



Help that is not recognized: Harmful neglect of decision support systems

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ABSTRACT

Decision support systems (DSSs) aim to enhance the performance of decision makers, but to do so DSSs have to be adopted and used. Technology acceptance research shows that user evaluations (i.e., beliefs, perceptions, and attitudes) are key drivers of adoption and use. This article first presents evidence from the literature suggesting that the link between user evaluations of DSSs and actual performance may be weak, or sometimes even negative. The authors then present two empirical studies in which they found a serious disconnect between user evaluations and actual performance. If user evaluations do not accurately reflect performance, then this may lead to harmful neglect of performance-enhancing DSSs. The article concludes with a discussion of interventions that may alleviate this problem.

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1. Introduction

Decision support systems (DSSs) are IT-enabled tools that aim to enhance the effectiveness and efficiency of managerial and professional decision making for ill-structured or weakly-structured problems [33]. There is a wide variety of decision support systems (see [25,26]), including passive DSSs that provide the user with compiled information only and active DSSs that provide specific solutions or recommendations. In order to enhance the decision-maker's performance, DSSs have to be adopted and used [56]. According to generally accepted models of technology acceptance [10,11], technology diffusion [53] and information system success [13,14], user evaluations (i.e., perceptions, beliefs and attitudes) are key drivers of DSS adoption and use. However, evidence in the literature suggests that what users achieve with DSSs, i.e., their actual performance, does not always correspond with what users perceive, i.e., their evaluations of the DSSs. When performance-enhancing DSSs are not used because the intended users do not recognize the added value or objective quality of the system, we have a situation of harmful neglect. The disconnect between user evaluations of DSSs and actual performance may partly explain the low adoption and usage rate of DSSs in practice [8,38].

To facilitate systematic research into DSS evaluation, Rhee and Rao [52] recently proposed a general framework that is applicable

to a wide variety of DSSs. In this framework, they explicitly distinguish between DSS performance as perceived by the user, on the one hand, and their actual performance with the DSS, on the other hand. In the present article, we investigate the link between user evaluations of DSSs and actual performance. The prevalent assumption in the DSS literature is that “if users give a system ‘high marks’, then it *must* be improving their performance” [22: p. 1827]. However, many studies in psychology and other domains challenge this assumption because they have found evidence that human perception and judgment are subject to biases. The hypothesized connection between user evaluations of DSSs and actual performance has not been researched extensively [22], but there is (indirect) evidence that there is a potential disconnect.

For example, in an experimental study, Lilien et al. [39] found that participants who had access to a database-oriented decision support system made objectively better decisions than those with access to an Excel spreadsheet only, but their subjective evaluations of both the decision outcomes and the decision process were not significantly different. As Lilien et al. [39: p. 233] note, “we find a surprising disconnect between objective performance measures that are favorable and subjective evaluation measures that are mixed or unfavorable”. Van Bruggen et al. [61] reported similar findings. In their simulation study, users of a high-quality DSS (with an error between the DSS outcomes and the actual outcomes that was set to 3%) performed much better than users of a medium-quality DSS (with an error that was set to 23%), but they were not more confident about the quality of their decisions. As user evaluations of DSSs are frequently used in research and practice, this apparent lack of connection with objective performance is of great concern, and motivates our research.

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The remainder of this article is organized as follows. We first discuss possible reasons for a disconnect between user evaluations of DSSs and actual performance and then present existing evidence from the literature. Next, we present our research framework and discuss two empirical studies in which we investigated the link between user evaluations of DSSs and actual performance. Both studies show a clear discrepancy between what users perceive and what they actually achieve with DSSs. This should be a reason for concern to both researchers and practitioners, as it may lead to wrong decisions regarding the adoption and use of DSSs. A neglect of performance-enhancing DSSs, for example, may hamper a company's competitive position and should be avoided. The article concludes with a discussion of interventions that can help users form evaluative judgments of DSSs that are more accurate.

2. The connection between user evaluations of DSSs and actual performance

Extant research on the adoption and use of DSSs predominantly uses the well-known and extensively validated Technology Acceptance Model (TAM: [10,11]) as a theoretical lens. This model is based on Ajzen and Fishbein's [2] theory of reasoned action (TRA) and describes how people come to accept and use new technologies. According to the model, user evaluations are important drivers of behavioral intentions and actual behavior with regard to the adoption and use of computer-based systems in general. User evaluations are elicited perceptions, beliefs and attitudes towards the use of DSSs [22]. In the TAM model, the key driver of use intentions and actual use is perceived usefulness. Perceived usefulness is "the degree to which a person *believes* that using a particular system would enhance his or her job performance" [10: p. 320]. The dominant role of perceived usefulness has been confirmed in numerous empirical studies (see, for example, [1,2,35]).

The TAM model, as well as more general theories on the diffusion of technological innovations (e.g., [53]), assumes that users are sensitive to differences in decision outcomes (accuracy, efficiency, etc.) as a result of technology use and are therefore able to accurately evaluate their performance [23]. Another well-known model, i.e., DeLone and McLean's model of IS success [13,14], explicitly links objective system quality with user evaluations and system use, which in turn influence individual and organizational performance. Here too, the implicit assumption is that, based on their use of the system, users are able to accurately gauge its objective quality. However, the connection between user evaluations of DSSs and actual performance is dependent on the user's ability to (1) recognize improvements in performance and (2) attribute (part of) it to the use of the DSS [22].

It is not always easy for users to evaluate the contribution of a DSS to their decision-making performance. First, the understanding of what constitutes a good decision and which factors exactly contribute to the quality of the decision may be limited because of incomplete information and/or a lack of accurate and timely performance feedback from the market [16]. When information is incomplete or when performance feedback is delayed, managers may have to rely on inferences and exploratory reasoning to assess their performance, which increases the risk of perceptual biases or misperceptions [32]. As weakly-structured or ill-structured problems, by their nature, come with incomplete information, misperceptions of the quality of a decision and the contribution of a DSS to decision-making performance are quite likely to occur.

Second, performance expectations and how people attribute success (i.e., to themselves or to the system) also play a role when forming evaluative judgments of DSSs (cf. [34]). For example, when users think that they did not perform well on the task, they may blame the DSS, but when they expect high performance, they may give themselves the credits rather than to attribute (part of) their high performance to the DSS. The connection between user evaluations of DSSs and

actual performance, or the lack thereof, has received limited attention [22,23,41,47]. Evidence from the literature, which we will present in the next section, suggests that the benefits from using high-quality decision support systems may often be substantially more than users think [39].

3. Evidence on the disconnect between user evaluations of DSSs and actual performance

A DSS either enhances performance or it does not, and users recognize this or they do not. This leads to four possible situations (see Fig. 1). "Rightful Conviction" (upper right quadrant) is a situation in which the DSS enhances performance and users recognize this. "Harmful Neglect" (lower right quadrant) occurs when the DSS enhances performance, but users do not recognize this. "Seductive Illusion" (upper left quadrant) means that the DSS does not enhance performance, but users think it does. "Wise Abstinence" (lower left quadrant) occurs when the DSS does not enhance performance and users recognize this. We searched the literature for DSS studies that could be classified in the four quadrants of Fig. 1. Eligible DSS articles were those that provided information on (i) the actual contribution of the DSS to decision-making performance, and (ii) the evaluation of the DSS by the user. We began our search in the premier outlet for DSS research in the domain of management, viz. "Decision Support Systems". We searched all issues from 1995 to 2010 and found eight relevant studies (key words used: DSS, evaluation, performance, effectiveness, efficiency, objective, subjective). We also used Google Scholar and the databases of JSTOR, Science Direct and EBSCO to search for additional evidence in other journals that publish DSS research, which resulted in eight additional studies (published in, for example, Management Science, Information Systems Research, Information and Management, and Decision Sciences).

Seven of the sixteen articles we found can be classified in the "Rightful Conviction" quadrant, six in the "Harmful Neglect" quadrant, two in the "Seductive Illusion" quadrant, and one in the "Wise Abstinence" quadrant of Fig. 1. Most of the presented evidence is indirect, meaning that the article reported both user evaluations and actual performance at the aggregate level without directly investigating their relationship. Only two studies, viz. Goodhue et al. [23] and Marsden and Mathiyalakan [41], explicitly examined this relationship, that is, they related the actual performance of individual users to their subjective evaluations of the DSS.

3.1. Rightful conviction

The ideal situation is when the effects of a DSS on actual performance and user evaluations are both positive. For example, Goodhue et al. [23] studied the effectiveness of an information system that facilitated the integration of different databases. The goal was to help managers find answers to simple, structured managerial questions (such as: what are the year-to-date shipping expenses for the different types of carriers that we use?). They found that managers who used the system were more effective (i.e., they gave more accurate answers) and more efficient (i.e., they needed less time to come up with an answer). They also found that user evaluations were positively related to the efficiency of the process, i.e., the less time they needed to come up with an answer, the more favorably they evaluated the system. The upper right quadrant of Fig. 1 presents six other DSS studies [5,27,29,30,45,47] that reported positive effects on both user evaluations and actual performance.

3.2. Harmful neglect

When the effect of a DSS on actual performance is positive, but user evaluations are negative (or neutral), users are not likely to adopt and use the DSS. In the introduction, we discussed the studies by Lilien

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