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The moderating roles of subjective (perceived) and objective task complexity in system use and performance

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ABSTRACT

This study builds on previous research by separating the effects of subjective (perceived) and objective task complexity to examine perceived task complexity as a positive moderator of the impact of decision support system (DSS) motivation on DSS use, and objective task complexity as a positive moderator of the effect of DSS use on performance. We manipulated task motivation and task complexity, and measured perceived task complexity, task motivation, and DSS motivation. The DSS also captured actual DSS use and the essential information for deriving the performance construct. The findings suggest that individuals report increased motivation in the high than low motivation task, and high task motivation leads to increased motivation to use the DSS to perform the task. Further, the results reveal that perceived task complexity decreases in the presence of the DSS and this highlights the importance of the DSS in alleviating cognitive resources which enhances user motivation to use the DSS, resulting in increased usage of the DSS to complete the task. The findings also accentuate the pivotal role of the DSS in assisting information processing of an objectively complex task which promotes the positive effect of DSS use on performance.

1. Introduction

Task complexity has been posited to impair the quality of a decision or judgment (Bonner, 1994). Specifically, individuals make lower quality decisions and spend more time in decision-making when they evaluate more rather than less complex information (Swink & Speier, 1999). While the positive relationship between effort and performance is stronger for a simple than complex task, goals strengthen performance in a complex task when one exhibits enhanced motivation to search for efficient strategies to complete the task successfully (Campbell, 1991). Goal setting research attributes improved outcomes to enhanced task motivation and increased effort to complete the task (Campbell, 1991; Kernan, Bruning, & Miller-Guhde, 1994).

Task complexity, a critical factor in performance research such as goal setting (Campbell & Gingrich, 1986; Earley, 1985; Locke, Frederick, Lee, & Bobko, 1984), has been conceptualized in a variety of ways (Campbell, 1988; Wood, 1986). According to Campbell (1988), prior research has conceptualized task complexity as objective (i.e., characteristic of a task), subjective (i.e., a psychological experience), or person-task interaction. In particular, previous research has dichotomized task complexity via the dimension of objectivity versus subjectivity and examined their respective effects on performance (Maynard & Hakel, 1997). The current study extends prior research by separating the effects of subjective (perceived) and objective task complexity to examine perceived task complexity as a positive moderator of the impact of decision support system (DSS) motivation on DSS use, and objective task complexity as a positive moderator of the effect of DSS use on performance. This study demonstrates how perceived task complexity enhances the effect of one's motivation to use a DSS on usage of the DSS to complete the task, and how objective task complexity promotes the effect of DSS use on performance. The current study postulates that the DSS attenuates information processing demands which reduces perceived task complexity and enhances task motivation, DSS motivation, and DSS use, leading to improved performance.

In addition, this study distinguishes between two forms of motivation; that is, task motivation and DSS motivation, to investigate how one's motivation to engage in a task leads to enhanced motivation to use the DSS to complete the task. One can derive positive experiences from engaging in a task where a series of activities are undertaken to achieve a purpose or goal (Thomas &

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Velthouse, 1990). Task motivation pertains to a desire to engage in a task, based on the subjective value of the task determined by the task characteristics and by one's goals, values, and past experiences (Eccles & Wigfield, 1995). Task values such as interest and importance drive one's motivation toward the task (Eccles & Wigfield, 1995; Wigfield, 1994; Wigfield & Eccles, 2000). In an expert system setting, Gill (1996) investigates how system features affect DSS motivation, which in turn influences system use. The author finds that users have an underlying motivation toward the task and both the task and perceptions of the expert system features influence continued use. While task motivation represents users' desire or value in performing the underlying task, DSS motivation is their interest in and the perceived importance of using the DSS to complete the task based on considerations such as the features of the DSS. Since motivation in a technology context is different from motivation in traditional psychology and learning tasks, users may be differently motivated toward the task and toward the technology. Thus, both forms of motivation need to be addressed.

Participants used an experimental DSS application designed for the purpose of this study to complete a rating and selection task, and provided their responses to questions assessing their perceptions of task complexity, task motivation, and DSS motivation. The DSS also collected all the essential data for determining DSS use and performance. The findings suggest that individuals performing the high motivation task (i.e., career selection) report higher motivation to engage in the task relative to those completing the low motivation task (i.e., café shop selection) and high task motivation leads to increased motivation to use the DSS to perform the task. Additionally, the results show that perceived task complexity decreases in the presence of the DSS and this highlights the importance of the DSS in alleviating cognitive resources which enhances user motivation to use the DSS, leading to increased usage of the DSS to complete the task. The findings also accentuate the pivotal role of the DSS in assisting information processing of an objectively complex task which promotes the positive effect of DSS use on performance.

An important contribution of this study is development of an experimental DSS application that directly assesses performance, an important construct of interest to academics and practitioners, in the same experimental setting where task complexity, task motivation, DSS motivation, and DSS use are measured. The performance measure is based on conjoint analysis, an approach used widely in the marketing literature (Carroll & Green, 1995; Green, Krieger, & Wind, 2001; Green & Srinivasan, 1990). The data collected from the rating and selection tasks are used to derive the performance construct.

Another contribution of this study pertains to the significant role of the DSS in mitigating cognitive effort associated with use of the additive difference compensatory decision strategy to process information; therefore, increased DSS motivation and DSS use are expected to occur, and these positive effects exert a positive impact on performance. When individuals encounter a complex task with burdensome cognitive demands, they may sacrifice accuracy for decreased effort. In the absence of processing assistance such as a DSS, decision makers may employ an efficient but ineffective strategy to process a complex task which demands substantial cognitive resources (Speier, 2006). When a choice task is complex, users may utilize a non-compensatory decision strategy (e.g., elimination by aspects) to screen all the alternatives based on one or more attributes and then employ a compensatory decision strategy (e.g., additive difference) to compare all the attributes for the reduced set of alternatives (Paquette & Kida, 1988). Decision makers prefer the additive difference compensatory decision strategy when a DSS provides high support for this strategy (Todd & Benbasat, 2000). A DSS that incorporates this normative strategy increases accuracy and mitigates the amount of cognitive effort necessary for assessing each attribute and alternative and the time required for making a decision (Todd & Benbasat, 1992).

The next section presents the hypotheses development. The following two sections explain the method for examining the hypotheses and the results respectively. Finally, the implications of this study's findings, its contributions and limitations, and suggestions for future research are discussed.

2. Hypotheses development

2.1. The effect of task motivation on DSS motivation

The task value aspect of motivation (i.e., a person's reason for choosing to perform a task) pertains to one's goals for a task and beliefs about the interest, importance, or utility of the task (Schiefele, 1999). Interest, importance, and utility are task value components that enhance the positive valence of a task (Eccles et al., 1983). While interest and importance are considered as intrinsic features, utility is considered as an extrinsic attribute (Deci & Ryan, 1985a; Deci & Ryan, 1985b; Harter, 1981). The present study focuses on the interest and importance values[3] because these intrinsic values drive one's motivation to perform a task primarily for the sake of the task itself (Csikszentmihalyi, 1990; Eccles et al., 1983; Schiefele, 1999) which is more sustainable (Wigfield & Eccles, 1992). Individuals are expected to exhibit increased motivation to perform a task if the interest and importance values of the task are high.

While task motivation represents the users' desire or value in performing the underlying task, DSS motivation is their interest in and perceived importance of using the DSS to complete the task based on considerations such as the information processing strategy incorporated into the DSS to increase motivation to use the DSS. This study examines the transferability and sustainability of the intrinsic values of a task to the intrinsic values of motivation to use a DSS to perform the task. When a task is embedded in a DSS, the intrinsic values that govern motivation to perform the task are transferred to the intrinsic values that determine motivation to use the DSS. When there is interest and stimulation in a task, this emotional state should encourage interest and stimulation in the DSS that supports the task. Further, a user who finds a task to be important should find use of a DSS that supports the task to be important.

In addition, the nature of a task determines one's motivation to use a DSS (Gefen & Straub, 2000; Todd & Benbasat, 1999). When a task is an integral, primary component of a DSS and the DSS directly supports performance of the task, task motivation is expected to influence motivation to use the DSS. Specifically, high task motivation will promote motivation to use the DSS that supports the task. This leads to the first hypothesis as follows:

H1. Increased task motivation leads to enhanced DSS motivation.

2.2. The moderating role of subjective (perceived) task complexity

Although social cognitive theory suggests that one may prefer a simple than complex task because a simple task entails a more certain outcome which decreases risks of failure (Bandura, 1997), individuals who choose to work on a complex task may attribute their choice to task interest (Inoue, 2007). In particular, intrinsically motivated individuals experience interest when they engage

[3] Previous studies have examined the interest, importance and utility components of the task value construct (Eccles & Wigfield, 1995; Wigfield & Eccles, 1992). Since the utility component is extrinsic in nature (Eccles & Wigfield, 1995; Eccles & Wigfield, 2002; Wigfield & Eccles, 1992), it is not included in the current study.