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ENHANCING WORK PERFORMANCE IN STABLE POST-ADOPTIVE STAGE: A SYSTEM USE-RELATED BEHAVIORS PERSPECTIVE

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Abstract

The success of enterprise systems (ES) hinges on the work performance of system users in the stable post-adoptive stage. With a high failure rate of ES implementation, it is crucial to explore factors that could enhance users' work performance. Drawing on literature on IS post-adoption and system use-related behaviors, this study proposes a theoretical model to understand how different types of ES use-related behaviors (i.e., technology interaction behaviors, task-technology adaptation behaviors and individual adaptation behaviors) can induce better performance in the stable phase of post-adoption. A field survey involving 250 physicians was conducted to test the proposed research model. The results showed different effects of ES use-related behaviors on improving users' work performance. Individual adaptation behaviors enhanced the user performance, while technology interaction behaviors and task-technology adaptation behaviors did not show significant effect on performance. Interestingly, individual adaptation and task-technology adaptation behaviors could moderate the relationship between system use and performance, yet in an opposite manner. This study offers important contributions to ES researchers and practitioners.

Keywords: Enterprise system implementation, Work performance, Stable post-adoptive stage, System use-related behaviors, System use, User adaptation

1 INTRODUCTION

Enterprise systems (ES) enable the integration of transactions-oriented data and business processes throughout the whole organization (Markus et al. 2000). With the expectations of improving performance and gaining competitive advantages, organizations have made substantial investments to embrace the ES (Kohli et al. 2006). A recent Gartner forecast predicts that the worldwide ES spending will grow to $326 billion in 2016, up from $310 billion in 2015. Such a growth rate will be even greater in 2018 ($368 billion) and 2019 ($391 billion) (Gartner 2016). Despite the high investments, many organizations are not able to get expected benefits from ES adoption (Kim et al. 2009; Lapointe et al. 2005; Sykes et al. 2014). The ES failure rates could be up to 80% (Sykes et al. 2014), which brings huge losses to the organizations or even makes the organizations go out of the business (Sykes 2015). Thus, it is crucial to explore factors that could bring desirable ES benefits.

After the rollout of an ES, the actual benefits of an ES can only be ascertained when the organization reaches the *stable post-adoptive stage* in which normal operation or routine use has been achieved (Markus et al. 2000). In this stage, users become familiar with the system's functions and utilize the system on a routine basis to perform their work (i.e., ES use has been a regular part of employees' daily work). With the system-related knowledge, some users may engage in certain exploitation and/or exploration behaviors in relation to the system or work (Burton-Jones et al. 2006). These effective ES use-related behaviors are considered as the major determinants of competitive advantage and productivity for both organizations and individual users (Doll et al. 1998). The Information Systems (IS) success model posits that repetitively utilizing a system by the system users in the post-adoptive stage is critical to achieve the long term viability (DeLone et al. 2003). Similarly, Jasperson et al. (2005) also recognize that users' considerable engagement with the system or its related tasks would finally contribute to ES success.

In line with the theoretical recognition, ES use-related behaviors should enhance employee work performance in the post-adoptive stage (Barki et al. 2007; Burton-Jones et al. 2012). Surprisingly, there is limited empirical evidence examining such influence in the ES setting. Prior studies tend to treat some use-related behaviors (e.g., exploring more system features) as the proxy indicators of system success and focus on the antecedents of these system use behaviors (Ahuja et al. 2005; Hsieh et al. 2007). Other studies report inconsistent findings regarding the effect of system use-related activities on work performance in general post-adoptive stage (Barki et al. 2007; Hsieh et al. 2011; Tong et al. 2015). Synthesizing the prior work, this study aims to answer the following question: *In the stable post-adoptive stage, how could the different types of ES use-related behaviors enhance users' work performance*?

This research draws on Barki et al. (2007)' typology of system use-related behaviors as the theoretical lens for the ES use-related behaviors. Referring to the set of behaviors concerning technology interaction and related adaptation in a social-technical context, this typology consists two types of use behaviors: 1) *technology interaction behaviors or system use* referring to users' interaction with the system to accomplish tasks; and 2) *user adaptation behaviors*, denoting the degree to which users change the system functionalities/interfaces or tasks or themselves to fit personal preferences and work patterns (Wu et al. 2014). The latter behaviours can be further categorized into individual adaptation behaviors (i.e., altering oneself to adapt to the ES) and task-technology adaptation behaviors (i.e., efforts in changing certain system function or how they are used) (Tong et al. 2015). We expect that in the stable post-adoptive stage, these two forms of user adaptation behaviors could affect users' work performance in a different manner.

Prior literature finds that in the stable post-adoptive stage, user adaptation behaviors in the form of feedback on system improvement could mitigate the negative effect of technology quality on work performance (Hsieh et al. 2011). Similarly, although not empirically test the relationship, Barki et al. (2007) also state that technology interaction behaviors could intertwine with users adaptation behaviors. These works imply that user adaptation behaviors could potentially play a moderating role on the relationship of technology interaction behaviors with work performance.

We developed a research model to explore the effects of technology interaction behaviors, user adaptation behaviors, and their interplays on users' work performance in the stable post-adoptive stage. We chose Electronic Medical Record System (EMRS) as the focal system, which is one of the most widely adopted ES in hospitals. An empirical survey involving 250 physicians showed that when the EMRS steps into a relative mature stage, user adaptation behaviors, not technology interaction behaviors, can play substantial yet different roles in helping users with their work. This study contributes to the IS post-adoptive literature and helps organizational management by unveiling mechanisms to enhance work performance of ES in the stable post-adoptive stage.

2 THEORETICAL FOUNDATIONS AND RESEARCH HYPOTHESES

2.1 Post-adoptive Stage of ES implementation

Although there are different phases of ES post-adoption (Markus et al. 2000), prior studies mainly focused on the initial phase of post-adoption, which refers to the period from which the ES is released and accessible to users until normal or routine use is reached (Tong et al. 2015). It has developed a cumulating body of knowledge about adoption and initial usage in IS (Cooper et al. 1990; Saga et al. 1994). From both theoretical and practical points of view, it is important to advance our understanding of post-adoptive stage of ES by having a comprehensive view about it.

According to Markus et al. (2000), the post-adoptive stage can be generally categorized as two phases. In addition, by distinguishing the stable phase (i.e., onward phase) and upward phase from the onward and upward phase, three phases can be identified: The shakedown phase, the stable phase and the upward phase. Table 1 summarizes the comparison between these three phases based on Markus et al. (2000)'s study and ES use practice.

<table>
<tr><th colspan="2">Phase</th><th>Description</th><th>Typical Activities</th><th>Typical Performance Metrics</th><th>Possible Outcome</th></tr>
<tr><td colspan="2">The shakedown phase (The early post-adoptive stage)</td><td>Period of time from “going live” until normal operation or routine use achieve</td><td>• Short-cutting testing and/or training
• Bug fixing and rework
• Adding people to accommodate learning and shakedown needs</td><td>• Relevant system performance measures
• Short-term changes in key performance
• Employee work quality</td><td>• System terminated
• Normal operation with routine use</td></tr>
<tr><td>The onward and upward phase</td><td>The onward phase (The stable post-adoptive stage)</td><td>Routine operation of business until such time as a new version of ES is implemented</td><td>• Continuous business improvement and additional user skill building (may not be done)
• User feedback on realize IS potential
• User exploration such as extended use</td><td>• Not usually formally measured
• Possible indicators: continuous business performance improvement, user skill assessment et. al</td><td>• Unwillingness or inability to improve performance
• Formal or informal assessment concerning with IS success (may not be done)</td></tr>
</table>

	The upward phase	Technology upgrading or a new version of ES is implemented	• Technology upgrading • Additional end-user skill building	• Not usually formally measured • Possible indicators include ease of upgrading/migra tion, shortening of project and shakedown phases over time	• Migrate technically (e.g., extreme dissatisfaction with implementation process or outcomes, loss of technical or end-use competence) • Formal or informal assessment that system has achieved goals and/or unexpected benefits

Table 1. The comparison of different post-adoptive phases of ES implementation

The shakedown phase refers to the period from which the system is initial released to users until normal or routine use is reached (Tong et al. 2015). The typical activities in this phase is training and technology rework (Markus et al. 2000). This period usually lasts between 6 to 12 months after adoption (Sykes et al. 2015), and ends when "normal operations" have been achieved.

After the initial adoption, users start getting familiar with the system's functions and operations, enabling a comprehensive knowledge of the system (Hsieh et al. 2011). As a result, norm operations can be achieved and system enters a state of being routinized/habitual used (Saga et al. 1994). We call it stable post-adoptive stage or stable phase of post-adoption in this study. It is the longest stage which only received little attention. The actual IS benefits are supposed to be ascertained only when this stage is achieved (Markus et al. 2000). But given the stability of this phase, achieving significant improvements in organizational functioning and performance becomes difficult (Hsieh et al. 2007). In some cases, when the organization considers its experience has been a success, it may stop continuous business improvement, technology upgrading and additional user skill building. To the contrary, the unfitness between system and the work facilitates users seek to recommend modifications, or furthermore, to explore and innovate when users have established considerable knowledge about the system (Sun 2012). Under this circumstance, users' system use-related behaviors in the forms of feedback and self-motivated exploration may serve as one of the most importance sources to enhance work performance (Hsieh et al. 2011; Orlikowski 2000). But little attention has be played to such behaviors of IS research in stable setting of ES implementation.

The common problem for the organization is how to improve the performance through the use of the system (Markus et al. 2000). The organization may decide whether to undertake further improvements or upgrades based on the assessment concerning with IS success when routine use has achieved. If the result is unsuccessful in meeting goals or business needs, the organization may move to the upward phase to upgrade or implement a new ES (Galy et al. 2014). Then a new round to access to stable phase will be induced.

As we mentioned before, it is during the stable phase that can ascertain the benefits of ES investments, thus, this study tries to understand how to improve user performance through ES use-related behaviors under a routinized context, namely, the stable phase.

2.2 ES Use-related Behaviors in Stable Post-adoptive stage

In this study, we anchor on Barki et al. (2007)'s definition of system use-related behaviors to examine the user performance in the stable post-adoptive stage. This broader conceptualizations of IS use can explain salient implementation and adoption outcomes better than previous feature-centric view in terms of capturing a more complete set of use-related behaviors enacted by individual user. Additional, this definition takes the richness of the relationships between system, tasks and users into consideration, which are the three fundamental elements of system use (Burton-Jones et al. 2006). Based on Barki et al. (2007)'s conceptualization, individual-level system use-related behaviors not only refer to the behaviors that associated with the interaction with system to complete tasks, but also include the adaptations, alterations, or modifications related to system, tasks and users in socio-technical context (Barki et al. 2007). In addition, by distinguishing the adaptation of task-technology from the adaptation of users themselves, three behavior categories can be identified, namely, technology interaction behaviors, task-technology adaptation behaviors and individual adaptation behaviors (Tong et al. 2015).

2.2.1 Technology Interaction Behaviors in Stable Post-adoptive Stage

Technology interaction behaviors refer to users' interaction with the system to accomplish tasks. In the stable phase, interacting with the system to perform tasks has been a routinized activity in employees' daily wok (Markus 2004). Therefore, we use the term "system use" to represent technology interaction behaviors in this study. It is the ES utilization of users for accomplishing different kinds of tasks in the set of steps that they need to follow (Tong et al. 2015). For example, system use of a resident physician includes activities such as entering diagnoses and summaries, marking progress notes et al., concerning with a completed process of patient care.

Prior literature suggested that the benefits of ES investments would be finally realized during the phase in which normal operation or routine use has achieved (Markus et al. 2000), which released a positive relationship between system use and user performance in stable phase. But it is insufficient for saying that system use will enhance user performance. We should consider such influence in terms of the nature, extent, and appropriateness in the studied context (DeLone et al. 2003).

In the stable phase, since users have become familiar with the system's functions and operations (Markus et al. 2000), it is possible for the users to perform full functional use of an ES, including informational use, transactional use, and customer service use to realize its richness potential in enhancing individual users' performance (Young et al. 2000). In addition, full use of ES helps users to understand their system-related works better (DeLone et al. 2003). Under this circumstance, they can utilize the ES in a more efficient and effective way concerning with their work. In other words, users' routinized and repetitive interaction with system in their daily work can contribute to users' work performance. Therefore, we believe

H1*: In the stable post-adoptive stage, system use is positively related to user work performance.*

2.2.2 Task-technology Adaptation Behaviors in Stable Post-adoptive Stage

Prior studies about user adaptation are located in a setting that new system implementation or system improvement is introduced. In fact, system is still offer obstacles to individuals even when the technology itself is not fundamentally new to users (Elie-Dit-Cosaque et al. 2011). Under this circumstance, users may engage in additional learning and adaptation to make the ES better fit themselves or the tasks or the organization (Barki et al. 2007). Therefore, one objective of this study is to understand the work mechanisms of different user adaptation behaviors in stable post-adoptive stage.

Task-technology adaptation behaviors include all types of behaviors that conducted by users to change or alter a system and how it will be implemented in an organization (Tong et al. 2015). Specifically, task-technology adaptation behaviors reflect the behaviors that a user modifies the technology (i.e., hardware or software), or task/work process to optimize the fitness of IT and his/her work (Beaudry et al. 2005). The key point of this kind adaptation is reinvention (Barki et al. 2007). Reinvention is deliberate and creative activities in which users make cognitive and behavioral efforts (Abbott et al. 2015), which can be seen as an important phenomenon that needs to be considered in IS post-adoptive study.

Task-technology fit theory (TTF) (Goodhue et al. 1995) and task characteristics from adaptive structure theory (AST) (DeSanctis et al. 1994) provide the theoretical foundation for task-technology adaptation behaviors. TTF highlights the importance of technology adaptation to induce better system use outcomes (Wu et al. 2014). If users can make system more suitable for their work through self-motivating to use it more, they can realize the expected benefits from the efforts in task-technology adaptation (Barki et al. 2007). AST suggests that task adaptation results in a better fitness and compatibility between systems and tasks, and it is positively related to system use and its performance (Beaudry et al. 2010).

User adaptation behaviors appear in the form of either exploitation (e.g., utilizing past experience/knowledge to refine and extend existing technologies), or exploration (e.g., experimenting on innovations) (Gupta et al. 2006). Task-technology adaptation is more likely to be a kind of exploitation in initial post-adoptive stage, but an integration of exploitation and exploration in stable phase. Since users have a mature experience of ES during stable phase, they can recommend useful and effective suggestions for IT improvement. When users engage in task-technology adaptation in this phase, changes can be made to system (both hardware and software) or tasks to optimize the fitness of system, tasks and users according to users' feedback and suggestions (Barki et al. 2007). Therefore, this kind of adaptation is beneficial to system use performance, and further contributes to user work performance.

As we mentioned before, task-technology adaptation refers to behaviors such as recommending to improve system function, interface or hardware et al. (Tong et al. 2015). Considerable task-technology adaptation behaviors of users indicate an unfitness between system, tasks or users (i.e., low IT capability) (Abbott et al. 2015). In other words, existing ES cannot satisfy users' requirement in term of completing daily work. Under this circumstance, the impact of the routinized interaction with system on user work performance will be hindered (Goodhue et al. 1995). Therefore, we recognize that task-technology adaptation of users has a negatively role on the relationship between system use and user work performance. Specifically,

H2a: *In the stable post-adoptive stage, the task-technology adaptation behaviors of users is positively related to user work performance.*

H2b: *In the stable post-adoptive stage, the task-technology adaptation behaviors of users negatively moderates the relationship between system use and user work performance.*

2.2.3 Individual Adaptation Behaviors in Stable Post-adoptive Stage

Unlike task-technology adaptation behaviors which adapt either the tasks or the technology, individual adaptation is performed by a user to adapt his/herself. In other words, individual adaptation reflects alterations and modifications that individuals make to themselves to adapt to the IT (Tong et al. 2015). These so call modifications to oneself include learning activities, and influence how individuals interact with the IT (Barki et al. 2007). The key point of individual adaptation behaviors is learning. Individual adaptation is a system use-related information acquisition process that users try to increased system knowledge and mastery (Lewis et al. 1993). This process mainly consists of two aspects: self-motivated learning and exploration, and information exchange with others (i.e., colleagues and IT specialist) (Barki et al. 2007).

As we mentioned before, user adaptation behaviors appear in the form of either exploitation or exploration. In the early stage of post-adoption, users are not familiar with the system. So they are unlikely to experiment with system-related innovations (Tong et al. 2015). But in the stable phase, since users have a mature experience of ES, they can explore and innovate by continuing learning and communication with others (Hsieh et al. 2011). For example, they can exchange information concerning with how to complete a certain task more quickly with other users. What's more, a relative comprehensive understanding of ES make it possible for users to independently expand one's knowledge and mastery of system, over and above the basic requirements of an organization. As a result, these exploratory and innovation behaviors can enhance system capacity to satisfy users by helping them to perform system-related work more efficiently and effectively (Hsieh et al. 2007). Then, the improved system capacity finally leads to better work performance (Ahearne et al. 2008).

According the definition of individual adaptation behaviors, the objective of adaptation is to adapt oneself to better fit the system and system-related tasks (Barki et al. 2007). That is, individual adaptation behaviors aim to explore how to better conduct the system-related tasks in one's work by improving one's ability in terms of IT. Obviously, individual adaptation behaviors help to enhance users' understanding of ES (Tong et al. 2015). Users become more familiar with the system's function and operation with self-learning or communication with others. In turn, users can interact with the system in a more efficient an effective way. As a result, user work performance can be improved. Therefore, user adaptation can play a vital role to expand the effect of system use on performance.

H3a: *In the stable post-adoptive stage, the individual adaptation behaviors of users is positively related to user work performance.*

H3b: *In the stable post-adoptive stage, the individual adaptation behaviors of users positively moderates the relationship between system use and user work performance.*

2.2.4 A Comparison between Task-technology Adaptation Behaviors and Individual Adaptation Behaviors in the Stable Post-adoptive Stage

Although both task-technology adaptation and individual adaptation are defined from the individual users' perspective, the underlying themes behind them are totally different. The task-technology adaptation focuses on refining and extending the system or related tasks to serve user work preference, while individual adaptation aims to adjust oneself by increasing IT knowledge (Tong et al. 2015).

During the initial stage of post-adoption, task-technology adaptation of users can help organization find shortcomings and fix bugs, which is one of the most primary task for ensuring the success of ES (Wu et al. 2014). Meanwhile, users are less likely to explore since they are unfamiliar with the system. The advantage of task-technology adaptation over individual adaptation of users in initial stage had been observed by Tong et al. (2015). However, in the stable phase, firm may stop or invest few to response users' suggestions. Under this occasion, task-technology adaptation seems less useful than individual adaptation in improving user performance since the IT learning and IT learning-related interactions with others or IS professionals is more likely to serve user work preference (Jasperson et al. 2005). On the other hand, individual adaptation can not only used to increase the fitness between system, tasks and users, but also to enhance users' understanding of ES. With the individual adaptation, one's IT capacity can be enhanced. In comparison, individual adaptation will achieve a better performance than task-technology adaptation in stable phase. Therefore,

H4: *In the stable post-adoptive stage, the individual adaptation behaviors of users induces better user work performance than task-technology adaptation behaviors.*

Figure 1. shows the research model. It contributes to the understanding of the relationship between ES use-related behaviors and user work performance. User performance was measured as the overall performance of a user concerning with workflow. Besides, factors that influence user performance (i.e., organization commitment, department, facilitating conditions, work overload, structural governance, position legitimacy power and perceived ease of use) were controlled, to enhance the interpretation of this model.

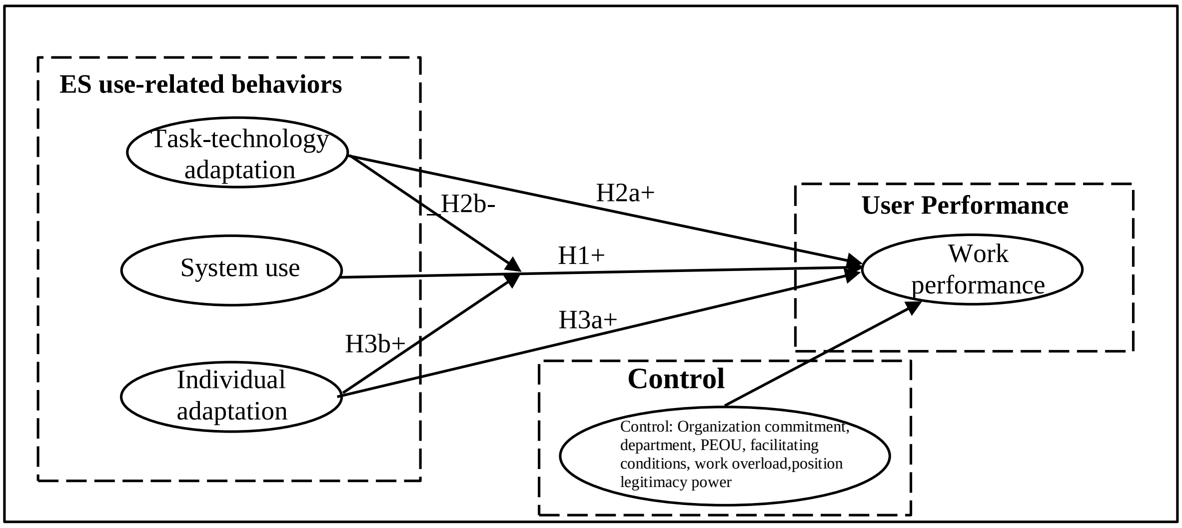

Figure 1. Research model

3 RESEARCH METHODOLOGY

3.1 Research Setting and Data Collection

In this study, we aim to explain and predict the work performance of an individual user with regard to their system use-related behaviors. The focal ES is an EMRS employed in the inpatient department of a major hospital. Since this study concerns with individual users' behaviors and performance, the choice of single organization helps control the effects of organizational level variables. The focal EMRS allows physicians to enter and view patient's diagnosis, progress notes, discharge information and test results. Besides, the EMRS can statistically analyse all these information for the sake of research. Thus, patient records which electronically collected and stored through the EMRS can supply patient data to providers on request and facilitate medication related tasks (e.g., physician prescription) (Wager et al. 2009). Our primarily interviews with the IT staff in the focal hospital reveals that the EMRS was released more than three years ago before we conducted this study, and the IT staff keeps on providing technical assistance for the users. On the one hand, the EMRS has been incorporated into the work process in the focal hospital, indicating a relative mature stage of system use. On the other hand, the focal hospital provides channels for the users to seek IT help and give feedbacks. Thus, we believe the EMRS in the focal hospital is appropriate for this study.

The unit of analysis is the individual user. Resident physicians are selected as the subjects since they are the majority of the EMRS users. The duration of each physician's EMRS use within the study period, varied from half a year to three years, indicating a routine use basis for all participants. Since EMRS is a typical ES that seamlessly integrating organization's information flows and workflow to support users' daily work, resident physicians need to use EMRS every day. This sample selection enables us to generalize our findings to other ES contexts in the stable post-adoptive stage. We collect data primarily through a survey methodology, along with supplemented qualitative and observational data. First, we did some interviews with IT staff and physicians and observed their works to obtain a contextual understanding to help us develop the research model and hypotheses. Second, we conducted a field survey to test the proposed research model. Before we conduct the regulation survey, we also did a pilot test and modified the questionnaire according to the pilot test result. Resident physicians were invited randomly to complete the survey during their break time. It was required that each participant in the survey must be a regular employee of the focal hospital who has considerable experience in using the EMRS directly. All these requirements were list and highlight in the cover letter of the questionnaire to make sure every participant were qualified. As an incentive, 50 yuan (equivalent to US$7.68) was provided to the participants for each completed questionnaire as a token of appreciation. Physicians who participated in the previous short interviews and pilot test were excluded from the study. The authors made several visits to survey collaborators in the hospital to increase the response rate. The hospital has 30 departments in total, five of which are not required to use the EMRS, so we sent about 300 survey questionnaires to the rest 25 departments. We finally got 250 valid responses (about 8-12 from each department), yielding a response rate of 83.3%. It is satisfactory since resident physicians have an intensive work schedule.

3.2 Measurements

We adapted previously validated questions when possible, to ensure the reliability and validity of measures. When previous suitable measures were unavailable, we developed new questions by context and literature study. The validated formative items for individual adaptation and task-technology adaptation were adapted from the scale of Barki et al. (2007). Their measures were developed under the stable post-adoptive context, and it has been applied in initial post-adoptive stage (Tong et al. 2015), which make it possible for us to make comparison of results across different post-adoptive stages. Example item of individual adaptation is “When I work in inpatient department, I have communicated with colleagues in order to better understand how this system operates”, and question of task-technology adaptation includes “How much effort (time and energy) have you spent recommending or suggesting improvements to this system’s functionalities when you use systems in inpatient department?” Instead of using general system use measures, system use was operationalized as a formative construct consisting of major system-related tasks. We identified five tasks for users (i.e., enter diagnoses and summaries, mark progress notes, view patients information such as history, diagnoses or medication orders performed by doctors, track test results, and conduct statistically research analysis) based on the primarily observations on medication administration processes and interviews with resident physicians and IT staff, including on example “In doing your own job in the inpatient department, how often do you use the system to input clinical notes to EMR (e.g., diagnosis, clinical progress, discharge summary)?”

The dependent variable is work performance. The seven criteria for work-related performance were self-developed based on the research context and the system-related performance proposed by Tong et al. (2015). This well-established measurement captures the different dimensions of resident physicians’ work, such as to accomplish work quickly, to achieve good performance evaluation, and to enhance effectiveness. Examples of this measurement include “it is easy to do my job” and “I can get better performance evaluation”.

Department, facilitating conditions (Venkatesh et al. 2008), organizational commitment (Angle et al. 1981), work overload (Ahuja et al. 2005), structural governance (Balaji et al. 2014), position legitimacy power (Raven et al. 1998) and perceived ease of use (Venkatesh et al. 2000) were included to control the effects of individual differences.

During the designing of the questionnaire, we consulted several senior researchers to identify and rectify potential problems in the framing and phrasing of questions. Minor modifications were made on certain items based on their suggestions. Before formal survey, we conducted a pilot test. Then several modifications in the phrasing and framing of the questions were made according to the physicians’ suggestions.

4 DATE ANALYSIS RESULTS

Partial least squares (PLS) method can maximize the variance demonstrated by the constructs and enabled latent variables to be either formative or reflective. Since our research was prediction-oriented and all the independent variables were developed as formative, emergent constructs, we used PLS to do the data analysis. After confirming good psychometric properties, we examined the structural model by assessing the significance of paths using the logistic regression in SPSS 22.0.

4.1 Evaluating the Measurement Model

The measurement model of this study was assessed using convergent and discriminant validities for all the reflective constructs. Convergent validity reflects the uni-dimensionality of the constructs and was evaluated by using item reliability, composite reliability of constructs, and the average variance extracted (AVE), according to Russell (1978). The Cronbach's alpha and Composite reliability should higher than 0.7 and AVE should no lower than 0.5 (i.e., the square root of AVE higher than 0.7). Scores for all the reflective constructs in the research model reached above criteria. Table 2 presents the test results for these constructs. Discriminant validity reflects the extent to which the indicators for each construct are distinctly different from indictors in other constructs, and was assessed using factor analysis and construct correlation in this study. Factor loadings of above 0.7 are considered as good. As depicted in Table 3, all the item loadings on the intended constructs were higher than the loading on the other constructs (MacKenzie et al. 2011). The second method is to assess whether the square root of AVE for a construct is larger than its correlations with other constructs. As shown in Table 4, all reflective constructs satisfy this criterion. Specifically, our data shows a strong convergent and discriminant validities. We measured the three formative constructs (i.e., system use, task-technology adaptation, individual adaptation) by following the guidelines proposed by Cenfetelli et al. (2009) and Petter et al. (2007). Weights can provide the relative contribution of indicators to assigned constructs, and loadings show the importance of indicators. The test results were satisfied.

Constructs	Mean	SD	AVE	Composite Reliability	Cronbachs Alpha
Work performance	5.2786	0.9471	0.6631	0.9217	0.8977
PEOU	5.0328	1.3826	0.8794	0.9669	0.9543
Organization commitment	6.1719	0.8760	0.9022	0.9651	0.9458
Work overload	5.4491	1.2379	0.7905	0.9186	0.8733
Position legitimacy power	2.6487	1.6859	0.8526	0.9455	0.9135

Table 2. Convergent validity

	Component				
	1	2	3	4	5
Work performance1	.704	.309	.135	-.110	-.011
Work performance2	.739	.252	.224	-.056	-.042
Work performance3	.889	.107	.168	.040	-.031
Work performance4	.745	.302	.049	-.005	.016
Work performance5	.718	-.038	.364	.043	.168
Work performance6	.835	.087	.145	.060	.040
PEOU1	.188	.897	.139	-.094	-.022
PEOU2	.227	.907	.121	-.112	-.078
PEOU3	.193	.903	.125	-.110	-.059
PEOU4	.193	.874	.096	-.169	-.063
Organziation commitment1	.248	.204	.892	-.063	.016
Organziation commitment2	.275	.144	.895	-.057	.032
Organziation commitment3	.239	.108	.907	-.034	-.021
Work overload1	.013	.019	.020	.017	.873

Work overload2	.031	-.063	.016	-.090	.917
Work overload3	.031	-.127	-.005	.065	.881
Position legtimacy power1	.018	-.127	-.062	.893	.008
Position legtimacy power2	-.019	-.125	-.027	.938	.031
Position legtimacy power3	.005	-.128	-.036	.901	-.043

Table 3. Assessment of factor analysis

	1	2	3	4	5	6	7	8	9	10
System use (1)	1									
Department (2)	0.0454	1								
Faciliating condition (3)	0.11	0.107	1							
Individual adaptation (4)	0.2702	-0.0358	0.0845	1						
Organization commitment (5)	0.2199	-0.0702	0.3246	0.265	1					
Work overload (6)	0.0513	0.1089	0.1114	0.156	0.0286	1				
PEOU (7)	0.2578	-0.0194	0.4178	0.1931	0.3331	-0.103	1			
Position legtimacy power (8)	-0.2746	0.0541	-0.074	-0.2803	-0.1054	-0.01	-0.2636	1		
Task-technology adaptation (9)	0.0696	0.1556	0.2486	0.0647	0.0017	0.0628	0.1797	0.1036	1	
Work performance (10)	0.1828	0.0647	0.4101	0.261	0.5046	0.0518	0.4286	-0.0247	0.1886	1

Table 4. Inter-Correlations among variables

4.2 Evaluating the Structural Model

Table 5 presents the results of analyses for three models: the control model, the main effects and the full model including all control variables.

	Control variables only	Control variables + Main effects	Full model
Control variables			
Department	0.077	0.069	0.056
Facilitating conditions	0.122*	0.123*	0.112
Organizational commitment	0.377***	0.355***	0.357***
Work overload	0.057	0.035	0.036
PEOU	0.244***	0.220***	0.213***
Position legitimacy power	0.075	0.093	0.061
Independent variable			
system use		0.018	0.055
Task-technology adaptation		0.073	0.079

Individual adaptation		0.148^{***}	0.167^{***}
Interaction terms			
system use * Task-technology adaptation			-0.092^{*}
system use * Individual adaptation			0.181^{***}

* 0.1 level of significance ** 0.05 level of significance *** 0.01 level of significance

Table 5. Results of the multiple regression analyses: path coefficients and significance

The results showed that the significance of paths remained after adding in control variables. Therefore, the results of the hypotheses tests were reliable and independent of the influences from the control variables. Our examination of the theoretical and the full models revealed that out of 6 hypotheses, 4 were supported. The main effect of system use on user work performance was not observed (β=0.018), i.e., H1 was not supported. Task-technology adaptation was not seen to have a significant relationship with work performance (β=0.073), i.e., H2a was not supported. But it did negatively moderate the relationship between system use and user work performance (β=-0.092, p<0.1), i.e., H2b was supported. Individual adaptation was seen have a significant effect on user work performance (β=0.148, p<0.01), and have a significant moderating effect on the relationship between system use and work performance (β=0.181, p<0.01), i.e., H3a and H3b were supported. The path coefficients of individual adaptation and task-technology adaptation to user work performance were 0.148 and 0.073, suggesting a better performance of individual adaptation than task-technology adaptation in improving user work performance in stable phase. We did another partial correlation analysis to ensure individual adaptation was significant related to work performance without the influence of task-technology adaptation (β=0.254, p<0.01). Thus, H4 was support.

5 DISCUSSION AND IMPLICATIONS

5.1 Main Findings

The objective of this study is to know how the different types of ES use-related behaviors could enhance user work performance in the stable post-adoptive stage. To this end, we investigated the impacts of three different ES use-related behaviors, namely, system use, task-technology adaptation behaviors and individual adaptation behaviors, on user work performance in stable phase of post-adoption. In addition, we tested the moderating effects of different user adaptation behaviors on the relationship between system use and user work performance.

Contrary to our expectation, system use in stable phase did not show a significant relationship with user work performance. A plausible explanation for this discrepancy is that the focal ES was first released more than three years ago, which may need to be upgraded to improve its capability in supporting organizational tasks. The results also showed that individual adaptation behaviors not only significantly enhanced users' work performance, but also extremely positively moderated the relationship between system use and user work performance, consistent with our hypotheses. For the task-technology adaptation behaviors, prior studies in the early post-adoptive stage showed it could directly affect the performance of users (Tong et al. 2015). However, we didn't see the significant effect in stable phase. This finding is consistent with previous observations that the firm may not perform continuous IT supports promptly. It always takes long times to improve IT in the stable context (Markus et al. 2000), which would restrain the direct effect of task-technology adaptation behaviors on performance. When engaging in task-technology adaptation, users expect to improve technology capability in time by optimizing the fitness of system and tasks. The unprompted and/or delay responses from IT department will undermine the impact of task-technology adaptation. Besides, we did find that task-technology adaptation behaviors would negatively moderate the effect of system use on user work performance as we expected. It is conformed to our argument that the re-adaption to the changes coming with task-technology adaptation reduce the positive effect of system use on user work performance.

5.2 Theoretical Implications

Several theoretical implications can be extracted from this study. First, this study contributes to the ES post-adoptive literature by being one of the earliest attempts to conceptualize and examine the stable post-adoptive stage of ES implementation. Focused on the specific characteristics of stable phase of ES implementation, we could have a comprehensive and richness understanding about the ES post-adoption.

Second, this study also contributes to the literature on ES use by investigating the roles of different ES use-related behaviors in influencing the user work performance. Our findings suggest that system use may not have direct impact on user work performance when routine use has been achieved, but the users' individual adaptation behaviors could facilitate user work performance through adapting themselves. These findings are important for user to further understand the interaction between ES use-related behaviors and performance.

Third, this study explores how different kinds of user adaptation behaviors can generate better user work performance from system use. Prior studies only concerned with the direct effect of user adaptation behaviors on performance in early stage. They ignore the influence of user adaptation on mitigating the negative effect of technology uncertainty and low technology quality, which can finally contribute to system use performance. This study extends the view of user adaptation literature by comparing the impacts of different user adaptation behaviors on the relationship between system use and user performance in stable phase, and shows a different result to the condition in early post-adoptive stage. Individual adaptation behaviors have a positive effect on the relationship between system use and user work performance, while task-technology adaptation behaviors have a negative effect on it.

5.3 Practical Implications

Many technical specialists and consultants sincerely believe that good IT project management is the answer to technology change success (Markus 2004). This study provides important implications for practice in understanding how induce better performance through users' ES use-related behaviors in stable phase of post-adoption. On the one hand, individual adaptation behaviors of users towards ES play a significant role in influencing their work performance. In the stable post-adoptive stage, system use alone cannot guarantee a better performance. Instead, management should encourage users to continue learning IT-related knowledge and further explore and innovate through communication with others (including IT staff and other colleagues). For example, hospital can provide more seminars for users to communicate with IT professionals and colleagues to better understand how to operate ES in a more efficient and effective way. On the other hand, given insignificant direct influence on performance and negative moderating effect on the relationship between system use and user work performance of task-technology adaptation behaviors in the stable phase, management should take actions to avoid excessive task-technology adaptation of users.

6 CONCLUSIONS

This study provides a nuanced understanding of how ES use-related behaviors affect user work performance in stable post-adoptive stage, an area receives little research attention yet. Individual adaptation behaviors enhanced the user work performance, while technology interaction behaviors and task-technology adaptation behaviors did not show significant effect on performance. Besides, we observed that individual adaptation behaviors and task-technology adaptation behaviors play different roles in inducing system use to generate favorable user work performance. Based on our findings, hospital management could make specific strategies to extract more value when ES operations have become normalized and routinized in employees' daily work.

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