



Assessing ERP post-implementation success at the individual level: Revisiting the role of service quality



Pei-Fang Hsu ^{a,*}, Hsiuju Rebecca Yen ^{a,1}, Jung-Ching Chung ^b

^a Institute of Service Science, College of Technology Management, National Tsing Hua University, Taiwan

^b UPS Supply Chain Solutions

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ABSTRACT

Whereas previous studies have devoted great attention to the success of Enterprise Resource Planning (ERP) system implementation, this study aims to investigate how the different qualities of an ERP system affect its post-implementation success from the user's perspective. We refined DeLone and McLean's IS success model to examine the relative importance of ERP system quality, information quality, and service quality to post-implementation success, with users' satisfaction, users' individual benefits, and a very critical yet seldom investigated variable, users' extended use of ERP systems, as the outcome variables. Our research model was empirically examined with data from 151 ERP users. We found that service quality, in conjunction with system quality and information quality, significantly affects ERP post-implementation success in terms of user satisfaction. More importantly, service quality was found to significantly interact with information quality and system quality to promote an ERP system's post-implementation success by increasing employees' extended use.

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1. Introduction

Over the past few decades, organizations have made significant investments in Enterprise Resource Planning (ERP) systems that enable them to synergize the 4M resources (man, money, material, and machines), integrate business data throughout organizations, and support critical business functions such as manufacturing, inventory management, human resources, sales, delivery, customer service, and finance [1]. An ERP system is generally considered an expensive investment, with costs ranging from half a million to \$300 million, with an average cost of \$15 million [2]. Despite huge investments in ERP systems, benefits after implementation are not guaranteed [3]. A recent survey finds that 57 percent of organizations suffered operation stoppages after ERP implementation [4] and that 67.5 percent failed to realize half of their projected benefits after implementation [3]. Companies often encounter great difficulties in using, maintaining, or enhancing

ERP systems after implementation. These challenges may turn the costly investment into a post-implementation failure or even lead to a business disaster [5]. Therefore, the “ERP post-implementation” phase, also called the “post go-live” stage, is viewed as being critical [6–10].

However, the extant literature on ERP applications tends to focus on issues related to their adoption and implementation, with limited attention devoted to the post-implementation stage. For example, Esteves and Bohorquez [11] review study indicates that the number of ERP publications geared toward the implementation phase is 47 percent vs. 15 percent on post-implementation usage. Other meta-analytic studies (e.g., [12,13]) also report the paucity of research on ERP systems after implementation. Some scholars have acknowledged this gap and consider it a focus for the second wave of ERP research [9,10,14]. Additionally, while the majority of research has investigated ERP success at the organizational level, focusing on consequences such as profits, costs, or market share, etc. [5,10], few studies have concentrated on users' perspectives. Assessing the post-implementation success of ERP systems from the perspective of individual users is crucial because the underachievement of the implemented ERP systems may be due in part to the underutilization of the systems by the users [15,16]. In line with this argument, research also suggests that

* Corresponding author. Tel.: +886 3 5742221.

E-mail addresses: pfsu@mx.nthu.edu.tw (P.-F. Hsu), hjyen@mx.nthu.edu.tw (H.R. Yen), jungching.chung@gmail.com (J.-C. Chung).

¹ Tel.: +886 3 5162146.

positive impacts for the organization result from accumulated benefits that individuals obtain from their use of the ERP packages (e.g., [17,18]).

Thus, in this article, we extend the current ERP literature by revisiting DeLone and McLean's information systems success model (D&M IS success model; [19,20]) and proposing a framework that explains the success of an ERP system at the post-implementation phase from individual users' perspectives. Specifically, this study addresses two research issues that deserve further attention. The first gap is the need for understanding users' "extended use" of an ERP system and its relationship with the other components of the D&M IS success model when evaluating the success of the implemented ERP systems. Compared with other success constructs in the D&M model (e.g., system use, user satisfaction, and net benefits), extended use is a success construct that is often overlooked, and its relationship with other success constructs is not well understood [21]. Petter et al. [21] conclude that the inadequate understanding of "system use" seems to be largely caused by oversimplified or unspecified measures of this construct. When using an implemented ERP system, employees are required to use the system to perform their routine, which makes use/nonuse or frequency of use an insensitive indicator of individual impact. However, employees have discretion or flexibility in deciding the extent of their system usage. Firms that intend to further realize the benefits promised by mandatory systems must shift their employees from simple and shallow use during initial adoption to "extended use" because the full utilization of the system constitutes the basis of the system's success [15,20]. Hence, apart from previous studies that focused on the simple dichotomous use decision or amount of usage (e.g., frequency, time, etc.), this study turns to the notion of extended use, which refers to using a wider range of system functionalities for work productivity [15]. In this manner, we can better capture the important aspect of an ERP system as a complex IS that permits employees to use the system at different levels of sophistication [22]. Because the system of investigation has important implications in explaining extended use [15], by aligning the notion of extended use with the mandatory nature of ERP systems, this study complements the literature on assessing an ERP system's success after implementation.

The second gap that needs to be addressed is the lack of understanding of the interrelationships among information quality (IQ), system quality (SQ), and service quality (ServQ) after ERP systems are implemented. In an effort to re-specify their original model, DeLone and McLean [20] incorporate ServQ to complement the other quality dimensions because evaluating the success of an IS would be incomplete if the services provided by IS personnel were not properly considered. Despite increasing attention to the effects of ServQ in IS research, our knowledge regarding its roles in facilitating the success of an IS remains fragmented. Petter and McLean [23] meta-analytical study reports that only a few empirical tests of the D&M model have examined ServQ and that none of those studies found significant relationships between ServQ and other IS success constructs. Although researchers have urged the need to explicate the interactions among the IS success constructs [19–21,24], existing investigations of the updated D&M model assume that the three types of quality do not affect each other. While the exceptional studies that have examined the interrelationships among the three quality dimensions have proposed a mediation model [25,26], the relationships of the constructs within the D&M model can vary across contexts [20].

ERP systems are complex in nature, and their deployment is typically in conjunction with the continuous reengineering of business processes. Thus, despite their initial acceptance of the systems, users' utilization of such complex systems and realization

of anticipated benefits at the post-implementation stage may rely even more on IS personnel support and services, such as user training and bridging communication between users and the vendor [11]. Arguably, the impacts of an implemented ERP system's quality on use are, in part, a consequence of the interplay between the ServQ of the IS staff and the system's IQ and SQ. To that end, this study is designed to contribute to the IS literature by extending the D&M model and refining previous assumptions on the interdependency among IQ, SQ, and ServQ. Specifically, we illuminate the missing role of ServQ (i.e., its moderation on the influences of an adopted ERP system's IQ and SQ in evaluating the system's success). By highlighting the role of in-house IS staff as a complementary asset to the ERP system's IQ and SQ at the post-implementation stage, this study advances knowledge in the area of ERP post-implementation performance, which has predominantly focused on services provided by vendors or external consultants (e.g., [18,27]).

2. Literature review and theoretical foundation

We first review existing studies that focus on ERP post-implementation performance. As summarized in the review table (see Appendix A), most prior studies have examined ERP post-implementation performance at the firm level (i.e., the first nine articles in the table). Typical outcome variables include firms' profits, product quality, market value, productivity, process efficiency, shareholder return, etc. Few works have studied ERP post-implementation at the individual level. Notably, these studies tend to focus on one or two outcome variables, such as user satisfaction, user performance, or users' intention to use ERP systems. For example, Sykes et al. [28] investigate how employees' ERP post-implementation job performance is predicted by workflow and software advice. Through the lens of the social network structure, Sasidharan et al. [29] find that an individual's post-implementation performance is a function of his/her in-degree and betweenness centralities. In other studies, researchers employ satisfaction (e.g., job satisfaction; satisfaction with the system) to measure individual-level post-implementation success (e.g., [30,31]). Lastly, others consider an individual's use of the system as a proxy for the success of an implemented ERP and how such use is associated with job design [32] and learning [33]. There is no doubt that these studies have advanced our understanding of ERP post-implementation success at the individual level; however, that each of them focuses on only one or two "success" constructs has resulted in fragmented knowledge regarding an ERP system's post-implementation success.

Noting this gap in the literature, researchers (i.e., [34,35]) argue that the need to re-conceptualize IS success. Specifically, Gable et al. [34] model the success of ERP systems based on the assumptions that IS success is multi-dimensional and that the positive impacts of the IS are the ultimate outcomes sought by organizations. Their IS impact model suggests that four dimensions, including IQ, SQ, individual impact, and organizational impact, can effectively define the system's success. Despite their notable contributions in re-conceptualizing IS success, Gable et al.'s IS impact model remains limited in explaining an implemented ERP system's success at the individual level. First, their model does not consider ServQ, which has been proposed as an important factor when studying IS success [20]. Second, the IS impact model, which intends to measure success at the organizational level, has excluded success measures (i.e., extended use, satisfaction) that are critical to individual users who have adopted the ERP systems. Finally, the relationships among the success measures of an implemented ERP system remain unknown.

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