The Links between Goal Orientations and IT Use for Process Innovation

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ABSTRACT

The goal orientation theory suggests that the goals that individuals are pursuing create the framework that influences how they interpret and react to the event they encountered. This study applies the goal orientation theory in the context of information technology use by knowledge workers. A research model is proposed and tested with a sample of 211 knowledge workers. The statistical results of structural model showed that both performance goal orientation and learning goal orientation have positive effect on using IT for work process innovation.

Keywords: Goal Orientation, Knowledge Worker, Process Innovation, IT Use

INTRODUCTION

Psychology Researchers in the motivational theory (Dweck & Leggett, 1988) suggests that the goals that individuals are pursuing create the framework that influences how they interpret and react to the event they encountered. Specifically, Dweck and Leggett (1988) identified two classes of goals that individual is pursuing: performance goal and learning goal. When individuals are pursuing performance goal, they are more concerned with gaining favorable judgment of their competence. However, when individuals are pursuing learning goal, they are more concerned with increasing their competence. Due to different interpretation schemes, different goals foster different behavior patterns. Focusing on performance goals creates a vulnerability to the helpless behavior pattern, while focusing on learning goals generates a mastery-oriented behavior patterns.

The goal orientation theory has been incorporated into the organizational research to study the implementation of training program and appraisal systems (Button et al., 1996; Bobko & Colella, 1994; Kozlowski et al., 2001). However, little research incorporated goal orientation in information systems use. We believe that goal orientation has an important implication in the information systems research as well. Does computer user's goal orientation affect how computer user use computer for their work? Are performance goal and learning goal mutually exclusive? Could computer users acquire both learning goal and performance goal? We believe that understanding the impact of computer users' goal orientation would enhance the information system design principle on improving interface between computer users and information systems.

In this study, we suggest that learning goal and performance goal are not necessarily exclusive from each other. As a matter of fact, knowledge workers could possibly acquire both learning goal and performance goal toward the computer use. Knowledge workers need to use computer to increase their task efficiency so that they can gain favor judgments from their colleagues, customers, or supervisors. This behavior pattern suggests that knowledge workers acquire performance goal for their computer usage. In the mean time, knowledge workers may enjoy learning more knowledge domain of the software. In this aspect, knowledge workers acquire learning goal for their computer usage. We propose that both goal orientations would motivate individual knowledge workers to use computer for their work process innovation.

In the following sections, this paper first reviews the literatures and then builds a theoretical model. After that, this paper discusses the research method to be used that followed by the data analysis. Finally this paper discusses the empirical results and their implications.

THEORY BUILDING

Literatures (Dweck and Leggett, 1998; Elliott and Dweck, 1988) in the goal orientation theory suggested that individuals have two different kinds of goal orientations (performance goal vs. learning goal) while pursuing their achievement. Individuals with performance goal tend to seek positive evaluation of their ability and performance from others. The motivation of seeking favorable judgment from others may lead to a "helpless" behavior pattern of avoiding risk and being low persistence when facing obstacle. In contrast, individuals with learning goal tend to seek challenges and to

increase their competence, and thus demonstrate a "master oriented" behavior pattern. While facing obstacle, individuals possess learning goal would demonstrate high persistence.

A common view toward the goal orientation is to view goal orientation as an individual trait or disposition that causes different behavior patterns (DeShon and Gillespie, 2005). Researchers (Dweck, 1986; Dweck and Leggett, 1988; Elliot and Dweck, 1988), who hold the dispositional view, suggest that individual who has a tendency to be either performance goal oriented or learning goal oriented, and individual's goal orientation is responsible for either helpless or master-oriented behavior pattern, in the context of achievement.

Alternatively, researches in goal orientation studies find that goal orientation is not necessarily a single continuum with strong performance goal at one end along with strong learning goal at the other end. On the contrary, learning goal and performance goal can be viewed as separated dimensions of individual's goal orientation (Button et al., 1996; Kohli et al., 1998; Kozlowski et al., 2001; Sujan et al., 1994). Button et al. (1996) contend that learning goal and performance goal are neither mutually exclusive nor contradictory. It is possible for an individual to perform relatively better than others, and to strive to improve one's skill at the same time.

Applying the goal orientation theory (Dweck, 1986; Dweck and Leggett, 1988) into the information technology use for knowledge work, the two different goal orientations can be incorporated into different behavior patterns for workers' information technology use. Performance goal oriented end users concern more about getting their job done as quickly as they can. When facing the failure outcome in using IT, they may display helpless behavior pattern and give up using information systems for their task completely. In contrast, learning goal oriented end users are willing to put more efforts in learning how information technology makes them more competent in their work. When facing obstacles in using information technology, individual with learning goal orientation displays mastery-oriented behavior pattern and is willing to put more effort to resolve their problems.

In this study, we contend that knowledge workers can set both performance goal and learning goal toward information technology use for their work process. As Button et al. (1996) highlighted in the organization context, employees have to set performance goal to satisfy performance standard and to meet the deadlines in order to be viewed as successful. The same argument can be applied to the context of using information technology to complete a task. Knowledge workers can possibly hold the performance goal for using information technology to produce the quality outcome, to get their work done quickly, and to meet their due dates. However, holding the performance goal does not prevent knowledge workers from setting learning goal at the same time. While using information technology to meet the performance goal, knowledge workers may be very likely to set the learning goal to learn new computer skills, and to gain more IT knowledge and increase the competence level at the same time.

In most cases, knowledge workers with high ability could set both high performance goal and high learning goal of using IT to complete their tasks. Highly capable knowledge workers usually like to perform well to earn recognition from others, and to improve themselves to gain competence in their profession. Empirical studies of marketing researchers (Sujan et al., 1994; Kohli et al., 1998) support that salespeople can pursue both learning goal and performance goal to learn how to do their job better, and also to demonstrate their ability to others at the same time.

For most knowledge workers, using information technology is not core tasks of their work. Although knowledge workers simply use IT as a tool to complete their tasks, using IT can greatly improve efficiency of their work. Thus, knowledge workers use the tool effectively does improve their work performance. Since the knowledge creation is the major component of knowledge work (Nonaka, 1994; Davenport, 2005), the motivation of knowledge workers in using IT may have a significant impact on their capacity of creating new work processes, such as adopting a new communication device within a workgroup. In this study, we propose that knowledge workers who set high performance goal and high learning goal will be more willing to use information technology to invent new work process. The research model in Figure 1 depicts the relationship between the goal setting styles and using IT for work process innovation. Also, this research model proposes the following hypotheses:

H1: A learning goal oriented knowledge worker is motivated to using computer for work process innovation.

H2: A performance goal oriented knowledge worker is motivated to using computer for work process innovation.

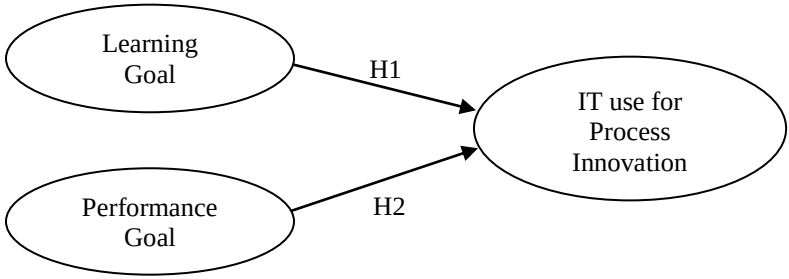


Figure 1: Research Model of Goal Orientation of IT use

RESEARCH METHOD

Sample

This study collects data through online survey. The respondents of the survey are knowledge workers who use information technology for doing their tasks. Knowledge workers are those who add values by processing existing information to create new information. The typical knowledge workers are engineers, IT professionals, managers, researchers, customer services professionals, etc. The selection criteria of this study are the knowledge workers: (1) who are managerial or professional workers; (2) who use computer software packages for their work; and (3) whose works involve the activities such as problem solving, decision making, and improvisation. The samples of this study include engineers from service engineering firms, customer support professionals from IT firms, business managers, marketing professionals, researchers, and IT professionals in different geographical areas in the United States.

Scale Development

End users could take different goal orientation toward information systems use for their work. Performance oriented individuals concern more about getting their job done and meeting their due date. While learning oriented individuals concern more about seeking understanding and learning something new. Items for learning goal and performance goal are generated from the studies of Dweck (1986), Elliot and Dweck (1988), Button et al. (1996), Phillips and Gully (1997), Dykman (1998), and Grant and Dweck (2003). IT use for work process innovation refers to the new ways of task execution result from the information system use. Items generated for work process innovation are based on literatures in organizational learning, knowledge management, and improvisation (e.g., Cohen and Levinthal, 1990; Kim, 1993; Nonaka, 1994; Boland and Tenkasi, 1995; Moorman and Miner, 1998; Miner et al., 2001).

A five-point Likert type scale is used for measuring learning goal, performance goal and work process innovation, where 1 = Almost never, 2 = Sometimes, 3 = About half of the time, 4 = Most of the time, 5 = Almost Always. 3 items are generated to measure performance goals, 3 items are generated to measure learning goal, and 3 items are generated to measure IT use for work process innovation (see Table 1).

Table 1: Measurement Items

Items	**Performance Goal (3 items) Alpha = 0.712**
PG1	My primary goal in using software package for my work is to complete my task quickly.
PG2	My primary goal in using software package for my work is to meet the due date of my task.
PG3	My primary goal in using software package for my work is to solve a problem immediately.
	Learning Goal (3 items) Alpha = 0.852
LG1	My primary goal in using software package for my work is to learn new computer skills.
LG2	My primary goal in using software package for my work is to gain new knowledge.
LG3	My primary goal in using software package for my work is to challenge myself.
	New Processes (3 items) Alpha = 0.947
NP1	Using computer application for my work enables me to implement new work methods.
NP2	Using computer application for my work enables me to integrate new ideas into my work processes.
NP3	Using computer application for my work enables me to implement new processes in my workgroup.

Cronbach's alpha (1951) is used to access the reliability of each scale. Alpha value is greater than 0.7 is considered acceptable (Nunnally, 1978). The alpha values of performance goal, learning goal, and work process innovation are respectively 0.712, 0.852, and 0.947 (see Table 1). The proposed scales demonstrate sufficient reliability.

Data Analysis

Confirmatory factor analyses were performed on the collected data with LISREL software. First, a confirmatory analysis tested whether performance goal orientation and learning goal orientation are two different dimensions. Second, assuming performance goal and learning goal are two separate factors, a structured model is tested to examine the relationships between the two goal orientations and the use of IT for work process innovation.

Convergent validity can be assessed through confirmatory factor analysis (CFA). Factor loading indicates how well items loaded on their respective latent variables. Bagozzi and Yi (1988) suggested that item-factor loading values should exceed 0.60.

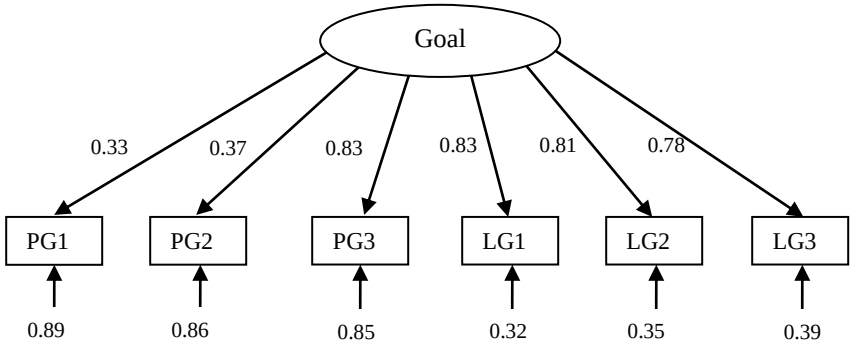
A non-significant chi-square value indicates a better model fit. Root Mean Square Error of Approximation (RMSEA) is one of the most informative criteria in covariance structure modeling (Byrne, 1998). A good model has an RMSEA of .05 or less. A model whose RMSEA is .10 or more has poor fit. The Goodness-of-Fit index (GFI) also represents the overall degree of model fit. Adjusted-Goodness-of-Fit index (AGFI) is an extension of GFI, adjusted by ratio of degrees of freedom for the proposed model to the degrees of freedom for the null model. Comparative Fit Index (CFI) and Normed Fit Index (NFI) relates the proposed model to null model. The value of GFI, AGFI, CFI, NFI rages from 0.0 (no fit) to 1.0 (perfect fit). To represent a very good model fit, GFI, AGFI, CFI, NFI value has to be 0.9 and above (Byrne, 1998; Segars and Grover, 1998). Within the fitted structural model, a significant path coefficient supports the hypothesized relationship between two latent variables.

Statistical Results

Data of a sample of 211 knowledge workers are analyzed based on the data analysis method described in the previous section. First, fitting all the indicators of performance goal and learning goal into a single-factor model (see Figure 2), the result reveals that this measurement model is poor fit to the data. Chi-Square value is 116.43 ($P < 0.0001$), RMSEA = 0.24, NFI = 0.95, NNFI = 0.80, CFI = 0.81, GFI = 0.84 and AGFI= 0.64. Second, fitting the indicators into two-factor model (that is, performance goal and learning goal) (see Figure 3), the result indicates that the two-factor model is a very good fit to the data. Chi-Square value is 8.91 ($P = 0.35$), RMSEA = 0.023, NFI = 0.98, NNFI = 1.00, CFI = 0.84, GFI =0.99, and AGFI = 0.96. The Chi-Square difference test, χ^2 (df =1, N=211) = 107.57, indicates these two models are significantly different at $p < .001$.

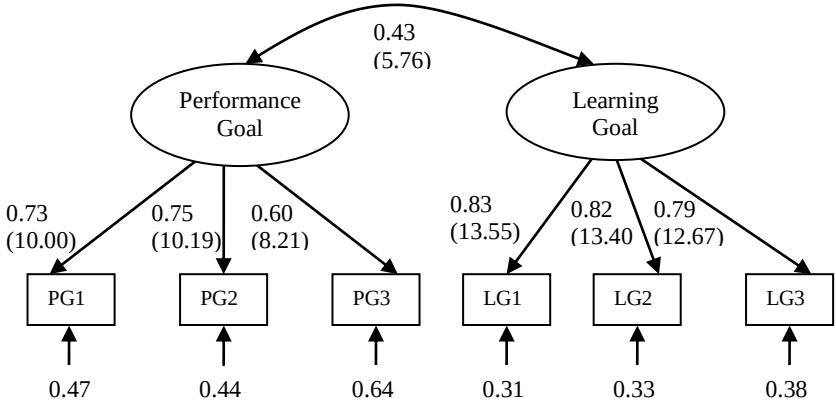
Examining standardized factor loadings of each latent variable in two-factor model, all factor loadings are above 0.6 and statistically significant ($p < 0.05$). The factor confirmatory analysis of two-factor model exhibits the convergent validity of each latent variable and a very good fit to the data.

To examine the causal links of the proposed research model as indicated in Figure 1, a structural equation modeling is used as a statistical method to test the proposed hypotheses. Collected data are used to fit the structural model of three latent variables: performance goal, learning goal, and IT use for process innovation. As mentioned in the data analysis section, chi-square value, Root Mean Square Error of Approximation (RMSEA) and several fit indexes are used to examine the model fit.



Chi-square = 116.43, df = 9, p-value = 0.00000, RESMA = 0.238

Figure 2: One-Factor Model (Standardized Solution)



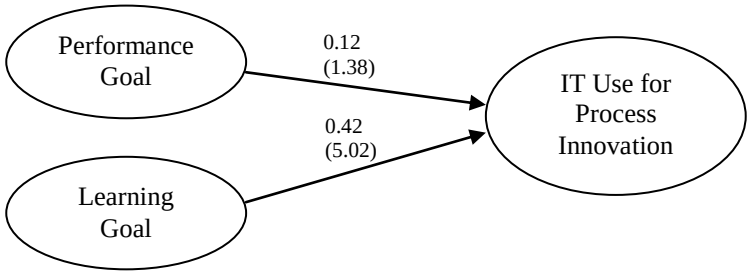
Chi-square = 8.91 , df = 8, p-value = 0.35037, RESMA = 0.023

*t-values are in parenthesis

Figure 3: Two-Factor Model (Standardized Solution)

The statistics of the model fitting are displayed along with the basic structure model in Figure 4. In term of the overall model fit, the Chi-square statistic is not significant (Chi-square = 28.51; df = 24; p = 0.239). Non-significant Chi-square statistics indicate a good model fit. The model fit indexes NFI = 0.98, CFI = 0.97, GFI = 0.97, and AGFI = 0.95 are all well above 0.9. In addition, RMSEA = 0.03, which is below 0.05. Both model fit indexes and RMSEA provide strong evidence of a very good model fit.

Examining the relationship from exogenous variables to endogenous variable, the findings of structural equation modeling show that one path coefficient is significant. The path coefficient from learning goal orientation to IT use for process innovation is significant (B = 0.42, t = 5.03). The statistic result supports the hypothesis 2. The path coefficient from performance goal to work process innovation is not significant (B = 0.12, t = 1.38). Thus the hypothesis 1 is not supported by the statistical results.



Chi-square = 28.51 . df = 24. p-value = 0.23921, RESMA
*t-values are in parenthesis

Figure 4: Structural Model with Standardized Solution and T- value

DISCUSSION

Previous researches (Ames and Archer, 1988; Elliott and Dweck, 1988; Elliot and Harackiewicz, 1994; Bell and Kozlowski, 2002) have established persuasive evidence that performance goal and learning goal orientations are systematically related to an individual's behavior patterns. These patterns reflect how people respond to setback situation differently. That is, while facing an obstacle, people with performance goal orientation may display a "maladaptive" or "helpless" response, and people with learning goal orientation may display a "master-oriented" response.

Researchers have held different views of goal orientation. Some researchers (Elliott & Dweck, 1988; Elliot & Harackiewicz, 1994; Bell & Kozlowski, 2002) suggest that goal orientation is a dispositional trait. People could be either performance goal oriented or learning goal oriented. Researchers (Ames & Archer, 1998; Button et al., 1996; Sujan et al., 1998; Kohli et al., 1998) view performance goal orientation and learning goal orientation as two separated dimensions. The dimensional view of goal orientation implys that people can possibly hold both performance goal and learning goal at the same time.

This study applies the goal orientation theory in the context of information technology use by knowledge workers. We contend that in the domain of the information technology use, the goal orientation is best represented by two separated dimensions. We also suggest that goal orientation can be both dispositional and situational. Some people are inclined to take one goal orientation over the other. However, at some situation, for example, the need to meet the approaching due date, knowledge workers may take performance goal over learning goal. We argue that when knowledge workers set both high performance goal and high learning goal for using information technology, they would be more often to use the information technology to innovate their work processes.

The result of confirmative factor analysis provided a strong evidence for the construct validity of the performance goal and learning goal. Single-factor and two-factor measurement models were fit to the data. Chi-square statistics and fit indexes suggested that two-factor model was fit to data much better than that of one-factor model. The empirical results support that performance goal and learning goal are better represented in two separate dimensions in the context of information technology use. The two- factor

measurement model also showed that performance goal and learning goal are positively related. The positive correlation of two factors infers that knowledge workers who take performance goal for using IT may also take learning goal for using IT.

The statistical results of structural model showed that both performance goal orientation and learning goal orientation have positive effect on using IT for work process innovation. However, the effect of performance goal to use IT for work process innovation was not significant. In the organizational context, it is usual for knowledge workers to set both the performance goal and learning goal to satisfy the performance standard and to seek increasing competence in using IT at the same time (Button et al., 1996). However, learning goal is the major drive for knowledge workers to use IT for creating innovative work processes. This result is consistent with the view that learning goal is related to the "master-oriented" response. Knowledge works have been highly embedded in information technology, increasing competency in information technology enables knowledge workers to discover new work method or work processes.

CONCLUSION

The nature of knowledge work is dynamic. Since knowledge workers have high degree of autonomy, they can decide which tools they want to use to complete their works. For knowledge workers who incline to take performance goal, if the information technology fails to do what they ask for, they may decide not to use the software for their tasks. Under such circumstance, knowledge workers will be less likely to go further to explore the opportunity of using IT to improve their work processes.

From IT management perceive, the value of information technology is laid on the successful use experience by end users. It would be wasting organization's resources, if installed information technology is not used often by the majority of corporate knowledge workers, since organization has made heavy investment into the computer software or information systems. A high usage of installed information systems will result in higher return on investment of information technology.

The empirical results of this study imply that satisfying end user's different goals is important for the software design. To enhance user experience in using IT, software designer has to satisfy end user's performance goal and learning goal. When end users take performance goal, software's friendly user interface and easy navigational features will encourage end user not to leave the information systems prematurely. On the other hand, to satisfy user's learning goal, software designer should also incorporate the sophisticated features and functions to enable end users to redesign work processes or create new work processes, since the knowledge creation is a vital component of the knowledge economy.

Future research can incorporate user's goal orientation into the information design principles, since users may incline toward either performance goal or learning goal for different tasks, and under different situations. Software design that is able to adapt to users' different needs will enhance user experience in using IT. Goal orientation research can also be integrated into IT training area. Different IT training strategies can be formulated for performance goal oriented and learning goal oriented individuals to maximize their IT training effectiveness.

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