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The effect of using group decision support systems in value management studies: An experimental study in Hong Kong

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Abstract

A group decision support system (GDSS) can be helpful to VM users overcome difficulties in value management (VM) workshops. A web-based GDSS known as interactive value management system (IVMS) is introduced in this paper. A comparative experimental study is undertaken to investigate the extent to which the use of IVMS can improve the performance of VM workshops by using a competing value approach (CVA). This study compares and contrasts the performance of a traditional VM workshop with an IVMS-supported VM workshop in three aspects: (1) process measures, (2) outcome measures, and (3) participants' satisfaction. The process measures indicate that IVMS is helpful in improving the efficiency, information reliability and supportability of decision and participation process, while the outcome measures show groups supported by IVMS perform better in ideas generations. The results also indicate that the use of GDSS results in increasing participant satisfaction.

Keywords: Value management (VM); Group decision support system (GDSS); Competing value approach (CVA)

1. Introduction

Value management (VM) is a structured and analytical process that seeks to achieve value for money by providing all necessary functions at the lowest cost consistent with required levels of quality and performance (AS/NZS, 1994). VM, which has been widely used in many developed countries for several decades, is a useful tool that can help the industry to meet these challenges. However, reluctance to use VM often stems from the time that an expensive team has to be employed to undertake the VM process (Shen and Chung, 2002). It would therefore be helpful to find a way that can make the process more efficient and effective to make the cost of undertaking VM decrease. VM faces more difficulties when employer–employee and superior–subordinate are in the same team, due to member dominance and conformance pressure (Shen et al., 2004), as shown in Table 1.

A group decision support system (GDSS) or group support system (GSS) combines communication, computer and decision support technologies to facilitate the formulation and solution of unstructured problems by a group of people (DeSanctis and Gallupe, 1987). For almost 20 years, researchers have been studying the effectiveness and efficiency of GDSS that support synchronous and asynchronous teams working in both field and laboratory settings. Many research studies have demonstrated that it is successful in improving the efficiency, reliability and quality of the group decision-making process (Dennis et al., 1990; Greenbery, 1991; Nunamaker et al., 1996; Adkins et al., 2002), but on the whole the findings related to the effectiveness of GDSS have been relatively inconsistent (Benbasat and Lim, 1993; Dennis and Gallupe, 1993; Fjermestad and Hiltz, 1999). However, although inconsistent results do indeed relate to variations in the experimental settings and methodology adopted in experimental studies, the common findings of a number of field studies have proved the

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Table 1
Problems of VM implementation in Hong Kong's construction industry (Shen et al., 2004).

Problems	Reasons	Impacts
Lack of information	• Poorly organized project information in the pre-study stage • Difficulty of retrieving project information in meetings	Increases "uncertainty" in the outputs of VM studies
Lack of participation and interaction	• Shy about speaking in public • Pressure to conform • Dominated by a few individuals • Poor team spirit	Member's contributions are reduced
Difficulty in conducting evaluation and analysis	• Insufficient time to compare analysis • Insufficient information to support analysis	Members have difficulty in responding to the "what if" question in meetings

effectiveness of GDSS in practice. These field studies have consistently shown positive results, and many "real world" users are satisfied with GDSS applications. These findings demonstrate the effectiveness of GDSS in supporting the group decision-making process (e.g., Dennis and Gallupe, 1993; Chun and Park, 1998).

Since the above research findings show that GDSS has the potential to improve the group decision-making process, GDSS was proposed to overcome the above problems in VM workshops. A series of studies have already been conducted to investigate the effectiveness of using GDSS in VM workshops (Fan and Shen, 2004; Shen and Fan, 2005; Shen et al., 2006; Fan et al., 2006, 2007). During the above studies, comparative experimental studies were taken as the main research method. Workshops conducted in traditional ways have been compared with workshops with GDSS support in several aspects (i.e., the decision quality, the quantity of ideas, and the perceived satisfaction). The results of these experimental studies show that GDSS is a useful tool in facilitating information exchange process, encouraging interaction, and promoting active participation in VM workshops. However, these findings were only based on the assessment of outcomes, and process effectiveness was overlooked. Now the question is how to evaluate the performance of GDSS in VM workshops comprehensively. Researchers have different viewpoints on what is or how a performance factor should be measured. Following the approach of Drazin and Van de Ven (1985), Benbasat and Lim (1993), and Dennis and Kinney (1998), Dennis and Wixom (2002) defined performance in terms of three major factors: (1) effectiveness as defined by decision quality or number of ideas generated; (2) efficiency as defined by the time to complete the task, and (3) participants' satisfaction with the process or outcomes. In order to investigate the performance of GDSS-supported VM workshops comprehensively, a comparative experimental study is conducted based on the performance framework developed by (Dennis and Wixom, 2002).

According to the framework, this paper compares and contrasts the performance of a traditional and GDSS-supported VM workshop in three aspects: (1) efficiency (process measures), (2) effectiveness (outcome measures), and (3) participants' satisfaction. This paper further revised this framework by integrating with a competing values approach (CVA) which is mainly used to measure the process performance. After the introduction of the framework, this paper turns to describe the design and process of the experimental study. Finally, the results of this experiment are presented and discussed.

2. Evaluating performance

In the three factors (efficiency, effectiveness and participants' satisfaction), efficiency falls into process, and effectiveness falls into outcomes correspondingly. Likewise, Fjermestad and Hiltz (1999) after reviewing approximately 200 published papers on GDSS found that among the outcome factors, group effectiveness and participants' satisfaction were the two factors most studied. Group effectiveness was measured in terms of decision quality and creativity, while participants' satisfaction included process satisfaction, decision satisfaction and general satisfaction (Fjermestad and Hiltz, 1999; Paul et al., 2004). Whereas no one conception of performance is perfect, the above three factors comprising group effectiveness (outcomes), group efficiency (process) and participants' satisfaction can be considered as a reasonable set of factors to triangulate on the performance construct (Dennis and Wixom, 2002). The outcomes can be measured by the quantity of ideas, the quality of decisions, and the satisfaction is usually measured through a questionnaire survey, while evaluating the effectiveness of the decision process is problematic.

2.1. Evaluating the performance of the group decision process: the competing values approach

Normally, the effectiveness of the decision process will be measured by the outcomes. However, it is quite possible for a most unreasonable method of information integration to be linked over time with coincidence, while in another instance for a most reasonable method of collective choice subsequently to fall far wide of the mark (McCartt and Rohrbaugh, 1989). Also, on many occasions, the decision process of a group, unlike the decision itself (made as a