Task Characteristics and Personal Success in Innovative Project

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***Abstract*—This paper investigates task characteristics affecting on personal success in innovative project. The authors develop process satisfaction and personal performance as personal success to understand how task characteristics affect on the individual outcomes. There are four critical task characteristics of innovative project, task ambiguity, task conflict norms, task complexity, and task creativity, in which the individuals may develop personal success by the intra-team processes. Empirical data collected from 146 members of innovative task groups. The results show that task characteristics, excepting task complexity, affect on personal success significantly.**

***Index Terms*—task characteristic, group process, innovative project, personal success.**

I. Introduction

Personal success in project, the individual level effectiveness underlies group outcome principally. However, literature lacks an individual viewpoint to examine task effectiveness in the innovative project. The main purpose of the present study is through the lens of task group characteristic, to understand personal success in innovative project [1]. The research question is: how do the task characteristics of innovative project affect an individual's success? A model was developed based on the group process theory, and then empirical data were collected to test the research model and hypotheses. In additional to this section, following section is literature review, section three is research methodology, section four is research results, and the final section is research finding and conclusion.

II. Literature Review

A. Task Group Effectiveness

In the present study, personal success incorporates personal performance and process satisfaction. Gladstein [1] proposes a model of task group effectiveness to explore the factors most influence on group outcomes. The model underlies the notion that group process leads to effectiveness. Effectiveness has three components: group performance, satisfaction of group-member need, and the ability of the group to exist over time [2] and [3]. Group process is the intragroup and intergroup actions that transform resources into product. The variables would include open communication, supportiveness, and a lack of interpersonal conflict [4]. The task-function oriented researchers have advocated the importance of discussion of group process [5]. Quite a few shared-cognition oriented studies that the similarity of member's thought, attitude, knowledge, beliefs, and expectations can benefit group processes and achieve better performance and satisfaction [7]. Recently, Mathieu, Maynard, Rapp, and Gilson [3] review ten year's team research and propose an Input-Mediator-Outcome team effectiveness framework.

A team must work in a way that increases group members' motivation to engage in future teamwork. Hoegl and Gemuenden [5] advocated that personal success can reach the purpose. In line with the notion, the present study adopts both process satisfaction and personal performance as the individual outcomes of task characteristic variables. The two variables process satisfaction and personal performance build the classification personal success that may increase an individual's willing for future collaboration [5]. For this study, personal performance can be defined as the extent to which a team member is able to meet established quality and cost and time objectives [5], while process satisfaction refers to contentment with the interactions that occur while team members are devising decisions [8].

B. Task Characteristic

1) Task ambiguity

Task ambiguity, absence of knowledge about the task, is often influence the success of a project [9]. The popular definitions of task ambiguity include that one does not have direct information about the task or face with confliction about relevant information [9] and [10]. Ambiguity is different from uncertainty that the former refers to incapable of grasping unknown decision variable of project success while the latter ambiguity emerges when relationships between decision variables are unknown [11]. More specific, ambiguity exists because the decision maker is not yet satisfied with his or her

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understanding of the problem in forthcoming problem solving processes [12]. Likewise, task ambiguity is a source of inadequacy of information that a project needs more learning and selectionism [9], as well as less helpful for project in new product development [11].

2) Task conflict norms

Task conflict norms are the standards of appropriate behavior within the work groups for resolving conflict toward task [13]. Task conflict norms regulate how people should behave while encountering diverse opinions among team members, that they have long been conceived from organizational cultures and are regarded as fundamental parts of all organizations [14]. There are several ways to manage conflicts. Jehn and Bendersky [15] state that the effects of intragroup conflicts on organizational performance may depend on how they manage task conflict. Gelfand, Leslie, and Keller [14] develop a typology of conflict cultures that draws upon two dimensions (active versus passive and agreeable versus disagreeable conflict management norms), forming four styles of managing conflict.

3) Task complexity

Task complexity refers to the manner in which task elements are interrelated and the extent to which task requirement are specified [16]. Ramirez and Steudel [17] define task complexity as the degree to which a task offers great difficulty in understanding or has confusing interrelatd sub-tasks. Task complexity can be regarded as: (a) psychological experience of task-doer, (b) an interaction between task and person characteristic. They are examined in the three bodies of research literature, the information-processing and decision-making, the task and job design, and goal-setting research literature, respectively [18].

4) Task creativity

The extent of creativity can be judged on dual standards of (1) novelty or uniqueness and (2) usefulness or value [19]. As well, Evan [20] highlights the contents of individual creativity: (1) discovering new relationships, (2) looking at subjects from new perspectives, and (3) forming new combinations from old concepts. Generally, scholars have accepted the definition that creativity is the processes and outcome of producing novel yet useful ideas or solutions to a problem [19]. Task creativity, therefore, refers to the degree to which cognitive process are used to lead to the production or creation of something that is both original and worthwhile [17].

In addition to creative outcomes perspective narrated above, scholars also understand task creativity in terms of creative processes brining about innovative products [19]. Mednick [21], therefore, aims at ideation process which includes making new combinations of associative elements and selecting an idea or solution that is helpful or proper to a given task. Runco and Chand [22] propose a two-tiered model of creative think that may be helpful to understand these processes. The first tier comprises three controlling components of creative thinking: problem finding, ideation, and evaluation whereas the second tier incorporates knowledge and motivation. Among them, creativity-relevant is group-based processes to seek a innovative solution that Staggar [23] explicates it as "a cognitive style favorable to taking new perspectives on problems, and application of heuristics for the exploration of new cognitive pathways, and a working style conducive to persistence."

III. Research Methodology

A. Research Model

A task group of innovative project is anticipated to create something new or unique, in that members are required to introduce new ideas or methods [19]. The task characteristics include uncertain, difficulty, unpredictability, and novel [1]. The current research proposes four task characteristics from both theoretical and practical viewpoints, acting as the predictors of individual outcomes. The independent variables contain task ambiguity, task conflict norms, task complexity, and task creativity whereas the dependent variables include process satisfaction and personal performance. The research model is shown in Fig. 1.

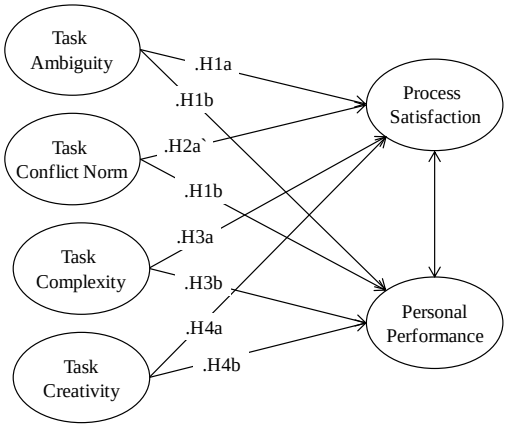

Figure 1. Research model

B. Research Hypotheses

Task ambiguity refer to that an individual does not know relevant information about the task or encounters with conflicting opinions about relevant information [10]. Ambiguous tasks resulting in unclear goals are critical factor for the failure of organizational project [24] and [25]. Task ambiguity contributes to lack of awareness on project, hindering team members from understanding the problem solving situation [9]. Thus, ambiguous tasks can influence group problems solving by vacillating strategy development [26].

H1: Task ambiguity is associated with personal success.

H1a: Task ambiguity is associated with process satisfaction negatively.

H1b: Task ambiguity is associated with personal performance negatively.

In the present study, task conflict norm is identical to group norms about conflict [27] that has a critical effect on the personal success in the innovative project. When team members work together with one another, different opinions and diverse viewpoints on task will exist in an innovative project. How members treat others' criticism

and evaluation will have a significant effect on person success [28]. A more openness norm such as open confrontation or open discussion, encourage participants to express their opinions and opinions. For example, Tjosvold et al. [28] argue that the open discussion of opposing views will result in a cooperative relationship, exploration, understanding, and integration of position and confidence in future collaboration.

H2: Task conflict norm is associated with personal success.

H2a: Task conflict norm is associated with process satisfaction positively.

H2b: Task conflict norm is associated with personal performance positively.

Task complexity results from uncertainty and lack structure. In order to achieve the goals in innovative project, the intensity of discussion and communication are needed among team members [17]. Goal difficulty, a core factor for goal setting theory [26], can offer the opportunity for team members to carry out an imagination. For instance, Tierney and Farmer [29] report that job complexity and some related construct can contribute to creative self-efficacy positively.

H3: Task complexity is associated with personal success.

H3a: Task complexity is associated with process satisfaction positively.

H3b: Task complexity is associated with personal performance positively.

There are considerable evidences suggesting that task creativity make a significant contribution to innovative project [19]. In such tasks non-routine processes with creativity cannot be easily developed to find inventive solutions to problems. This is because an important link that "creative behavior are causal influences on creative behavior" that more thinking and doing of creativity make more innovativeness [17] and [23].

H4: Task creativity is associated with personal success.

H4a: Task creativity is associated with process satisfaction positively.

H4b: Task creativity is associated with personal performance positively.

C. Questionnaire Design

The scales are derived from previous studies. They are validate and modified to fit the current research context. Due to the limitation of space, details of questionnaire are omitted.

D. Sample Description

The study employed survey methods to collect data. Due to the unit of analysis is individual level, the respondents were all team members of innovative projects. Respondents studied in a university of northern Taiwan, and they took a course innovative-and-creativity to learn the concept, procedure, methodology, and practice. In a particular training program of the course, they were taught related methodology of innovative proposal as well as lectured from industrial experts. Students were asked to submit an innovative artwork during the training, and this study distributed the questionnaires after their finishing innovative artworks. This study regards finishing artwork as a task whereby tests the research model.

From 146 respondents in 29 teams, there are total 131 samples (returned rate 93.15%) answered the questionnaires completely. The average age is 20.46, and the proportion of female is 55% while male is 45%. Team leaders reported the attributes of the artworks in which had 14 IT-related, 14 non IT-related, and one not available.

IV. Research Results

A. Measurement Model Test

Following recommended two-stage analytical procedures [30], confirmatory factor analysis and structural model were tested sequentially. First, the results of measurement model test are reported. LISREL 8.80 is adopted to test the measurement model with maximum-likelihood estimation procedures [31]. Specially, model fits are assessed in terms of the following indices: normed fit index (NFI), non-normed fit index (NNFI), comparative fit index (CFI), goodness-of-fit index (GFI), and root mean squared error of approximation (RMSEA). A model is considered to be fit if NFI > 0.9, NNFI > 0.9, CFI > 0.9, GFI > 0.8, and RMSEA is between 0.05 and 0.08 [33].

In CFA, factor loadings are good estimates of the validity of the observed variables because they can be viewed as regression coefficients in the regression of observed variables on latent variables [31]. Convergent validity ensures that all items measure a single latent construct, and it is established if all item loadings are greater than or equal to the recommended cut-off level of 0.70 [33]. Our results show that all loadings of each latent variable are above the cut-off value. The details are also exhibited in Table I.

TABLE I. Results of Measurement Model

	Mean	Standard deviation	Loading(λ)	t-value	Error
Task ambiguity (AVE=.68, CR=.89)					
AMB1	5.21	1.05	.72	9.14	.49
AMB2	5.46	1.15	.89	12.45	.22
AMB3	5.37	1.03	.87	12.12	.24
AMB4	5.50	1.05	.82	10.98	.33
Task conflict norm (AVE=.65, CR=.85)					
TCN1	5.80	1.00	.77	9.66	.41
TCN2	5.74	0.97	.86	11.21	.26
TCN3	5.86	0.87	.79	9.98	.38
Task Complexity (AVE=.67, CR=.80)					
CPX1	5.11	1.12	.81	10.62	.35
CPX2	4.90	1.16	.82	10.98	.32
Task Creativity (AVE=.77, CR=.87)					
CRE1	5.27	1.10	.88	12.55	.22
CRE2	5.24	1.04	.87	12.15	.25
Process satisfaction (AVE=.67, CR=.86)					
SAT2	4.77	1.12	.88	12.55	.22
SAT3	5.08	1.22	.87	12.15	.25
SAT4	5.11	1.05			
Personal performance (AVE=.65, CR=.85)					
PFM1	4.86	1.16	.71	---	.49
PFM2	4.79	1.12	.84	8.82	.30
PFM4	4.94	1.15	.90	9.07	.19

Discriminant validity reflects the level to which the measures for each dimension are distinctively different from each other. We applied the chi-square difference test

to assess the discriminant validity of the measurement model [33]. For each pair of constructs, the fit of a model was compared with the identified model to determine whether the two constructs are distinct or not.. Accordingly, 15 pair-wise tests (six constructs) are conducted for each model respectively. Due to the limitation of space, the current article does not list the details. All $\Delta\chi^2$ differences are significant above the level of $Pr[\chi^2(1)>3.84]=0.05$, indicating strong support for discriminant validity.

Initial results of the CFA indicates that research model is not fit the data well. A careful and iterative inspection of LISREL output reveals that two items do not load on the designated latent factors properly, the standardized loading < 0.7 as well as associated with high modification indices. We dropped these improper items (PFM3 and SAT1). Running CFA again, we find the new measurement model exhibits improved model fits [$\chi^2(106)=133.54$, $\chi^2/df=1.26$, NFI=0.92, NNFI=0.97, CFI=0.98, GFI=0.89, AGFI=0.84, RMSEA=0.045]. All results of CFA are showed in Table I.

Reliability of the construct η is examined based on CR (composite reliability) and AVE (averaged variance extraction) [32]. CR is calculated as $\rho_\eta=(\Sigma\lambda_i)^2/[(\Sigma\lambda_i)^2+\Sigma(1-\lambda_i^2)]$ and AVE is calculated as $\rho_{vc}(\eta)=(\Sigma\lambda_i^2)/[(\Sigma\lambda_i^2)+\Sigma(1-\lambda_i^2)]$. In the formulas, λ_i refers to the ith standardized component loading and $(1-\lambda_i^2)$ refers to the ith error variance [33]. While both CR is greater than 0.7 and AVE is greater than 0.5, it implies that the variance captured by the latent construct is more than that by error component [32]. That is, each measure is accounting for 50 percent or more of the variance of the underlying latent variable [34]. As the reports in Table I, CRs and AVEs are all above recommended cut-off values that the scale is of internal consistency reliability.

Overall, the evidences of good model fit, reliability, convergent validity, and discriminant validity suggest that the measurement model is appropriate for testing the structural model at a subsequent stage. The correlation matrix is revealed in Table II.

TABLE II. CORRELATION MATRIX

	1	2	3	4	5	6
1. Task ambiguity	.82					
2. Task conflict norms	-.46***	.81				
3. Task complexity	.01	.17	.82			
4. Task creativity	-.39***	.21*	.32**	.88		
5. Process satisfaction	-.51***	.54***	.07	.36***	.82	
6. Personal Performance	-.37***	.26**	.08	.38***	.05	.81

B. Structural Model Test

According to the two-step approach, then the research model and hypotheses are tested by using the structural equation modeling (SEM) techniques. The results of SEM analysis are reported in Fig. 3. Because this study regards that four antecedent variables (i.e. task characteristics) are independent, 6 pair-wise relationships are set to zero in LISREL program. Besides, we also set two dependent variables correlated in LISREL program due to theoretical viewpoint that process satisfaction and personal performance are not of causality but related. Then the structural model is tested after these constrains. Overall model fit indices show that the research model is a realistic representation of the data [NFI=0.90, NNFI=0.94, CFI=0.95, GFI=0.86, AGFI=0.81, RMSEA=0.069].

Each research hypothesis is tested by examining the path coefficients and its level of significance. H1a and H1b are supported that the path coefficients are γ=-0.31 (t=-2.43, p<0.01) and γ=-0.23 (t=-2.42, p<0.01). H2a is supported that the path coefficient is γ=0.41 (t=4.24, p<0.001). H4a and H4b are supported that the path coefficients are γ=0.21 (t=2.31, p<0.01) and γ=0.30 (t=2.99, p<0.01). Other details see Fig. 3. The results of testing research hypotheses are summarized in Table Ⅳ.

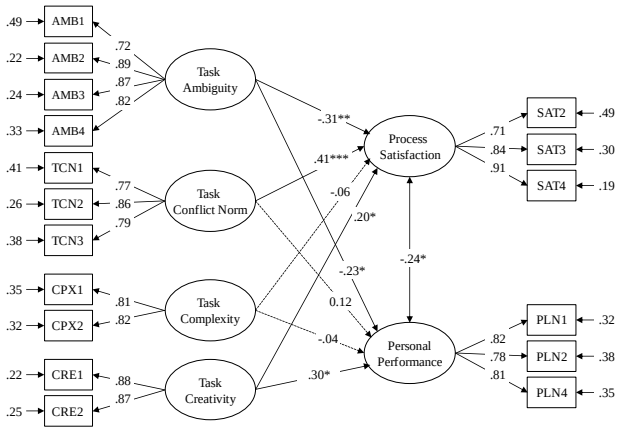

Figure 2. Results of structural model test

C. Results of Hypotheses Test

Comprehensively, the results of hypotheses are summarized in Table III. Key findings reveal both task ambiguity and task creativity relating to personal success significantly.

TABLE III. RESULTS OF RESEARCH HYPOTHESE

H1		**Supported**
H1a	Supported	
H1b	Supported	
H2		**Partial Supported**
H2a	Supported	
H2b	Not supported	
H3		**Not Supported**
H3a	Not supported	
H3b	Not supported	
H4		**Supported**
H4a	Supported	
H4b	Supported	

V. RESEARCH FINDING AND CONCLUSION

This article investigates the influences of task characteristics on individual task outcomes in the setting of innovative projects. According to the results of testing research model and hypotheses, some findings are reported as following. First, task ambiguity is detrimental to both process satisfaction and personal performance. Second, task conflict norms and task creativity can foster both process satisfaction and personal performance. Third,

task complexity demonstrates an insignificant relation to task outcomes. A possible explanation is that the group members take task complexity for granted because the task complexity is already embedded in the setting of innovative task. As a result, task complexity is not critical to task outcome for innovative projects. Fourth, this study examines both process satisfaction and personal performance simultaneously. Structural equation model technique can estimate several multiple regression equation at a time whereby more than one dependent variable can be tested as a whole. In our model, we posit process satisfaction and personal performance correlated to reflect practice. Surprisingly, the relationship between process satisfaction and personal performance is negative (Φ=-0.24, t=-2.68, p<0.01).

This paper investigates the association of task characteristics on personal success, process satisfaction and personal performance, in innovative projects. The results show that task conflict norms, task creativity, and task ambiguity influence personal success. There are two possible future research directions. First, task complexity has effect on neither process satisfaction nor personal performance. To this regard, a further examination of task complexity on personal success is considered. Second, according to the results of structural model equation testing, process satisfaction correlates to personal performance negatively that part of previous studies showing similar results. It indicates that a further understanding of personal success, the opposite relationships between them is desired.

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