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Creative self-efficacy and its factors: An empirical study of information system analysts and programmers

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ABSTRACT

Based on a survey of 94 information systems developers, this study explored how personal factors (i.e. computer self-efficacy and domain-specific information technology skills), contextual factors (i.e. strength of ties and degree centrality) and creative self-efficacy are related. Regression analysis results demonstrate that system analysts and programmers differ in terms of influencing factors on creative self-efficacy. Domain-specific skills were the main influence in the system analyst model, followed by degree centrality. In comparison, degree centrality was the only influence in the programmer model. Degree centrality exerted a negative influence in both groups. Additionally, among system analysts, the strength of ties slightly influenced creative self-efficacy, while computer self-efficiency and domain-specific information technology skills exerted only small influences on programmers.

1. Introduction

Organizations must innovate to maintain their advantages in the face of environmental stresses (Hanninen & Kauranen, 2007; Lee & Chang, 2007; Morcillo, Rodriguez-Anton, & Rubio, 2007). However, organizational innovation is based on individual creativity (Woodman, Sawyer, & Griffin, 1993). Amabile (1997) indicated that one of the important factors influencing creativity is individual motivation. Ford (1996) further observed strong self-efficacy is an important motivational component in developing creativity. Bandura (1997) also illustrated that self-efficacy belief is a major impetus for creative individual actions. Bandura (1986) defined self-efficacy as "People's judgments of their capabilities to organize and execute courses of action required to attain designated types of performances". Restated, self-efficacy describes individual belief in their capabilities to perform a particular behavior. Creativity is a domain-specific, subjective judgment regarding the novelty and value of an outcome of a specific action (Ford, 1996). People with high self-efficacy have intrinsic driver to develop novel and useful ideas such as creativity. Given the potential link between self-efficacy and creativity, Tierney and Farmer (2002) employed the model of self-efficacy developed by Gist and Mitchell (1992) to present a creative self-efficacy construct, and discussed its potential predictors (personal and contextual resources) and relationship with creative performance. Based on their results, creative self-efficacy appears to provide strong efficacy beliefs for enhancing creative behaviors.

Bandura (1997) further noted that efficacy views can be general or specific. Specificity thus can be increased to transform self-efficacy from a general view into a specific measure that can be applied in a narrow domain such as creativity area. Although Tierney and Farmer noted the significance of personal and contextual resources for forecasting individual creative self-efficacy, issues involving specific domains (e.g. information system) have been comparatively neglected. The creativity of information systems (IS) developers is a source of innovation for software firms. To facilitate innovation, software companies must understand the factors that contribute to the belief of IS developers who can be creative in their work roles. Accordingly, the purpose of this study is to explore the correlations and associations between several possible contextual/personal factors and creative self-efficacy of IS developers.

2. Literature review and hypotheses development

2.1. Creative self-efficacy of information systems developers

2.1.1. Information systems developers

Prior researches indicated that there are different roles of IS staff owing to their tasks. According to Lee, Trauth, and Farwell (1995), among the several types of IS professionals include programmers, technical specialists, business/system analysts, end-user support consultants and computer operators, and data entry clerks. Moreover, Todd, McKeen, and Gallupe (1995) defined IS professionals as including programmers, system analysts and IS managers. This study focuses on examining creative self-efficacy

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in software development and concentrates on two main categories of IS professionals, system analysts and programmers. This study thus only considers two major categories of IS professionals, system analysts and programmers. The system analyst is responsible for dividing complex problems into several small and simple tasks, and for evaluating and designing system specifications. Meanwhile, the programmer is responsible for developing a system platform or components, and for coding and testing programs according to system analyst defined specifications.

Moreover, this study only addresses the development of software packages because IS developers, who develop software packages, have more autonomy and more flexibility to develop creativity than other IS developers developing custom-made information systems. Grudin (1991) explained that software package design and information systems development differ in the relationships between developers and users. IS developers need to interact with users directly to understand their requirements when developing information systems. However, most software package developers are not directly connected to end-users, instead indirectly communicating with them through staff who sell products or provide services to customers (Keil & Carmel, 1995). For example, during software package development, system analysts can use their experience and knowledge to plan specifications; programmers have more autonomy to choose appropriate technological trends. However, custom-made IS developers have to follow user's requirement to develop systems. Clearly, to meet market demand, IS developers of software package have more flexibility in incubating ideas or procedures that are new, original, suitable or useful for creativity (Oldham & Cummings, 1996).

2.1.2. Creative self-efficacy of IS developers of software packages

Bandura (1986) proposed self-efficacy through the frame of social cognitive theory, and defined self-efficacy as follow:

> Self-efficacy as people's judgments of their capabilities to organize and execute courses of action required to attain designated types of performances. It is concerned not with the skills one has but with judgments of what one can do with whatever skills one possesses.

However, self-efficacy reflects the *general* beliefs of individuals in their abilities across domains (Chen, Gully, & Eden, 2001). To study creativity performance, which implies novel and valuable outcomes, Tierney and Farmer (2002) developed *specific* self-efficacy, namely creativity self-efficacy, to judge capacities in a narrow domain. Creative self-efficacy differs from creativity. Creativity indicates the generation of domain-specific, novel, and useful outcomes. In contrast, creative self-efficacy denotes the belief that one has the ability to produce creative outcomes for the jobs. Self-efficacy is not concerned with past actions, but rather with the judgments regarding what could be done in the future (Compeau & Higgins, 1995).

Although creativity and creative self-efficacy naturally differ, they are related. Oldham and Cummings (1996) defined the results of creativity to include outcomes, ideas or procedures that are new, original, suitable or valuable. Amabile (1988) defined creativity as novel and useful results. Creative self-efficacy describes the belief of an individual in his ability to generate creativity. Tierney and Farmer (2002) indicated creative self-efficacy as key influence on creativity. Creative self-efficacy is a form of self-evaluation that influences decisions regarding creative behaviors to undertake, the amount of effort and the persistence level when encountering challenges (Bandura, 1977).

Different tasks of IS developers might require different types of creativity and thus have different creative self-efficacy. This study thus defines the creative self-efficacy of IS developers as follows.

1. The creative self-efficacy of a system analyst refers to the belief of an individual in his ability to develop novel and useful ideas regarding system flows or system specifications when planning and analyzing software packages.
2. The creative self-efficacy of a programmer refers to the belief that one has the ability to develop new and useful ideas or outcomes of platforms, components or programs during software package development.

2.2. Possible factors to creative self-efficacy of IS developers

Tierney and Farmer (2002) stated that individuals assess their *personal and contextual resources* to form personal efficacy judgments. Therefore, while proposing the model for exploring the creative self-efficacy of IS developers, this study addresses not only personal resources (computer self-efficacy and domain-specific IT skills), but also contextual resources (the strength of ties and network positions).

2.2.1. Computer self-efficacy and creative self-efficacy

Computer self-efficacy indicates a judgment regarding the ability of an individual to use a computer (Compeau & Higgins, 1995). Gist, Schwoerer, and Rosen (1989) expressed that computer self-efficacy is positively correlated with computer-related performance. Shin (2006) also demonstrated that computer self-efficacy could significantly, positively and directly influence the system usage. In the computing field, an individual with higher computer self-efficacy generally has greater confidence in using advanced software (Fagan, Neill, & Wooldridge, 2004). Amabile (1988) indicated that performance capability is required to achieve creative capability in a domain. An IS developer with higher computer self-efficacy has more confidence in his computer using ability; is unrestricted by existing IT; can quickly learn new skills, and can do his job well. IS workers with high computer self-efficacy may have high creative self-efficacy. Therefore, we posit that a correlation exists between computer self-efficacy and creative self-efficacy in IS developers.

The dissimilarity in the jobs of system analysts and programmers may moderate the relationship between computer self-efficacy and creative self-efficacy. Programmers stress technical skills, while system analysts value systems analysis and design skills (Todd et al., 1995). Although system analysts rarely adopt IT for direct software package development, they still need to understand the degree to which using IT to develop software packages can support business flow. Programmers apply IT for software package development. Programmers with high computer self-efficacy in encountering work difficulties are more confident in learning diverse IT and using different IT to effectively perform their work, thus possibly upgrading their beliefs regarding creativity. Therefore, Hypotheses 1a and 1b are presented with regard to the relationships between computer self-efficacy and creative self-efficacy.

Hypothesis 1a. A correlation exists between computer self-efficacy and creative self-efficacy in system analysts.

Hypothesis 1b. A correlation exists between computer self-efficacy and creative self-efficacy in programmers.

2.2.2. Domain-specific IT skills and creative self-efficacy

Increasing domain knowledge can develop or verify workable ideas, and can also influence creativity (Simonton, 1999). Sternberg and Lubart (1995) and Gardner (1993) observed that domain knowledge influences creativity. Moreover, Gist and Mitchell