making and collaboration with both internal colleagues and external suppliers.

Based on their knowledge and experience, sourcing professionals vary in their adherence to procedures for carrying out their tasks, including work scheduling and decision-making. For example, a sourcing professional might have high decision-making autonomy related to supplier selection because of unique knowledge of his or her firm's sourcing modes and access to information like supplier performance and total spending with a particular supplier. The sourcing professionals at our research site were assigned to a primary sourcing category (on which they spend 50% or more of their time) and one or more secondary categories based on individual expertise and experience and the work demands of their primary category. For example, a sourcing professional might spend 80% of work time on sourcing direct materials (primary category would be direct materials) and 20% on sourcing services (secondary category would be services). The sourcing professionals were also assigned to either the central sourcing department, located at the corporate headquarters or to a field location in support of a manufacturing site or a geographic region. Depending on the sourcing volume at a particular field location, some sourcing professionals were required to allocate a portion of their time to other responsibilities, such as administrative duties. Based on our interviews with the sourcing professionals, who differed in work autonomy, work experience, job tenure, sourcing category, job location, and percentage of time spent on sourcing activities, it was evident that these differences contributed to varying perspectives on the degree of process standardization that was required for their jobs.

Prior to the implementation of the new sourcing ES, sourcing professionals relied on personal productivity software for collecting, storing, and analyzing data and information (i.e., word processing and spreadsheets) and email for communicating with internal collaborators and external suppliers. These fragmented IS solutions, however, did not provide standardized processes for information and workflow management and did not provide visibility into project progress, agreements and contracts, or other information to support collaboration and reporting. The new sourcing ES (i.e., the eSourcing system) was designed to deliver a suite of integrated modules to support the strategic sourcing process through standardized templates and workflows. Aligned with the objectives of the strategic sourcing process, a sourcing ES is typically composed of modules representing key sourcing work processes (e.g., managing a sourcing project; selecting and evaluating suppliers; and negotiating, creating, and managing agreements and contracts).

4.2 Measures

The measurement items for our constructs are shown in Table 1. Each item for a multi-item construct was measured using a 7-point Likert-type scale from "1 = *strongly disagree*" to "7 = *strongly agree*."

Pre-Implementation Information Visibility and Credibility: Employee perceptions of information visibility and information credibility based on incumbent system use were assessed according to their definitions.

Aligned with the definition of information visibility, we developed a three-item measure to assess employees' perceptions of information visibility in terms of the degree to which information about previous projects, others' specialized knowledge of sourcing projects, and others' experience with specific suppliers is perceived as accessible to a sourcing professional based on incumbent system use. Similarly, aligned with the definition of information credibility, we developed a four-item measure to assess employees' perceptions of information credibility regarding the degree to which they are confident in the project-related, product-related, price-related, and supplier-related information accessed through the incumbent system.

Pre-Implementation Process Standardization: We reviewed relevant research from the literature on operations management and organizational behavior to identify measurement items for process standardization. As process standardization pertains to the extent to which work activities and sequences of activities are standardized (Anderson et al., 1994; Feldman & Pentland, 2003; Hackman & Wageman, 1995; Schroeder et al., 2008), we developed a three-item measure to assess the sourcing professionals' perceptions of standard procedures for inputs, outputs, and activity sequences in the work processes.

Pre-Implementation Performance Expectancy: Performance expectancy of the new ES was measured using the four items developed and validated in Venkatesh et al. (2003) that we adapted to our empirical setting.

Table 1. Summary of Measures

Construct	Item	Sources
Pre-implementation (T_1: before training)		
Information visibility	I am able to access the specialized knowledge of others required for a sourcing project.	Developed for this study (Goodhue, 1998; O'Reilly, 1982; Wang & Strong, 1996)
	I am able to access the learning of others from previous projects (e.g., how savings were generated).	
	I am able to access the experience of others with specific suppliers.	
Information credibility	I am confident in the product-related information accessed through the system.	
	I am confident in the project-related information accessed through the system.	
	I am confident in the price-related information accessed through the system.	
	I am confident in the vendor-related information accessed through the system.	
Process standardization	The sourcing process establishes standards for the inputs to my work processes.	Developed for this study (Anderson, Rungtusanatham, & Schroeder, 1994; Feldman & Pentland, 2003; Hackman & Wageman, 1995; Schroeder et al., 2008)
	The sourcing process establishes standards for the outputs of my work processes.	
	The sourcing process standardizes the sequences in which I am to perform activities.	
Pre-implementation (T_2: after training)		
Performance expectancy of the new ES	I will find the eSourcing system useful in my job.	Venkatesh et al. (2003)
	Using the eSourcing system will enable me to accomplish tasks more quickly.	
	Using the eSourcing system will increase my productivity.	
	If I use the eSourcing system, I will increase my chances of getting a raise.	
Post-implementation (T_3: 6 months ES use)		
Effective ES use	When I am using the eSourcing tool, I use features that help me to...	Burton-Jones & Straub (2006); Burton-Jones & Grange (2013)
	...capture specifications for what I am sourcing.	
	...engage as many potential suppliers as possible.	
	...verify that a supplier is adhering to the contract terms.	
	...collaborate with suppliers.	
Post-implementation (T_4: 12 months ES use)		
User satisfaction	I am very satisfied with the eSourcing tool.	Bhattacherjee (2001)
	I am very pleased to be using the eSourcing tool.	
	I am absolutely delighted to be using the eSourcing tool.	
Job effectiveness	Please assess your job effectiveness in the last 6 months for your primary category on the following dimensions:	Developed for this study based on considerations used to assess sourcing professionals' job effectiveness
	Cost savings in the short run	
	Cost savings in the long run	
	Cycle-time reduction	
	Inventory reduction	

Post-Implementation Effective ES Use: Burton-Jones & Grange (2013) described three elements comprising effective use: user competencies and motivations, system features, and task characteristics. Given the complexity of the system use construct, Burton-Jones & Grange (2013), consistent with the approach to measuring use in Burton-Jones & Straub (2006), suggested that researchers can justify what parts of the system use construct they are measuring based on the empirical setting of their study. Because our empirical setting involves the mandated use of a new ES to perform complex work processes, we focused on measures of effective ES use that combine features of the new ES and elements of the work processes. Working with a panel of domain experts, we selected measurement items reflecting the use of system features that would enable the sourcing professionals to attain job benefits or the goals of system use for strategic sourcing (e.g., requirements gathering, supplier selection, and supplier management and collaboration).

Post-Implementation User Satisfaction: We measured the sourcing professionals' cognitive and emotional assessments of using the new ES with three items adapted from Bhattacherjee (2001).

Post-Implementation Job Effectiveness: We reviewed relevant research on the job performance appraisal process (e.g., Bommer et al., 1995; Chopra & Meindl, 2001; Mentzer, Min, & Bobbitt, 2004) to select our measurement items for job effectiveness. Because job performance measures are often context specific, we also consulted with category directors in the sourcing department to inform the items that would appropriately measure job effectiveness. Through reviewing relevant literature and discussions with category managers, we identified cost savings, cost avoidance, cycle time reduction, and inventory reduction as facets for evaluating sourcing professionals' job effectiveness. Because we had assured study respondents that participation was voluntary and anonymous, there was no practical way to match individual and supervisor reports. Although self-reported measures may be subject to bias, prior research has argued that in scenarios where not all behaviors or outcomes are directly observable by supervisors (e.g., cost avoidance), self-reporting may be considered a valid source of information on individual job performance (e.g., Conway & Hoffcutt, 1997; Facteau & Craig, 2001).

Control Variables: Based on our review of the relevant literature, we controlled for several important covariates that could possibly have an impact on one or more of the dependent variables in our research model. We controlled for work autonomy as the degree of perceived decision-making autonomy (Grant & Parker, 2009; Hackman & Oldham, 1976; Morgeson & Humphrey, 2006). We also controlled for work experience (measured in years) to account for the impact of sourcing work knowledge and for job tenure (measured in years) to account for the influence of socialization in the organizational culture (e.g., Judge & Bono, 2001; Morris & Venkatesh, 2010; Sykes & Venkatesh, 2013). Because of the possibility of differences in the category sourced, we controlled for whether the sourcing professional was assigned to a sourcing category of goods or services (0 = goods; 1 = services). Pre-implementation, we controlled for the effect of employees' perceptions of incumbent system quality, proxied by ease of use (Venkatesh, Davis, & Morris, 2007). Post-implementation, we controlled for expectation confirmation on the outcome variables of interest in our model (i.e., effective ES use, user satisfaction, and job effectiveness), as prior research has suggested that experience relative to expectations is a dominant driver of user reactions to system use (Brown et al., 2008). Finally, we included pre-implementation job effectiveness (T_1) and 6-month post-implementation job effectiveness (T_3) as controls at the appropriate stages in the model.

4.3 Data Collection

We adopted a longitudinal design for data collection (see Table 2) to better support causal inferences versus a cross-sectional design (Shadish, Cook, & Campbell, 2002). We received a schedule for the new ES implementation and training sessions as well as a list of sourcing professionals from the manager of the firm. Before the initial training session, the employees were made aware of the aims of our survey and were asked to participate. The first wave of data collection occurred immediately before training on the new ES (T_1). We collected data for all independent variables and control variables. Next, immediately after training on the new ES but still during pre-implementation (T_2), we measured the sourcing professionals' expectancy beliefs that using the new ES would lead to job benefits. We invited 78 employees to participate in both surveys and received a total of 68 (87%) usable responses from both survey waves.

For the two new survey waves in the post-implementation period (6 months after the implementation of the new ES [T_3] and 12 months after the implementation of the new ES [T_4]), we employed the following procedures. We asked the manager of the firm to send a customized email to each sourcing professional containing a unique survey link. When an employee clicked on the link, the survey portal was able to detect the employee and create a unique ID for him or her. Each survey link was introduced with a cover letter reiterating the purpose of the study and details regarding anonymity and confidentiality. A reminder was sent to each participant within the following seven days if the employee had not completed the survey.

Table 2. Longitudinal Design for Data Collection

Pre-implementation (T_1): before training	**Pre-implementation (T_2): after training**	**Post-implementation (T_3): 6-month ES use**	**Post-implementation (T_4): 12-month ES Use**
Information transparency from incumbent system use • Information visibility • Information credibility **Work process characteristic** • Process standardization **Controls** • Work autonomy • Work experience • Job tenure • Sourcing category • Ease of use • Job effectiveness	**Expectancy beliefs** • Performance expectancy	**New ES use** • Effective ES use **Controls** • Expectation confirmation • Job effectiveness	**Job benefits** • User satisfaction • Job effectiveness

At T_3, the survey email was sent to 80 employees, and 71 useable responses were received (88%). Following 6 months of post-implementation ES use in the strategic sourcing process, we collected data for effective ES use, expectation confirmation, and job effectiveness. Then, at T_4, following 12 months of post-implementation ES use, we collected data for user satisfaction and job effectiveness. We invited 61 sourcing professionals to participate, and we received a total of 54 (89%) usable responses. Based on a statistical power analysis (Cohen, 1988), we found that our sample size was sufficient to detect a modest effect size of 0.12, power at 0.8, and alpha at 0.05 for one-tailed tests. A small sample size may increase Type II error but can reduce Type I error and make hypothesis testing more conservative (Murphy, Myors, & Wolach, 2014). In other words, it is difficult to detect significant effects with a small sample, but if significant effects are found, internal validity is high (Kraemer & Blasey, 2016).

4.4 Safeguards Against Endogeneity

We followed several steps when designing our study to support the validity of causal inferences suggested by our research model. To safeguard against reverse causality, we implemented a longitudinal research design with time lags between our constructs. To safeguard against simultaneity, we included several covariates identified by prior research as control variables in testing our hypotheses. In particular, we included pre-implementation and post-implementation job effectiveness, allowing us to dynamically control for omitted variables that influence job effectiveness. Furthermore, our longitudinal research design (with data collection at four points in time over 18 months) to examine the progression of the perceptions and behaviors of employees using a single ES in a single organization guards against endogeneity concerns when interpreting the relationships between constructs in our research model.

5 Descriptive Statistics and Measurement Validation

Means, standard deviations, and correlations for our variables in the research model are shown in Appendix Table A1. We conducted several tests to validate our measurement model. We used partial least squares (PLS) for a confirmatory factor analysis to calculate item loadings and cross-loadings (see Appendix Table A2). Each item loaded higher on its intended construct than on the other constructs by at least 0.30 (Gefen & Straub, 2005), thus suggesting good convergent and discriminant validity of our measurement items. We also calculated Cronbach's alpha and composite reliability and found evidence of strong convergence. These results are reported in Table A1. In an assessment of discriminant validity, we found that the zero-order correlations between constructs were greater than the square roots of the average variance extracted (AVE), as reported in Table A1. These results provide strong evidence that the measurement items are reliable and valid. Therefore, we computed construct sources in PLS for further analysis to test our hypotheses.

We collected predictor and criterion data at multiple points in time as a procedural remedy for common method bias (Podsakoff et al., 2003). We also employed statistical procedures to assess common method bias. First, we used the Harman one-factor test, which diagnoses common method bias when a single factor or a general factor accounts for the majority of covariance

among the measurement items. The results of an exploratory factor analysis indicated that the first factor with an eigenvalue greater than 1 did not account for the majority of the variance in our items as it accounted for only 27% of the total variance. We also assessed common method bias using the marker variable technique (Lindell & Whitney, 2001; Malhotra, Kim, & Patil, 2006). In applying this technique, we included the marker variable "I do not get distracted very easily," which is theoretically unrelated to the constructs in our research model. This item was measured on a 7-point Likert scale that was identical to the scales used to measure the other constructs. A comparison of the partial correlations after accounting for the correlation with the marker variable and zero-order correlations did not indicate any material changes in significance. These assessments suggest that common method bias is not a significant threat to our results.

6 Results

We used ordinary least squares (OLS) regression to test our model and hypotheses. We standardized our independent variables before creating the interaction terms to avoid multicollinearity. Furthermore, because information visibility and information credibility are moderately correlated ($r = 0.65$), we orthogonalized the variables involved in the interaction terms in order to guard against multicollinearity (Saville & Wood, 1991; Sine, Mitsuhashi, & Kirsch, 2003, Sine, Shane, & Gregorio, 2006). The results of our regression analysis are reported in Table 3. We found support for our hypothesis that at high/low levels of process standardization, information visibility has a more negative/positive relationship with performance expectancy as the interaction term between information visibility and process standardization is statistically significant and negative ($\beta = -0.27$, $p < 0.001$). Thus, H1 is supported. Likewise, we found support for our hypothesis that at high/low levels of process standardization, information credibility has a more negative/positive relationship with performance expectancy as the interaction term between information credibility and process standardization is statistically significant and negative ($\beta = -0.34$, $p < 0.001$). Thus, H2 is supported.

To gain more insight into our hypothesized relationships, we plotted the marginal effect of information visibility on performance expectancy at different levels of process standardization. This is the marginal effect of information visibility at a specific level of process standardization on performance expectancy: a positive effect means an increase in performance expectancy on a 7-point scale, while a negative effect means a decrease in performance expectancy on a 7-point scale. High and low levels of our variables are defined as one standard deviation above and below the mean. As Figure 2 shows, the performance expectancy of using the new ES increases with information visibility based on incumbent system use when pre-implementation process standardization is low (i.e., a positive relationship) and decreases with information visibility when process standardization is high (i.e., a negative relationship). We conducted a simple slope test and found a significant and positive relationship between information visibility based on incumbent system use and performance expectancy of using the new ES when pre-implementation process standardization is low ($p < 0.05$) and a significant and negative relationship between information visibility based on incumbent system use and performance expectancy of using the new ES when pre-implementation process standardization is high ($p < 0.05$).

In Figure 3, we plotted the marginal effect of information credibility on performance expectancy at different levels of process standardization. This is the marginal effect of information credibility at a specific level of process standardization on performance expectancy: a positive effect means an increase in performance expectancy on a 7-point scale, while a negative effect means a decrease in performance expectancy on a 7-point scale.

As Figure 3 shows, the performance expectancy of using the new ES increases with information credibility based on incumbent system use when pre-implementation process standardization is low (i.e., a positive relationship) and decreases with information credibility when process standardization is high (i.e., a negative relationship). We conducted a simple slope test and found a significant and positive relationship between information credibility based on incumbent system use and the performance expectancy of using the new ES when pre-implementation process standardization is low ($p < 0.05$) and a significant and negative relationship between information credibility based on incumbent system use and performance expectancy of using the new ES when pre-implementation process standardization is high ($p < 0.05$).

Next, we report the results from the tests of H3 and H4. H3 suggests that the effect of performance expectancy on user satisfaction is mediated by effective ES use. H4 posits that the impact of effective ES use on job effectiveness is mediated by user satisfaction. To test H3 and H4, we followed literature on mediation analysis showing that it is not necessary to establish a direct effect between the independent variable and the dependent variable in order to establish mediation as previously assumed (Baron & Kenny, 1986), and that a precise test of mediation requires examining whether the independent variable affects the dependent variable through the mediator (Zhao, Lynch Jr., & Chen, 2010).

Table 3. OLS Regression Results

	PE (POT)	PE (POT)	PE (POT)	PE (POT)	EU (POI6)	USAT (POI12)	USAT (POI12)	JEFF (POI12)
Work autonomy (PRI)	**-0.37 (-3.50)**	**-0.31 (-3.01)**	**-0.36 (-3.75)**	**-0.31 (3.23)**	0.20 (1.25)	-0.07 (-0.44)	0.11 (0.69)	-0.16 (-1.01)
Work experience (PRI)	-0.12 (-0.64)	0.04 (0.19)	-0.25 (-1.43)	-0.08 (-0.50)	0.01 (0.01)	0.02 (0.11)	-0.08 (-0.38)	**-0.54 (-2.52)**
Job tenure (PRI)	0.22 (1.29)	0.16 (0.98)	**0.30 (1.88)**	0.24 (1.58)	-0.07 (-0.32)	-0.06 (-0.25)	0.08 (0.43)	0.36 (1.66)
Sourcing category	0.08 (0.78)	0.12 (1.18)	0.09 (0.87)	0.13 (1.34)	-0.13 (-0.84)	-0.19 (-1.30)	**-0.26 (-1.92)**	0.02 (0.14)
EOU (PRI)	0.12 (1.10)	0.08 (0.75)	0.12 (1.17)	0.08 (0.78)				
EC (POI6)					-0.01 (-0.04)	0.08 (0.57)	0.03 (0.02)	0.02 (0.12)
JEFF (PRI)	**0.42 (4.19)**	**0.41 (4.29)**	**0.42 (4.61)**	**0.42 (4.79)**	-0.04 (-0.25)	-0.03 (-0.17)	-0.08 (-0.56)	0.20 (1.37)
JEFF (POI6)						**0.40 (2.81)**	-0.24 (-1.26)	0.19 (0.95)
Main effects								
INFOV (PRI)	-0.07 (-0.64)	-0.10 (-0.95)	-0.13 (-1.33)	**-0.17 (1.74)**	0.02 (0.15)		-0.15 (-1.10)	**0.33 (2.31)**
INFOC (PRI)	0.17 (1.65)	0.14 (1.39)	0.06 (0.54)	0.02 (0.20)	-0.14 (-0.90)		0.05 (0.39)	-0.24 (-1.67)
PSTD (PRI)	**0.32 (2.93)**	**0.26 (2.45)**	**0.35 (3.49)**	**0.29 (3.00)**	-0.02 (-0.11)		-0.13 (-0.90)	0.21 (1.38)
PE (POT)					**0.52 (3.25)**		0.19 (1.29)	-0.07 (-0.46)
EU (POI6)							**0.62 (3.74)**	-0.18 (-0.88)
USAT (POI12)								**0.48 (3.52)**
Interaction effects								
INFOV × PSTD		**-0.26 (-2.26)**		**-0.27 (-2.62)**				
INFOC × PSTD			**-0.34 (3.41)**	**-0.35 (-3.67)**				
R^2	0.43	0.48	0.53	0.58	0.27	0.21	0.47	0.45
N	68	68	68	68	71	54	54	54

Notes: (1) Bold figures indicate significance at $p < 0.05$; standardized coefficients are reported; *t* statistics are shown in parentheses; one-tailed tests are used because directional relationships are hypothesized.
2) INFOV = information visibility; INFOC = information credibility; PSTD = process standardization; PE = performance expectancy; EU = effective ES use; EOU = ease of use; EC = expectation confirmation; USAT = user satisfaction; JEFF = job effectiveness; PRI = pre-implementation; POT = post-training; POI6 = post-implementation (6 months); POI12 = post-implementation (12 months).
3) For a modest effect size of 0.12, power at 0.8, and alpha at 0.05 for one-tailed tests, the required sample size is 54.

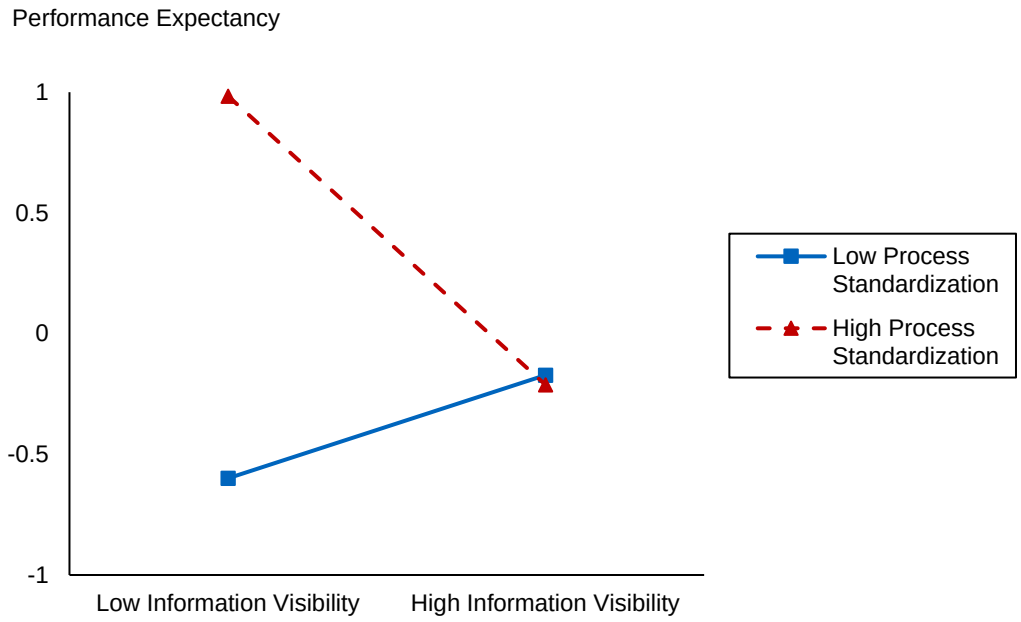

Figure 2. Marginal Effect of Information Visibility at Varying Levels of Process Standardization

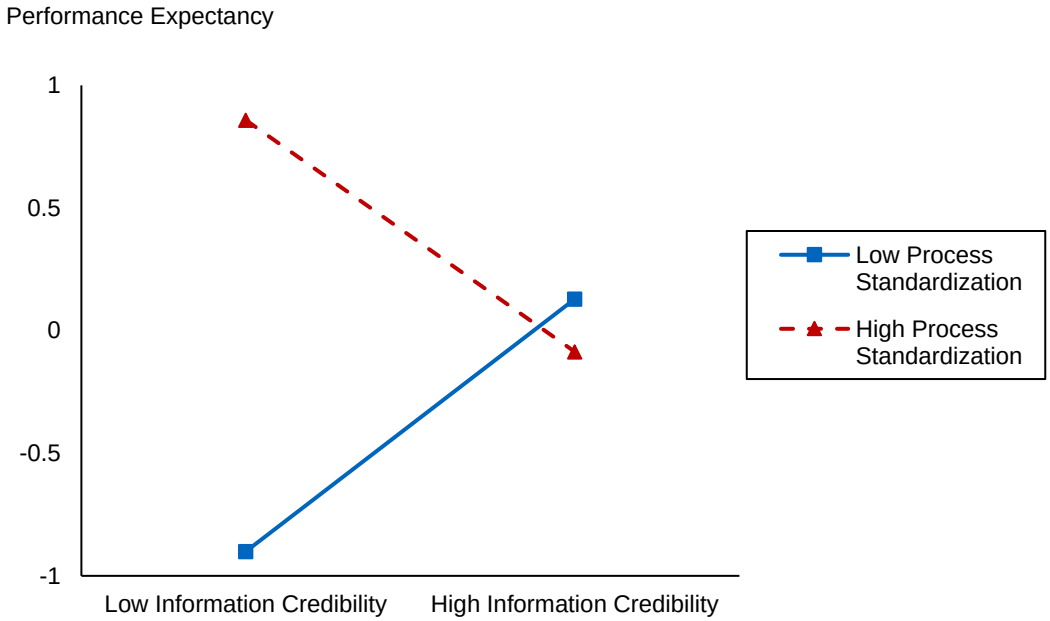

Figure 3. Marginal Effect of Information Credibility at Varying Levels of Process Standardization

Accordingly, we assessed the influence of effective ES use on job effectiveness through user satisfaction by using the bootstrapping approach to conduct the mediation analysis (Preacher & Hayes, 2008). To test the mediating effect of effective ES use in the relationship between performance expectancy and user satisfaction, we used 2000 bootstrap samples. Our results indicate a mediation path of 0.31 with the bias-corrected 95% confidence interval between 0.10 and 0.63 because the 95% confidence interval does not include 0. The results of this test support H3. To test the mediating effect of user satisfaction in the relationship between effective ES use and job effectiveness, we again used 2000 bootstrap samples. The results indicate a mediation path of 0.25 with the bias-corrected 95% confidence interval between 0.09 and 0.54. The results of this test support H4 because the 95% confidence interval does not include 0.

7 Discussion

7.1 Theoretical Implications

Our study contributes to the IS literature in several ways. It provides a deeper understanding of the transition from an incumbent system to a new ES by surfacing the role of beliefs regarding the incumbent system in influencing performance expectancy of a new ES and consequently effective ES use and job outcomes. While past work has discussed the role of incumbency (e.g., Davenport et al., 2004; Polites & Karahanna, 2012; Sykes et al., 2009), effective use (e.g., Burton-Jones & Grange, 2013; Burton-Jones & Volkoff, 2017), and user satisfaction (e.g., Au et al., 2008; Hsieh et al., 2012), our study integrates these concepts into a cohesive and parsimonious model. We provide a temporal perspective on how the downstream use-to-performance benefits chain relates to employees' pre-implementation perceptions of the incumbent system context. In doing so, we highlight the need to carefully assess pre-implementation incumbent systems and work processes, as they are consequential in shaping beliefs, behaviors, and outcomes associated with ES use.

Specifically, our study add to the body of work on the role of incumbent systems in ES implementations (e.g., Arif et al., 2005; Bala & Venkatesh, 2013; Davenport et al., 2004; Morris & Venkatesh, 2010; Peppard & Ward, 2005; Polites & Karahanna, 2012; Sykes et al., 2009). We surface information transparency (i.e., information visibility and information credibility) and process standardization as key aspects of the incumbent system context that affect the transition to a new ES. We show that information visibility and information credibility influence employee appraisals of a new ES, contingent on process standardization. We find that the relationship of information visibility/information credibility based on incumbent system use with performance expectancy of a new ES is (1) positive when pre-implementation process standardization is low, and (2) negative when pre-implementation process standardization is high. These findings extend general models of technology acceptance and use by identifying how salient factors related to an incumbent system and associated work processes interact to affect employees' beliefs about a new ES and resulting usage behaviors. These insights support the idea that integrating contextual characteristics can be an effective way to develop and elaborate IS theories (Hong et al., 2013).

Our study also reveals the critical role of pre-implementation performance expectancy in influencing effective use and, in turn, fulfilling employees' needs, leading to user satisfaction and job effectiveness. Recent IS research has called for greater attention to contextualizing system use (Hong et al., 2013; Straub & del Guidice, 2012). In response, we conceptualize effective ES use as usage behaviors that help employees attain system goals and operationalize it by focusing on the usage elements of a system for the tasks involved in knowledge work, specifically strategic sourcing. We find that effective ES use mediates the relationship between pre-implementation performance expectancy and post-implementation user satisfaction. This finding extends the technology acceptance and use literature by showing that employees who expect performance gains from new ES use are more likely to engage in effective use that goes beyond simple mandated use in work processes. We also find that user satisfaction, which is well established in the IS success literature as an important proxy of IS success (Delone & McLean, 1992; Petter et al., 2008; Rai et al., 2002), plays a mediating role to channel the influence of effective ES use on job effectiveness. This finding extends prior research on user satisfaction in mandatory use settings (Au et al., 2008; Hsieh et al., 2012) by revealing the critical role of user satisfaction as a mediator in the link between effective use and job effectiveness. Our study reveals that employees' cumulative cognitive and affective appraisals of a new ES regarding fulfillment of their job needs are critical for realizing gains in job effectiveness through effective use of the ES.

7.2 Implications for Practice

Our study has several practical implications for managers tasked with improving employees' job effectiveness. Managers should recognize that incumbent systems and work processes influence how employees perceive performance benefits from ES implementations. In addition to training employees on a new ES, it is important to understand the incumbent system context. Employees who perceive that an incumbent system provides them with high information visibility and information credibility are

likely to appraise that the new ES will help them attain job benefits only if the work processes associated with the incumbent system are unstandardized. In contrast, employees who utilize an incumbent system in conjunction with standardized work processes are likely to believe that a new ES may even be detrimental to their job effectiveness. Therefore, it is critical for managers to be aware that employees evaluate the performance benefits of a new ES against the incumbent system context, specifically information visibility and information credibility, based on work process standardization. Moreover, to realize job benefits, it is important to focus not just on establishing use mandates but also on promoting effective use to achieve system goals. Forums for sharing best practices on effective use can be a valuable experience-sharing mechanism to promote learning about how novel system features can be used to achieve system goals. Moreover, managers should closely monitor user satisfaction, as it is a key indicator of how well employees' needs for support from a new ES are fulfilled by their effective use of the system. Indeed, fulfilling employees' needs for support from a system in their jobs is critical in bridging effective use (where use is directed at achieving system goals) and job effectiveness (where knowledge work achieves desired job outcomes).

7.3 Limitations and Future Research

Our study has some limitations. We conducted a longitudinal field study in a large global manufacturing firm. This research design enabled us to study the progression of the ES implementation over time and to control for organizational differences by sampling employees within a strategic sourcing process in the same organization. While this research design allowed us to evaluate the model while controlling for differences between organizations, future research should evaluate the external validity of our findings with different organizations, work processes, and information systems. Also, our research design, which enabled us to obtain four waves of matched survey data, constrained our sample size. Although the sample size provides the statistical power to detect a modest effect size and a small sample makes significant results more conservative. Future research could evaluate our findings by employing larger samples. Last but not least, our research design and control variables safeguard against endogeneity concerns, but there may nonetheless be limitations (e.g., omitted variables) in eliminating those concerns.

Future research could extend our work by identifying and validating other incumbent system and related work characteristics that are important in determining performance expectancy of a new ES. Our work could also be extended by incorporating other constructs that are important to ES implementations, such as training, user involvement, and experience. Future studies could also extend our model by investigating factors in addition to user satisfaction that channel the job benefits of effective ES use, and by incorporating additional job outcomes such as job stress. Finally, it would be useful to further examine the link between job outcomes at the employee level and in terms of firm performance.

8 Conclusion

Our study provides an integrated and parsimonious model of the antecedents and consequences of employees' effective ES use. We reveal how information transparency and process standardization based on incumbent system use interact to affect the performance expectancy of a new ES and, consequently, effective ES use and job outcomes. We find that information visibility and information credibility based on incumbent system use impact pre-implementation performance expectancy of a new ES (1) positively when pre-implementation process standardization is low, and (2) negatively when pre-implementation process standardization is high. We also find that effective ES use mediates the positive impact of pre-implementation performance expectancy of a new ES on post-implementation user satisfaction, which in turn enhances job effectiveness. In sum, our study provides an overarching model that explains how employees' incumbent system context affects their beliefs, behaviors, and job outcomes associated with using a new ES.

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APPENDIX

Table A1. Descriptive Statistics and Correlations

	Mean	SD	CA	CR	WAUT (PRI)	WEXP (PRI)	TEN (PRI)	SOCAT (PRI)	EOU (POT)	EXPC (POI6)	INFOV (PRI)	INFOC (PRI)	PSTD (PRI)	PE (POT)	EU (POI6)	USAT (POI6)	JEFF (PRI)	JEFF (POI6)	JEFF (POI12)
WAUT (PRI)	5.20	0.94	0.84	0.78	**0.74**														
WEXP (PRI)	89.02	80.33	--	--	0.11	--													
TEN (PRI)	144.88	116.03	--	--	0.13	0.72	--												
SOCAT (PRI)	--	--	--	--	0.14	-0.15	-0.10	--											
EOU (POT)	5.10	1.02	0.89	0.92	-0.22	-0.14	0.00	0.03	**0.92**										
EXPC (POI6)	4.27	1.12	0.88	0.92	0.14	0.12	0.20	0.10	0.01	**0.87**									
INFOV (PRI)	4.24	1.13	0.83	0.81	0.22	0.07	0.09	0.09	-0.03	0.01	**0.79**								
INFOC (PRI)	3.81	1.06	0.88	0.91	0.14	-0.20	-0.04	**0.32**	**0.26**	0.11	**0.65**	**0.85**							
PSTD (PRI)	4.52	1.33	0.93	0.96	0.13	**-0.29**	-0.15	0.06	**0.59**	0.02	0.02	-0.17	**0.94**						
PE (POT)	5.02	1.42	0.83	0.89	-0.27	-0.17	-0.02	0.08	**0.56**	0.20	-0.02	-0.11	0.16	**0.83**					
EU (POI6)	4.26	1.06	0.86	0.91	0.03	-0.13	-0.10	0.01	0.14	0.10	0.16	-0.11	0.16	**0.44**	**0.84**				
USAT (POI6)	3.96	1.26	0.98	0.99	0.05	-0.05	-0.03	0.08	-0.10	0.01	-0.02	-0.10	-0.15	0.16	0.17	**0.98**			
JEFF (PRI)	4.33	1.01	0.78	0.84	0.17	0.15	0.03	0.17	-0.23	0.12	0.20	-0.04	-0.20	0.23	0.02	0.11	**0.76**		
JEFF (POI6)	3.93	0.83	0.82	0.88	0.17	-0.02	0.03	0.01	-0.23	0.11	0-.09	-0.08	-0.05	0.10	0.08	0.10	0.06	**0.81**	
JEFF (POI12)	4.21	1.13	0.85	0.75	0.11	-0.23	-0.06	0.03	0.12	0.01	0.07	-0.05	**0.22**	**0.20**	0.10	**0.47**	-0.10	0.11	**0.77**

Notes: (1) Correlations in bold are significant at $p < 0.05$; square roots of AVE are on diagonal.
(2) SD = standard deviation; CA = Cronbach's alpha; CR = composite reliability.
(3) WAUT = work autonomy; WEXP = work experience (months); TEN = job tenure (months); SOCAT = sourcing category (i.e., goods or service); EOU = ease of use; EXPC = expectation confirmation; INFOV = information visibility; INFOC = information credibility; PSTD = process standardization; PE = performance expectancy; EU = effective ES use; USAT = user satisfaction; JEFF = job effectiveness; PRI = pre-implementation; POT = post-training; POI6 = post-implementation (6 months); POI12 = post-implementation (12 months).
4) Sourcing category: goods = 60.6%, services = 39.4%.

Table A2. Loadings and Cross-Loadings

	WAUT	EOU	EXPC	INFOV	INFOC	PSTD	PE	EU	USAT	JEFF (PRI)	JEFF (POI6)	JEFF (POI12)
WAUT1	0.97	-0.05	0.06	0.26	0.03	0.09	-0.07	0.12	-0.01	0.06	0.04	0.07
WAUT2	0.55	-0.14	0.35	0.26	0.14	0.26	-0.33	-0.04	0.00	0.04	0.00	0.09
WAUT3	0.64	-0.19	0.33	0.07	0.12	0.20	-0.20	0.05	0.11	-0.11	-0.08	0.08
EOU1	-0.07	0.69	-0.07	0.14	0.48	-0.19	0.49	0.07	0.63	-0.09	0.20	0.35
EOU2	-0.01	0.84	-0.18	-0.17	0.10	-0.14	0.60	-0.01	0.22	-0.09	0.21	-0.19
EOU3	-0.07	0.99	-0.06	0.02	0.22	-0.10	0.45	-0.10	0.36	-0.06	0.15	0.00
EXPC1	-0.03	-0.09	0.74	-0.02	0.03	-0.03	-0.13	-0.26	0.14	-0.19	-0.07	0.24
EXPC2	0.09	-0.05	0.95	-0.04	0.01	0.17	-0.34	-0.40	0.09	-0.07	-0.27	-0.04
EXPC3	0.09	-0.09	0.95	-0.12	-0.07	0.31	-0.39	-0.40	0.08	-0.13	-0.33	-0.02
EXPC4	0.06	-0.04	0.80	-0.23	-0.12	0.18	-0.18	-0.25	-0.06	-0.23	-0.13	0.04
INFOV1	0.16	0.12	-0.06	0.82	0.62	-0.09	0.07	0.21	0.14	0.08	0.22	0.29
INFOV2	0.05	0.14	0.09	0.68	0.65	0.00	0.00	0.02	0.25	-0.05	0.28	0.27
INFOV3	0.18	-0.09	-0.13	0.91	0.47	0.16	-0.01	0.30	-0.05	0.44	0.26	0.29
INFOC1	0.07	0.11	0.06	0.61	0.84	-0.19	0.09	0.21	0.21	0.08	0.18	0.21
INFOC2	0.00	0.23	0.14	0.55	0.89	-0.14	0.20	0.04	0.30	-0.13	0.26	0.29
INFOC3	0.01	0.07	-0.05	0.44	0.78	-0.04	0.18	0.20	0.30	0.04	0.28	0.13
INFOC4	0.00	0.31	-0.12	0.52	0.91	-0.34	0.37	0.27	0.40	-0.05	0.36	0.21
PSTD1	0.11	-0.09	-0.02	-0.12	-0.32	0.87	-0.08	0.00	-0.30	0.19	0.08	-0.21
PSTD2	0.01	-0.15	0.01	0.09	-0.17	0.66	-0.16	0.01	-0.28	0.36	0.12	-0.38
PSTD3	0.08	-0.12	0.18	0.07	-0.24	0.99	-0.39	-0.11	-0.06	0.27	0.02	-0.27
PE1	-0.14	0.54	-0.24	-0.01	0.30	-0.27	0.73	0.05	0.25	-0.06	0.46	0.15
PE2	0.05	0.39	-0.32	0.01	0.25	-0.43	0.97	0.47	0.19	0.02	0.51	0.21
PE3	-0.03	0.43	-0.33	0.06	0.25	-0.38	0.96	0.42	0.20	-0.01	0.43	0.29
PE4	-0.23	0.49	-0.09	-0.02	0.12	-0.12	0.60	0.14	0.25	-0.01	0.13	-0.14
EU1	0.27	-0.11	-0.29	0.36	0.26	-0.16	0.37	0.81	0.17	0.39	0.19	0.31
EU2	0.40	0.12	-0.18	0.11	0.07	-0.11	0.02	0.58	-0.01	0.09	-0.02	-0.09
EU3	0.03	-0.03	-0.30	0.31	0.24	0.04	0.37	0.87	0.07	0.24	0.54	0.24
EU4	0.06	-0.13	-0.43	0.09	0.17	-0.21	0.40	0.92	0.03	0.25	0.38	0.18

	WAUT	EOU	EXPC	INFOV	INFOC	PSTD	PE	EU	USAT	JEFF (PRI)	JEFF (POI6)	JEFF (POI12)
USAT1	0.03	0.37	0.11	0.05	0.39	-0.03	0.24	0.12	0.99	-0.15	-0.03	0.24
USAT2	0.00	0.33	0.05	0.06	0.37	-0.06	0.23	0.11	0.99	-0.18	-0.04	0.24
USAT3	0.10	0.32	0.08	-0.05	0.24	0.03	0.17	0.04	0.94	-0.19	-0.06	0.18
JEFF1 (PRI)	0.02	-0.20	-0.08	0.22	0.00	0.37	-0.20	0.17	-0.13	0.71	0.18	-0.06
JEFF2 (PRI)	0.00	0.07	-0.12	0.22	0.04	0.20	0.15	0.38	-0.04	0.84	0.35	-0.14
JEFF3 (PRI)	0.02	-0.11	-0.20	0.20	-0.11	0.11	-0.05	0.23	-0.31	0.83	0.04	-0.08
JEFF4 (PRI)	-0.04	-0.09	-0.07	0.46	0.11	0.10	-0.08	0.15	-0.11	0.64	0.11	0.13
JEFF1 (POI6)	-0.01	0.16	-0.30	0.04	0.01	0.10	0.23	0.31	-0.12	0.10	0.68	0.05
JEFF2 (POI6)	0.08	0.17	-0.15	0.30	0.27	-0.05	0.39	0.25	-0.03	0.04	0.79	0.25
JEFF3 (POI6)	0.11	0.16	-0.16	0.37	0.40	0.01	0.43	0.44	0.06	0.33	0.92	0.24
JEFF4 (POI6)	-0.16	0.06	-0.24	0.20	0.34	-0.05	0.48	0.36	-0.07	0.31	0.84	0.05
JEFF1 (POI12)	0.05	-0.05	0.07	0.29	0.12	-0.08	0.11	0.20	0.15	-0.17	0.13	0.79
JEFF2 (POI12)	0.08	0.00	0.00	0.20	0.19	-0.27	0.22	0.22	0.23	0.00	0.19	0.80
JEFF3 (POI12)	-0.04	0.06	-0.02	-0.03	-0.05	0.16	0.02	-0.06	0.17	-0.08	0.17	0.63
JEFF4 (POI12)	-0.06	0.09	-0.02	0.22	0.18	-0.06	0.12	0.06	0.23	-0.03	0.11	0.62

Notes: WAUT = work autonomy; EOU = ease of use; EXPC = expectation confirmation; INFOV = information visibility; INFOC = information credibility; PSTD = process standardization; PE = performance expectancy; EU = effective ES use; USAT = user satisfaction; JEFF = job effectiveness; PRI = pre-implementation; POI6 = post-implementation (6 months); POI12 = post-implementation (12 months).

About the Authors

Rob Hornyak is an independent researcher based in Tempe, AZ. He has experience in the software industry as a product manager and an applications consultant. His current research focuses on innovation in strategic business processes. Rob's research has been published in *Journal of Operations Management*, *Journal of Management Information Systems*, and *MIS Quarterly Executive*, among other outlets.

Arun Rai is Regents' Professor at the Robinson College of Business at Georgia State University, holds the Robinson Chair, and is the director of the Center for Digital Innovation. His research has focused on the development and deployment of information systems to drive innovation and create value. His work has contributed to understanding the digital transformation of organizations and supply chains; governance of IT investments and platform ecosystems; and deployment of digital innovations at scale to empower individuals and address thorny societal problems including poverty, health disparities, infant mortality, and digital inequality. He serves as editor-in-chief for the *MIS Quarterly*. He is a Fellow of the Association for Information Systems and a Distinguished Fellow of the INFORMS Information Systems Society and has received the Association for Information Systems LEO Award for Lifetime Exceptional Achievement in the information systems discipline.

John Qi Dong is an associate professor with tenure in the Faculty of Economics and Business at University of Groningen. His research interests include the business value and outcomes of digital innovation, the change processes and strategies of digital transformation, the economic and societal impacts of digital development, as well as a variety of topics related to knowledge management and organizational learning. His work has been published or is forthcoming in *MIS Quarterly*, *Journal of Management*, *Journal of the Association for Information Systems*, *Journal of Product Innovation Management*, *European Journal of Information Systems*, *Journal of Strategic Information Systems*, *Decision Support Systems*, *Information and Management*, *Journal of Business Research*, *Long Range Planning*, *Technological Forecasting and Social Change*, and *Drug Discovery Today*. He serves as associate editor for *Journal of the Association for Information Systems* and *Information and Management*, as well as editorial board member for *Journal of Strategic Information Systems*.