Available online at www.sciencedirect.com
ScienceDirect
Decision Support Systems 42 (2007) 2126–2136
Decision Support Systems
www.elsevier.com/locate/dss

An experiment on the effectiveness of creativity enhancing decision-making support systems

Guisseppi Forgionne [a], John Newman [b,*]

[a] Department of Information Systems, College of Information Technology and Engineering, University of Maryland, Baltimore County (UMBC), 1000 Hilltop Circle, Baltimore, MD 21250, United States
[b] Department of Management Science, College of Arts and Sciences, Coppin State University, 2500 W. North Ave, Baltimore, MD 21216, United States

Received 27 July 2005; received in revised form 12 May 2006; accepted 26 May 2006
Available online 18 July 2006

Abstract

Recent research suggests that creativity can enhance the performance of people for a variety of tasks, including decision-making. Creativity enhancements can be delivered through a decision-making support system. In theory, such delivery should improve the decision performance of the system's user. This paper tests the theory empirically and discusses the implications for decision-making.

Keywords: Decision-making support; Creativity; Creativity enhancement and delivery; Decision support

1. Introduction

Creativity can be defined as the ability to discern new relationships, examine subjects from new perspectives and to form new concepts from existing notions [4,7]. Creativity can be a personality trait or an achievement [8]. As a personality trait, creativity is a dispositional variable characteristic leading to the production of an act, items and instances of novelty. As an achievement, creativity results in a product from the process. The product may be a scientific discovery, an innovative new product or service, art and literature, all of which satisfy some human need.

Formal research has found variables that affect creativity as an achievement include: cognitive variables (intelligence, knowledge skills and others), environmental variables (cultural and socioeconomic factors) and personality variables in addition to creativity as a trait (motivation, confidence and others) [8] (p. 209). Furthermore, researchers have established that creativity can be learned and improved and is not as strongly dependant on individual traits as originally thought [17,25]. Creativity may not so much be the result of genius as being in an idea-nurturing work environment [12,26,30]. This literature suggests that tools that enhance creativity can be made available to decision-makers. Moreover, such availability may enhance the decision-making process.

According to a popular model, decision-making involves a series of phases and steps [5,30]. Creativity

* Corresponding author.
E-mail addresses: forgionn@umbc.edu (G. Forgionne), jnewman@coppin.edu (J. Newman).

0167-9236/$ - see front matter © 2006 Elsevier B.V. All rights reserved.
doi:10.1016/j.dss.2006.05.009

is useful during most of these phases and steps. For example, creativity can assist in problem design by helping the decision-maker to identify relevant alternatives during the design phase of the process [13,20,24]. In addition, the selection of an appropriate evaluation model is a creative process, involving the matching of problem characteristics with existing models or the construction of a model that describes the problem accurately. Hence, creativity can facilitate the choice phase of decision-making [16,23].

There has been evidence that creativity enhances the performance of persons in a variety of tasks, including decision-making [14,16,19,29]. However, decision-makers may be unaware, and/or lack proficiency in the use, of creativity enhancing tools. It may be useful, then, to deliver the creativity enhancing support through an information system. In theory, such delivery should improve the effectiveness of decision-making support.

This paper tests the theory. First, the paper presents a creativity-enhanced decision-making support system. Next, there is an empirical analysis of the system concept. Then, the paper discusses the study's implications for decision-making support.

2. Creativity enhancing decision-making support system

A number of information systems exist to generate knowledge for decision-making support. These systems collectively can be called decision-making support systems [9]. Usually, the support is offered in a fragmented and incomplete manner with little, if any, delivery of creativity enhancing tools. Yet, the integration of enhancements, including creativity support, within DSS, theoretically, can enhance the quality and efficiency of the decision-making support, create synergistic effects, and augment decision-making performance and value [3,15,21,22,28].

Based on previous research [9,11], the resulting creativity enhancing decision-making support system (CDMSS) will have the conceptual architecture shown in Fig. 1.

Fig. 1 shows that the CDMSS captures and stores as inputs problem specific knowledge (ideas and concepts) and creativity enhancing tools. Ideas and concepts may come from conventional wisdom, documents detailing standard operating procedures, case studies or other sources, while creativity enhancing tools include morphological analysis, metaphors, convergent and divergent thinking mechanisms, brainstorming, calculus and other methodologies.

The decision-maker utilizes computer technology to: (a) organize (chiefly categorize and classify) the problem knowledge, (b) structure ideas and concepts into problem elements and relationships, and (c) simulate conceptual problem solutions. Results are reported as problem elements (status reports), the problem's conceptual structure (criteria, alternatives, events and relationships) and/or forecasted outcomes from the conceptual analyses.

Feedback from the user-controlled processing guides the decision-maker through the design stages of the decision-making process and identifies the parties affected by the conceptual analyses [18]. This identification helps the decision-maker to develop an implementation plan and put the plan into action. Created problem elements and structures are stored as additional inputs for future or additional processing [27].

In theory, such support should improve decision-making performance and add value to the user's decision-making. The improvement can occur through an enhanced process (for example, better problem design) or better outcomes (for example, improved user learning or organizational performance).

3. Empirical analysis

The theory suggests the following research question and hypotheses:
A traditional DSS is used as the baseline to provide a fair test for the CDMSS.

Box 1

> Research question: can the creativity-enhanced decision-making support system (CDMSS) improve decision-making?
>
> Null hypothesis: The CDMSS will result in no improvement in decision-making when compared to a traditional decision support system (DSS).
>
> Alternative hypothesis: The CDMSS will result in an improvement in decision-making when compared to a traditional decision support system (DSS).

To answer the research question, an experiment, involving a complex semi-structured decision situation, was used to collect data and test the hypotheses. The experimental study followed a research plan developed and successfully utilized previously [11].