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ABSTRACT

This research reviews the task-technology fit literature and draws parallels with the internal-external efficacy model recently developed by Eden (2001). In particular, it argues that the construct of task-technology fit, operationalized with perceptual measures as is commonly done, is equivalent to the concept of means efficacy included in the internal-external efficacy model. As a result, the latter provides a theoretical lens through which existing results in the task-technology fit literature can be interpreted, as well as a number of avenues for further research that have not been conceptualized before. A research model based on these arguments is outlined, as well as the potential contribution of carrying out such study.

Keywords

Computer self-efficacy, task-technology fit, means efficacy, performance.

INTRODUCTION

The linkage between deployments of information technology and some measure of performance (for an individual user or for an organization) resulting from their use has always been a central area of interest within the Information Systems (IS) discipline. Indeed, investigating the effects of technology usage lies at the core of our body of knowledge. While some researchers have focused on these effects at the organizational level (employing, for example, the resource-based view of the firm as the theoretical foundation, see Wade and Hulland, 2004), others have examined the issue taking individual knowledge workers as the focal unit of analysis.

Two major streams of research stand out within the study of individual performance in technology-supported tasks. Grounded in Bandura's (1997, 2001) Social Cognitive Theory, computer self-efficacy (CSE, one's perception of self-capability about using computer technologies) has been the subject of much research in the IS field (e.g., Compeau and Higgins, 1995a,b; Marakas, Yi and Johnson, 1998; Marakas, Johnson and Clay, 2007, etc.), which has established the important effects that the construct has on individual performance. The many cognitive, motivational, and affective mechanisms by which these effects occur have been detailed by Bandura (1997) and extensively replicated. In short, the relationship between CSE and individual performance is well accepted in the IS literature. The second stream of research was first outlined by Goodhue (1995, 1998; Goodhue, Klein, & March, 2000) and posited that task-technology fit (TTF), that is, how well suited a technology is for performing a specific task, would be an important factor in performance on said task. This relationship has also received much empirical support in various studies.

Although the theoretical rationale for the performance effects of TTF was based on the objective fit of the technology to the task, most measures of TTF in the literature are based on participants' perceptions of TTF, rather than objective measurement. The assumption that individuals who are actively engaged in the performance of these tasks can provide accurate evaluations of the suitability of the technologies has been used to bridge the gap between perceptual measures and an underlying rationale based on objective fit; that is, perceptual measures are good surrogates of actual TTF. The Internal/External Efficacy Model developed by Eden (2001; Eden, Ganzach, Granat-Flomin, & Zigman, 2010), however, argues that both perceptions of one's capability to use a tool (in this context, CSE) and one's perceptions of how well suited a tool is for a particular task (which the authors call means efficacy) are distinct but important determinants of performance on said endeavor. The major argument set forth here is that TTF and means efficacy are equivalent constructs and, based on the logic presented by Eden (2001), perceptions of TTF have an importance of their own on performance beyond their presumed role as mere surrogates of objective fit.

INTERNAL / EXTERNAL EFFICACY RESEARCH

The distinction between internal and external sources of efficacy, which forms the underlying theoretical lens employed in this research, was first formulated by Eden (2001) based on earlier work on Pygmalion-style leadership (Eden, 1988, 1990, 1992), conceptual distinctions between different sources of efficacy beliefs by Gist and Mitchell (1992), and earlier work on the subjective assessment of the adequacy of tools for job performance (Eden & Aviram, 1993). Though of relatively recent appearance in the management literature, there is a small but growing collection of empirical studies that provides support for the validity of its main propositions across a number of different contexts, such as psychology, leadership, training and, most notably, the introduction of new information technologies to the workplace.

The vast majority of research related to self-efficacy has been conducted following the seminal work of Bandura (1986, 1997) with its clear focus on self-efficacy as a subjective judgment of competence for performing specific actions or achieving specific goals. Indeed, Bandura (1997, p. 21) defines self-efficacy as "… a judgment of one's ability to organize and execute given types of performances". After more than thirty years of research in this area, there is overwhelming empirical evidence of the effects of self-efficacy on performance, both in the psychology and management literatures (see Stajkovic and Luthans, 1998 for an extensive meta-analysis), which includes experimental evidence in both laboratory studies as well as field experiments (Bandura & Jourden, 1991; Bandura & Wood, 1989), that support the causality of those relationships. There is also ample literature on the determinants of self-efficacy (Bandura, 1997; Gist, 1989; Gist & Mitchell, 1992). Within the Information Systems discipline, starting with the seminal work of Compeau and Higgins (1995a, 1995b) and Marakas, Yi and Johnson (1998), there is an extensive empirical literature that has examined various aspects of computer self-efficacy as a specific instantiation of the general theory as applied to our particular domain. A number of studies have examined specific aspects of this important construct (Agarwal, Sambamurthy, & Stair, 2000; Johnson, 2005; Johnson & Marakas, 2000; Yi & Davis, 2003; Yi & Im, 2004).

The Internal-External Efficacy model (Eden, 2001), while still retaining the subjective nature of efficacy judgments (that is, efficacy judgments are deemed to be perceptions of competence or adequacy, but not necessarily objective assessments of either), expanded on the conceptualization of efficacy beliefs as solely based on internal determinants and distinguished between resources that may be internal or external to the individual performing the assessment. Based on earlier work by Gist and Mitchell (1992) on the determinants of self-efficacy, who distinguished between those that were under the control of the subject and those that were external to her, Eden (2001) argues that external sources of efficacy beliefs complement internal ones, but have largely been unexplored in the literature, which has followed Bandura's (1997) emphasis on the latter. Rather, overall efficacy for performing a task successfully is deemed to be a subjective judgment of all available resources that may be applied to that end. While some of those resources – competence, energy, skill, motivation, talent, etc. – are internal to each individual, other resources are external to her. Subjective beliefs about the adequacy or sufficiency of those external resources are thus labeled external efficacy beliefs. In his development of his Internal-External Efficacy model, Eden (2001) argues that these external efficacy beliefs are an alternative determinant of motivation and concerted effort placed by an individual in the performance of a task, with consequent effects on its outcome.

In this broader approach to the conceptualization and assessment of efficacy beliefs, then, internal and external sources of efficacy to perform are taken to be two distinct determinants of task performance. Within the latter, Eden (2001) distinguishes between several different categories of external efficacy beliefs, related to different aspects of the external environment in which the focal task is being performed, as well as two different levels – general and specific – of detail about their realization. Examples include the quality of organizational leadership, be it top management (as a source of external efficacy operating at a general level) or an immediate supervisor (which operates at a more direct, specific level) or, most important for this particular research, beliefs in the quality of the tools available for task performance. When operating in technology-supported environments, as is the case in the vast majority of modern organizations today, this belief – labeled means efficacy – directly translates into an individual's belief in the quality of the technologies that are available or provided for the performance of the task at hand. This is taken to be a different construct from self-assessments of capability to use those tools, e.g., computer self-efficacy. As put by Eden et al (2010): "… *internal efficacy may include an individual's belief about his or her ability to use a particular tool, whereas means efficacy is that individual's belief about the tool itself, regardless of any self-estimate about his or her ability to use it*" (p. 690). A major tenet of this research is that the construct that Information Systems researchers have studied under the label of task-technology fit (Goodhue, 1995) is equivalent to the one put forth by Eden (2001) when he refers to means efficacy. This important point will be explored in more detail in the next section.

To summarize, the Internal-External Efficacy model postulated by Eden (2001), which has received empirical support in a number of studies and particularly in the context of the introduction of new information technologies, distinguishes between internal efficacy judgments – computer self-efficacy – and assessments of adequacy of external resources that are employed in task performance. Of particular interest here is a particular category of external resources, which encompass belief in the quality of the means – in our case, information technologies – that are available to carry out focal tasks. Research indicates that means efficacy beliefs can be measured and manipulated separately from computer self-efficacy, and that they are causally related to task performance even after accounting for the effects of the latter. In the next section we review existing research in the task-technology fit stream of our literature, and highlight the many similarities between this construct and the concept of means efficacy outlined by Eden (2001).

TASK-TECHNOLOGY FIT RESEARCH

The construct of task-technology fit was first conceptualized and measured by Goodhue (1995, 1998) as part of an effort to supplement existing theories that focused exclusively on technology utilization as a precursor to performance and which only implicitly considered the adequacy of the technology for the task at hand, such as the technology acceptance model (Davis, 1989) or DeLone and McLean's model of information systems success (DeLone & McLean, 1992), what Goodhue (1995) termed "utilization focus" research. In contrast to these perspectives, the technology to performance chain model proposed by Goodhue (1995) underscored that both technology utilization and fit to the focal task are prerequisites for successful performance outcomes. There is an important stream of empirical studies that have validated different aspects of the model (Dennis, Wixom, & Vandenberg, 2001; Goodhue, 1995, 1998; Goodhue, et al., 2000; Goodhue & Thompson, 1995; Jarupathirum & Zahedi, 2007).

Two particular aspects of this research stream are important for the arguments set for here. The first is the underlying logic that explains why higher levels of fit between tasks and the technologies employed to carry them out (or, as discussed later, between the individuals performing the tasks and the technologies involved) are expected to result in more successful performance of said tasks. Grounded in earlier work on cognitive fit, it is the objective characteristics of the technologies employed and the tasks for which they are employed, and how well those fit with each other, that lead to increased (or decreased if fit is poor) task performance as a result. Though some studies have been conducted by focusing on these objective aspects of tasks and technologies (e.g., Dennis, et al., 2001), most research in this area has employed perceptual user evaluations as surrogates for objective assessments of fit, following earlier work that argued technology users were capable of adequately evaluating tasks and technologies (Goodhue, 1995). As a result, though this research stream is grounded on objective fit of tasks and technologies as a source of successful task performance, empirical support for that argument has been mostly provided by users' perceptions of how adequate technologies were for task performance.

The second key aspect of interest here refers to where the focus of interest has been in past research in this area. While commonly discussed as 'task-technology fit', the model originally proposed by Goodhue (1995) distinguishes between task-technology fit, which represents how well suited a specific technology is for performance of a certain task and is a function of task and technology characteristics, and technology-individual fit, which represents how capable individuals are of using the focal technology, which is a function of technology and individual characteristics. These two constructs, in turn, affect an overall task-technology-individual fit, which is the most direct antecedent of performance; though the 'task-technology fit' label for the overall evaluation may be misleading, it has been commonly referred to as such out of convenience. An examination of extant empirical research in this area shows that most studies that examined task-technology fit only measured this aspect of the model and not the more comprehensive judgment, which encompasses individual characteristic as well. Marcolin, Compeau, Munro and Huff (2000) make a similar point.

At this point it is possible to draw some parallels between these two streams of research that highlight their extensive similarities. As noted above, empirical tests of the model proposed by Goodhue (1995) have largely been conducted using perceptual measures; hence, what has been shown is that user perceptions of task-technology fit have effects on task performance. Jarupathirum and Zahedi (2007) explicitly acknowledge this as well. Thus, whereas means efficacy can be defined as an "*…individual's belief in the utility of the tools available for performing the job…*" (Eden, 2001; Eden, et al., 2010) and task-technology fit as an individual's perception of "*…the degree to which a technology assists an individual in performing his or her portfolio of tasks…*" (Goodhue, 1995) it is straightforward to see that both definitions are referring to the same underlying concept. Similarly, technology-individual fit refers to the degree to which an individual is competent in operating or using the focal technology – the concept is close to that of user competence developed by Marcolin et al (2000). To the extent that competence in using a technology is assessed by the individual's perception of her competence, researchers are tapping into the computer self-efficacy construct, that is, an "*…individual's judgment of one's capability to use a computer...*" (Compeau & Higgins, 1995b). The key point here is that extant research conducted within the task-technology fit literature can be understood within the internal-external efficacy model in a way that provides further grounding for the observed effects as well as others hitherto unexplored. The research model described next seeks to empirically test the major arguments developed here.

RESEARCH MODEL AND HYPOTHESES

TTF research has generally been conducted using (a) perceptual measures of fit and (b) various tasks and technologies aggregated in a single study. Effects of TTF on performance have been thus attributed to variance in the degree to which various technologies are suited for performing various tasks, as evaluated by respondents. This research design, however, confounds variance in perceptions of TTF by respondents facing the same task/technology scenario with that from respondents facing different scenarios. If the effects of TTF are, as has been argued in the literature, the result of the objective fit of a technology to a particular task, and perceptions of TTF simply reflect this fact, then variance in perceptions of TTF within a single task/technology combination should not be predictive of performance. This would occur because all respondents are using the same technology for performing the same task, and therefore there would be no variance in the fit of the technology to the task.

If, on the other hand, variance in perceptions of TTF in this scenario do have explanatory power on performance, that would be indicative that those perceptions encompass something more than surrogate evaluations for objective fit. Rather, as noted by Eden, evaluations of how well a specific tool is suited for performance of a task has motivational effects on its own right. If this is indeed the case (and preliminary research by Eden et al, 2010, provides some support), perceptions of TTF can become an important lever for the improvement of performance, that could be subject to interventions. By manipulating perceptions of TTF while keeping the objective TTF fixed by design, it is possible to tease out these effects. Doing so requires (a) showing that perceptual TTF can indeed be manipulated (H2), and (b) that those perceptions are predictive of performance (H5 and H6), in accordance with the theoretical arguments by Eden (2001; Eden, et al., 2010). In addition, showing that variations in perceptual TTF cannot be attributed to the CSE manipulation would further increase the validity of these results (H3); this improves on earlier research by Eden et al (2010) who measured CSE but did not experimentally manipulate it. To better tease out the effects of TTF on performance as well as show that the concept is distinct from that of internal efficacy (e.g., CSE), the latter will be manipulated (H1) and is expected to have an effect on performance as well (H4). Maximal motivation to perform well, and thus improved performance, should result when both kinds of efficacy beliefs are high – an interactive relationship (H6). See Figure 1.

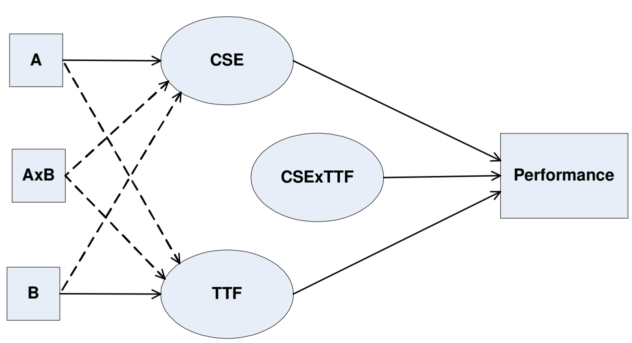

Figure 1. Research Model

CONTRIBUTION

To the extent that perceptions of task-technology fit and judgments of means efficacy are equivalent constructs, the internal-external efficacy model proposed by Eden (2001) would help explain the predictive power of perceptions of fit over and above actual, objective fit of tasks and technologies. As well, it serves to integrate two major streams of IS research, task-technology fit and computer self-efficacy, under a comprehensive theory. Finally, the possibility of manipulating task-technology fit introduces a new lever that can be employed to foster acceptance of technologies as well as improve performance outcomes resulting from their use. Research into the determinants of perceptions of task-technology fit appears to be another area for fruitful research in the future.

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