EMPLOYEES' INNOVATION BEHAVIOR
The Role of External Information Awareness and Proactiveness of Innovation Strategy

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Abstract: Employees' innovation behavior (IB), which involves developing, promoting, judging, distributing and implementing new ideas, is the foundation for knowledge creation and diffusion in organizations. Therefore, it is important to encourage employees' IB in knowledge management initiatives. To better understand IB, this study applies the theory of planned behavior (TPB). Employees' attitude towards innovation, subjective norm about innovation, and perceived behavioral control to innovation are expected to influence employees' IB. In addition, the effects of organizational factors are considered. Specifically, the influence of external information awareness (EIA) and proactiveness of innovation strategy (PIS) are examined. Results from a survey of employees in Japanese organizations show that employees' attitude, subjective norm, and perceived behavioral control not only significantly influence their innovative behavior, they also mediate the effects of EIA and PIS. This study contributes to research by understanding what individual and organizational factors influence employees' IB and extending TPB by considering the effects of EIA and PIS, using data collected from an understudied yet important context. The findings also suggest that managers should focus on improving perceived behavioral controls, EIA and PIS to encourage employees' IB.

1 INTRODUCTION

In this information and knowledge intensive era, innovation has become an important determinant of competitive advantage and long-term survival for companies. As interactivity and complexity of innovation both within and across organizations, it advances new challenges in exploration and exploitation knowledge, which is one cardinal foundation of "organizational innovative potential" (Swan et al., 1999). Growing emphasis on innovation through knowledge management, innovation behavior (IB) of knowledge workers, which involves developing, promoting, judging, distributing, and implementing new ideas at work, is the primary source for organizational innovation (Jassen, 2004; Scott and Bruce, 1994; Swan et al., 1999). For example, a research of Turgoose (2000) suggests that the acceptance rate of ideas suggested by employees positively influences organizational performance. The process research of knowledge management and innovation also emphasizes the importance of employees' innovation behavior. It suggests that innovation in organizations is a "relay race" based on successful connection of individual innovations along continuous stages from new idea and knowledge initiation to implementation (De Jong and Den Hartog, 2007; King, 2002; Swan et al., 1999). Hence, employees' innovation is indispensable for organization success and it is important to understand individual employees' innovation behavior.

In this study, innovation behavior is defined as employees' behavior "directed towards the initiation and intentional introduction (within a work role, group or organization) of new and useful ideas, processes, products, or procedures" (De Jong and Den Hartog, 2007). In order to encourage employees' innovation behavior, prior research has tried to identify antecedents of employees' innovation behavior. Examples include leadership (De Jong and Den Hartog, 2007; Scott and Bruce, 1994), work groups relationship (Scott and Bruce, 1994), multifunctionality of jobs (Dorenbosch, 2005), organizational knowledge structure (Ong et al., 2003), and external work contacts (De Jong and Den Hartog, 2007). These studies provide many advices for man-

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agers, but few studies have focused on the psychological analysis of employees' innovation behavior. A study of Scott and Bruce (1994) suggests that, at individual level, employees' innovation behavior is a primary response to cognitive meaningful and feasible interpretation of situations, which is more integrative, rather than to the situations per se. So there is a path model of individual innovation from situational and personal characteristics to psychological factors, and to behavior sequentially. Hence, we consider a structured study of employees' innovation behavior's psychological antecedents is important, because it helps to improve management efficiency by focusing on those factors related to the more effective psychological antecedents of employees' innovation instead of paying attention to everything. In this paper, the theory of planned behavior (TPB), which is a social psychological model, is used to explain employees' innovation behaviour. It identifies three antecedents of intention: attitude towards innovation (ATT), subjective norm about innovation (SN) and perceived behavioral control to innovation (PBC). TPB is a well-conceived psychological theoretical framework that provides a useful lens for the intervention of a wide range of behaviors.

The organization provides basic conditional environment for individual behaviors, so organizational characteristics have potential influence on employees' innovation behavior (De Jong and Den Hartog, 2007; Krueger Jr, 2007; Scott and Bruce, 1994). In this study, we consider two factors that have been neglected in prior research: external information awareness (EIA) and proactiveness of innovation strategy (PIS). Now, in the highly competitive Internet economy, while lots of innovative firms have extended their search for new ideas by involving "the use of a wide range of external actors and sources to help them achieve and sustain innovation", openness is becoming a key approach for innovation (Laursen and Salter, 2006). An open organization is likely to have high external information awareness of customer requirements and markets trends, which could raise employees' consciousness of the importance of innovation. On the other hand, on the basis of resource-based view (RBV), proactive strategy is positive with firm performance when proactiveness bolsters firms to develop some competitive advantages (Arogon-Correa and Sharma, 2003). As the highly-qualified innovative employee is treated as one important strategic resourse for firms in terms of knowledge creation and diffusion to keep long-term competitive advantage (Lieberman, 1988), there is a lack of research considering the relationship between proactiveness of innovation strategy and employees' innovation. We posit that proactiveness of innovation strategy could prompt employees to engage in innovation behavior. Overall, the organizational characteristics of external information awareness and proactiveness of innovation strategy may improve the explanatory power of TPB for employees' innovation behavior.

It has been observed that most empirical research on innovation behavior has been mainly conducted in western countries such as US (Scott and Bruce, 1994, 1998), Netherlands (De Jong and Den Hartog, 2007; Pieterse et al., 2010) and Spain (Martin et al, 2007). This study addresses the gap by collecting data from employees in Japanese companies to understand their innovation behavior. As a leader in the global market of automobiles and electronics (Fagerberg, 2005), Japanese companies are among the most innovative. It is therefore a suitable context for studying employees' innovation behavior. In general, Japanese companies view innovation as a collaboration of all employees, regardless of organizational levels, rather than a task for limited part of the organization (Forrester, 2000). It is therefore interesting to examine what motivates Japanese employees to engage in innovation behavior.

In sum, the research questions addressed in this study are:

RQ1: What are the social psychological factors influencing employees' innovation behavior?

RQ2: Does organizational external information awareness and proactiveness of innovation strategy influence employees' innovation behavior?

Based on a survey of 127 employees of Japanese organizations, we found that employees' attitude, subjective norm, and perceived behavioral control are positively related to their innovation behavior as predicted by TPB. More interestingly, they mediate the influences of external information awareness and proactive innovation strategy. This study potentially contributes to research and practice in several ways. First, this is the first study to apply TPB to study employees' innovation behavior. The findings indicate that the theory is suitable for understanding the behavior. Second, we examine how the factors in the TPB mediate the influences of organizational factors on employees' innovation behavior. This provides explanations for how organizational factors influence employees' innovation behavior. Together, these findings offer insights into how innovation behavior may be promoted in organizations. Third, this is the first study to examine the innovation behavior of employees in Japanese companies, which is a highly relevant but understudied context.

2 CONCEPTUAL BACKGROUND

2.1 Innovation Behavior

In this study, innovation behavior is defined as employees' behavior "directed towards the initiation and intentional introduction (within a work role, group, or organization) of new and useful ideas, processes, products, or procedures" (De Jong and Den Hartog, 2007). Unlike individual creativity, which focuses on the production of novel and useful ideas, innovation behavior also includes the production or adoption of useful ideas and idea implementation (Scott and Bruce, 1994). Prior research on innovation behavior has identified many individual and organizational antecedents from different perspectives, such as proactivity, self-confidence, problem-solving style, leadership, work group relationship, job autonomy, organizational knowledge structure, and organizational support (De Jong and Den Hartog, 2007; Dorenbosch et al., 2005; Ong et al., 2003; Scott and Bruce, 1994; Unsworth and Parker, 2003).

However, few prior studies have focused on the psychological antecedents of employees' innovation behavior. As behavior is a result of rational decision of individuals based on the judgment of "perceived" existence of related preconditions, the associated psychological process and psychological factors are important (Ajzen, 1991). So, "perceived" psychological antecedents are more directly related to innovation behavior rather than other organizational and environmental factors. It addresses the importance of social psychological analysis of employees' innovation behavior. This study proposes a structural psychological model of employees' innovation behavior, and considers how psychological behavioral antecedents mediate the influence of organizational factors (i.e., external information awareness and proactiveness of innovation strategy) on employee's IB. TPB and the organizational factors are described next.

2.2 Theory of Planned Behavior

The theory of planned behavior provides explanations of social and psychological influences on behavior (Ajzen, 1991). It is a deliberative processing model in which individuals make behavioral decisions based on careful consideration of available information. The theory posits that human behavior is preceded by intention formation and that intention is determined by individuals' attitude, subjective norm, and perceived behavioral control. Since this study is cross-sectional, we focus on actual behavior rather than intention. Attitude is a personal evaluation or interest about performing the target behavior by an individual. Subjective norm reflects the individual's perception of social influence and pressure from relevant social constituents such as peers and superiors about the necessity to perform the target behavior. Perceived behavioral control reflects the perceived existence of necessary facilitators (e.g. time, ability) to successfully perform the target behavior. In other words, perceived behavioral control is an assessment of the ability to overcome possible obstacles for performing the target behavior (Ajzen, 1991). TPB has been shown to be an effective model for predicting employee behaviors such as individual technology adoption (Morris et al., 2005), participation in learning and training (Wiethoff, 2004), identification of environment opportunities (Krueger Jr 1998), and support for organization change (Jimmieson et al., 2008). For the high predictive power of TPB, we use TPB to understand employees' innovation behavior in this study.

Some prior studies have examined the effects of these three antecedents separately. For example, employees' attitude is an important predictor for their creative performance (William, 2004). Perception of innovation climate, as an important dimension of perceived behavioral control, is studied in Scott and Bruce (1994). Perceived opinion of "important others", which is similar to subjective norm, has been examined to be important for nurses' innovation behavior in Amo's study of health care industry (2006). This study contributes by examining these aspects together and comparing their relative importance to employees' innovation behavior in an empirical study. This is the first study to examine their relative effects.

2.3 External Information Awareness

External information is an important driver of innovation that provides signals of market trend and extends limited internal innovation capability (Cooper et al., 1995; Frishammar et al., 2005). In a volatile environment where customer needs and technology changes rapidly, organizations need to maintain strong relationships with their environmental constituents in their innovation endeavour. It has been emphasized that firms should openly "use external ideas as well as internal ideas", especially those from key customers, suppliers, competitors, research organizations and market to accelerate innovation. This approach is named open innovation (Chesbrough, 2003). These suggest that it is important for organizations to have strong external information

awareness.

External information awareness refers to the extent to which organizations track best performers, main competitors and technologies in the industries, and maintain contact with suppliers, customers, and the government to gather information from the external environment (Mendelson, 2000; Von Hippel, 1988). In firms with active network to access both internal and external knowledge and expertise, employees' awareness and access of external knowledge and knowledge sharing among employees will be strengthened also (Cohen and Levinthal, 1990). Even many scholars certified empirical linkage between external information awareness and innovation performance on the organizational level (Tambe et al., 2009), however, few prior studies have considered the potential influence from external information awareness to employees' innovation behavior for its capability to bolster employees' external information and knowledge access. This study provides new insights by examining how external information awareness influences innovation behavior through affecting employees' attitude, subjective norm, and perceived behavioral control.

2.4 Proactiveness of Innovation Strategy

Innovation strategy guides organizations' innovation endeavor (Lumpkin, 1996; Saleh, 1993). An important aspect of innovation strategy is proactiveness. Proactiveness "implies taking initiative, aggressively pursuing ventures, and being at the forefront of efforts to shape the environment in ways that benefit the firm," which is opposite with reactiveness (Knight, 2000). In other words, proactiveness of innovation strategy refers to the organization's quickness to innovate and to introduce new products or services. According to the resource-based view (RBV), proactiveness is posited to be positively related to firm performance when firms some develop competitive advantages from proactive stratgy, while a reactive strategy of innovation is considered to be not effective to keep long-term success in a dynamic and sophisticated environment (Arogon-Correa and Sharma, 2003; Souder, 1987).

A proactive innovation firm is likely to be a leader rather than a follower (Lumpkin, 1996). Slater (2006) identified four types of innovation strategy: early market innovator, early adopter, mainstream market, and conservationist (late majority and sluggards). Early market innovators are those organizations which "appreciate innovation for its own sake" and continuously focus on discovering new needs of customers. Early adopters are those that are sensitive to new market trends and actively "adopt and use innovation to achieve a revolutionary improvement". Organizations in the mainstream market are those that are sensitive to innovation risks and prefer to conduct a "mature" innovation that already confirmed by the market and with low risk. Conservationists are those organizations that are highly conservative or averse to innovation.

As highly-qualified innovative employees and tacit innovation processes are considered as hard-to-imitate strategic resources for firms to get and maintain innovation advantages (Lieberman, 1988), the potential linkage between proactiveness of innovation strategy and employees' innovation behavior can deepen our understanding of the positive influence from proactiveness on firm performance. However, there has been a lack of research considering this potential linkage. This research seeks to address this gap.

3 PROPOSED MODEL AND HYPOTHESES

Figure 1 shows the proposed model of employees' innovation behavior. Based on TPB, employee's innovation behavior is a function of attitude towards innovation, subjective norm about innovation, and perceived behavioral control to innovation. These three antecedents are expected to mediate the influence of proactiveness of innovation strategy and external information awareness on employees' innovation behavior. Additionally, industry, firm size, department and job position are included as a control variable that may influence employees' innovation behavior. The hypotheses are explained next.

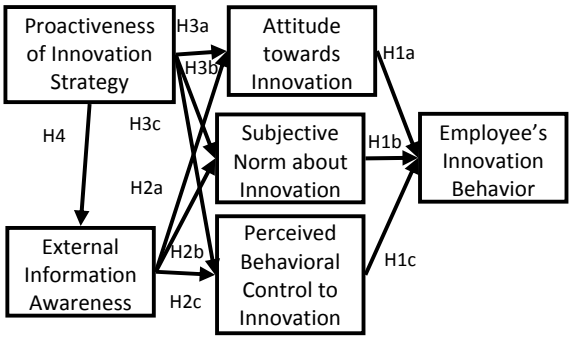

Figure 1: Proposed Model.

3.1 The Effects of Attitude, Subjective Norm, and Perceived Behavioral Control

According to TPB, attitude, subjective norm, and perceived behavioral control are positively related to individuals' behavior. We expect these relationships for employees' innovation behavior as well.

Attitude is a person's evaluation or interest about performing the target behavior by an individual, which is strongly related to the perception of behavior-associated outcomes and "the strength of these associates" (Ajzen, 2005). Based on the "principle of compatibility", employees' innovation behavior should be anticipated by their attitude toward innovation (Ajzen, 2005). That is to say, as a general rule, employees tend to do innovation when they view it as beneficial or favorable, as it has high possibility of increasing their job efficiency and reputation in the workplace. A study of Lee and Wong (2006) demonstrated the positive relationship between attitudes and performance of R&D scientists and engineers. William (2004) also certified the empirical link between attitudes toward divergent thinking, which is "an integral process in creativity", and employees' creation. Meanwhile, in general, innovators are treated to be with higher attitude toward innovation than non-innovators (Pizam, 1972). So, we posit that:

Hypothesis 1a: Employees' attitude toward innovation is positively associated with their innovation behavior.

Subjective norm reflects an individual's perception of social encouragement and pressure from relevant social referents such as peers and superiors about the necessity to perform the target behavior (Ajzen, 2005). When employees' key social referents in the workplace seem to all "suggest" them to conduct innovation behavior, employees are likely to feel pressured to engage in innovation. For example, Amobile (1988) considers that leaders' expectations are important for employees' creative work, and Amo (2006) indicates that the perceived opinion of "important others" such as managers and colleagues influence health-care workers' innovation behavior. Meanwhile, CEOs' commitment toward innovation indicates the importance of innovation in firm's development strategy and customers' new service or product requirements and expectations and they compel employees to innovate continuously. In addition, from the process view of innovation, the implementation of new innovation ideas demands heavily on the engagement of these key social referents (Van de Ven et al., 1989). Accordingly, we hypothesize that:

Hypothesis 1b: Employees' subjective norm about innovation is positively associated to their innovation behavior.

Perceived behavioral control reflects the perceived existence or absence of necessary facilitators (e.g. time, ability) to successfully perform the target behavior (Ajzen, 2005). Facilitators such as opportunities for innovation, freedom to innovate, and resources provided by organization are important, as they provide the basic "physical" preconditions for employees to carry out innovation. Hence, the existence of these facilitators is another independent factor which will be considered when employees make a rational decision of conducting innovation behavior. In support, it has been found that perception of organizational innovation support and resource supply, which is an important part of PBC, has strong positive effects on employees' innovation behavior (Scott and Bruce, 1994). Then we postulate that:

Hypothesis 1c: Employees' perceived behavioral control to innovation is positively associated with their innovation behavior.

3.2 The Effects of Organizational Context

On the basis of Scott and Bruce's study (1994), at individual level, employees' innovation behavior is a primary response to cognitive meaningful and feasible interpretation of situations, which is more integrative, rather than to the situations per se, so there is a path model of individual innovation from situational and personal characteristics to psychological factors, and to behavior sequentially. TPB suggest that many personal, social, and informational background factors are related to attitude, subjective norm, and perceived behavior control, and in turn to behaviors (Ajzen, 2005). Although organizations provide the basic environment for employees' behavior, there is a lack of empirical studies testing the effects of organizational factors on employees' behavior (Morries et al., 2005). In this research, we expect two organizational factors: external information awareness and proactiveness of innovation strategy to be important to employees' innovation behavior, and their influences are mediated by attitude, subjective norm, and perceived behavior control.

3.2.1 The Effects of External Information Awareness

Nowadays, with increased globalization, innovation requires firms utilize both internal and external innovation sources to advance their R&D capability (Chesbrough, 2003). High external information awareness means organizations tend to be highly open to environment to absorb external knowledge or gain complementary resources. Since these external sources accesses compensate the lack of internal ability, external information awareness enhances the employees' perception of innovation success and support innovative initiatives, especially for employees in innovation-adopter firms. Meanwhile, external information awareness will improve employees' perception of innovation necessity. Hence employees in organizations with strong external information awareness will develop a positive attitude towards innovation.

Hypothesis 2a: External information awareness is positively associated with employees' attitude towards innovation.

As external information awareness could also improve CEO and senior managers' perceived necessity to innovate, they will tend to persuade and require employees to do innovation through assigning more innovation-related tasks and giving more innovation rewards. At the same time, employees may also feel more innovative pressure from direct contact with external stakeholders such as customers. In addition, the closely cooperation among employees is always needed in the innovation project corresponding to external customer requirements, so the innovation pressure from colleagues will be enhanced sequentially.

Hypothesis 2b: External information awareness is positively associated with employees' subjective norm about innovation.

External information awareness is associated with a wider knowledge and technology base to achieve and sustain innovation. Hence, employees are likely to get more innovation support and freedom. Meanwhile, the external information about customers, suppliers and competitors is a trigger of employees' innovation to provide innovation hints, and the external resource may extend employees' research and development capability.

Hypothesis 2c: External information awareness is positively associated with employees' perceived behavioral control to innovation.

3.2.2 The Effects of Proactiveness of Innovation Strategy

Proactiveness of innovation strategy refers to an organization's quickness to innovate and the speed to introduce new products or services according to new market opportunities (Lumpkin, 1996). Proactiveness of innovation strategy reflects the high priority of innovation inside organizations. In proactive organizations, employees' proactive innovation is more appreciated than in reactive organizations. According to the theory of organizational alignment (Sender, 2007), rewards system should be aligned with the strategic goals and values, so innovators are expected to receive more formal or informal organizational rewards. Hence, employees will develop more positive attitude toward their innovation behaviors.

Hypothesis 3a: Proactiveness of innovation strategy is positively associated with employees' attitude towards innovation.

Innovation strategy directly reflects administrators' expectation of employees' work, and the highlight of innovation management. Managers in organizations with proactive innovation strategy are likely to focus more on continuous generation and implementation of new ideas actively to react to new market trends quickly. Consequently, employees are likely to feel more pressure from social referents to innovate.

Hypothesis 3b: Proactiveness of innovation strategy is positively associated with employees' subjective norm about innovation.

Proactive organizations invest more in R&D and human capital than reactive ones (Arogon-Correa and Sharma, 2003), so they are likely to provide more support (i.e., money, times, and opportunities) for employees' innovation. With the aim to innovate quickly, proactive organizations are likely to give faster feedback, and implement employees' idea bravely.

Hypothesis 3c: Proactiveness of innovation strategy is positively associated with employees' perceived behavioral control to innovation.

Additionally, we expect proactiveness of innovation strategy to increase organizations' external information awareness. Proactive firms are likely to actively recognize and catch the value of new products design and marketing opportunity, even with high potential risks (Lumpkin, 1996). So, continuous focus of external information is likely to be one of

the tactics utilized by top managers (Shoukry, 1993). Early market innovators and early adopters need a close communication and cooperation with external partners such as suppliers, customers, and government to capture new market trends. Successful environmental information scanning and gathering is a primary prerequisite for implementing proactive strategy (Goodman, 1989).

Hypothesis 4: Proactiveness of innovation strategy is positively associated with external information awareness.

4 RESEARCH METHOD

4.1 Survey Instrument Development

The proposed model was assessed with data collected in a survey. The questions related to attitude, subjective norm, perceived behavioral control and employees' innovation behavior were adapted from prior studies applying TPB (Bock et al., 2005; Fishbein and Ajzen, 1981; Lin and Lee, 2004; Price and Mueller, 1986; Robinson and Shaver, 1973). *Attitude* was assessed with four questions: "...engaging in innovation behavior is enjoyable", "...innovation behavior is valuable", "...innovation behavior is beneficial", and "...innovation behavior is favorable". *Subjective norm* was measured in terms of perceived innovation encouragement and pressure from CEOs, supervisors, colleagues, and customers (e.g., "...receive innovation encouragement and competitive pressure from CEOs/direct supervisors/colleagues/customers to innovate"). *Perceived behavioral control* was assessed in terms of perceived existence of resources for innovation (e.g., technology, financial support), opportunities for innovation, freedom to innovate, and feedback, such as "there are many opportunities for employees to innovate in my company" and "employees in my company are given the freedom to innovate at work". *Employees' innovation behavior* was measured with four questions related to frequency of innovation, time spent on innovation, activeness in innovation, and participation in innovation projects. Examples include "…innovate actively" and "…spend significant time innovating at work". Measures for *external information awareness* were developed based on prior studies (Freel, 2000; Kaufmann et al., 2002; Mendelson, 2000; Souitaris, 2001) and focuses on the capture and sharing of information about market trend, government policy, customers, suppliers, competitors, and strategic partners such as research and development institutes and consultants. All items were measured on a five-point Likert scale anchored by "strongly disagree" (1) and "strongly agree" (5).

Proactiveness of innovation strategy was measured by four multiplicative measures. The multiplicative measures were based on the forms of proactive innovation strategy identified by Slater (2006): early market innovator, early adopter, mainstream market, and conservationist (late majority and sluggards). Early market strategy is perceived when firms continuously consider expressed and latent customers needs in conducting innovation to create new market trends (item PIS1). Early adaption strategy is perceived when firms are sensitive to follow new market trends that created by competitors (item PIS2). Mainstream strategy is perceived when firms prefer to capture external market trend, but postpone implementing innovation until it becomes mature inside organization (item PIS3). Conservation strategy is perceived when firms develop non-active attitude toward innovation (item PIS4). Among these designs, early market strategy is the highest level of proactiveness of innovation strategy, while conservation strategy is the lowest one. These four items form a Guttman-type scale. Actually, these four strategies are on a development continuum for firms to accommodate environment changes. Firms mainly adopting early market strategy should also relatively emphasize early adaption strategy in order to timely alter wrong market expectations. Firms mainly using early market strategy should also considering early market strategy and mainstream strategy to capture high potential first-mover advantages and avoid high financial risks. Similarly, firms mainly with mainstream strategy will consider early adoption strategy and conservation strategy, and firms mainly with conservation strategy will try mainstream strategy under some situations.

Four control variables: industry, firm size, department, and job position were included in this research. *Industry* was measured as a categorical variable indicated by respondents as either from manufacturing or non-manufacturing sectors. *Firm size* was measured by the number of employees. *Department* was measured as a categorical variable indicated by respondents as either from IT-related or non IT-related departments. *Job position* was measured by the hierarchical level of respondents from employee (1) to department head (3).

4.2 Data Collection

Table 1: Demographic Profile.

Characteristic		Number of Response	Percentage of Respondent
Industry	Manufacturing	70	55.1%
	Finance	4	3.1%
	Construction	12	9.4%
	Service	8	6.3%
	Advertisement	7	5.5%
	Distribution	15	11.8%
	Energy	4	3.1%
	Transportation	7	5.5%
Department	Corporate development	95	74.8%
	Business planning	3	2.4%
	Cooperate IT-related	10	7.9%
	Business IT-related	1	0.8%
	Other	18	14.2%
Job Position	Department head	19	15%
	Section head	62	48.8%
	Employee	41	32.3%
	Other	5	3.9%
Number of Employees	More than 1000	82	64.6%
	501 - 1000	20	15.7%
	101 - 500	20	15.7%
	Less than 100	5	3.9%
Total		127	100%

A survey was conducted in Japan with the support of the Japanese Innovation Management College in late 2010. The questionnaire was sent to 1,819 employees listed in the database of NTT DATA Corporation. We received 127 completed responses and the response rate is 7 percent. The demographic profile of the respondents is shown in Table 1. Most of responses are from large organizations with more than 1000 employees (64.6 percent). Most respondents work in the manufacturing sector (70 percent). Among the respondents, 74.8 percent are from the corporate development department, 48.8 percent are section heads, and 32.3 percent are non-managerial staff.

5 DATA ANALYSIS

The Smart PLS (Partial Least Square) version 2.0 and the Bootstrap resampling method with 2000 resamples were used to test the research model by structure equation modelling (SEM).

5.1 Tests of Measurement Model

All scales show high internal consistency and reliability. The Cronbach's alpha estimates for attitude, subjective norm, perceived behavioral control, employees' innovation behavior and external information awareness shown in Table 2 were all above the recommend threshold of 0.70 (Hair et al., 2005). In structural equation modelling (SEM), composite reliability (CR) is also used to value the reliability of constructs, and the suggested threshold of it is 0.70 (Chin et al., 1996). In Table 2, all CRs of constructs are above 0.85. In addition, the loadings of each item to constructs are also significant at $p<0.001$.

Convergent validity is assessed by average variance extracted (AVE) and factor analysis. In Table 2, all AVEs are above the recommended acceptable value of 0.50 (Chin et al., 1996). The exploratory maximum-likelihood factor analysis with Equamax rotation supports our proposed evaluation of constructs (see Appendix). Five corresponding factors are extracted. Next, an acceptable individual reliability of item is shown by the item loadings to their related constructs being above 0.70. In our study, the loadings of each item to constructs in the sample are all above the recommended benchmark of 0.70 (Chin et al., 1996).

The discriminant validity demonstrates the difference of construct measures in the research model. Results of comparing square root of AVEs and constructs correlation coefficients support the adequate discriminant validity of our questionnaire. In construct correlation part of Table 2, bold numbers in the diagonal are the square roots of AVE, while off-diagonal numbers are Kendall's tau correlation coefficients among constructs. Kendall's tau correlation coefficient is better measure of correlations of ordinal variables, which can be interpreted as same as Pearson correlation coefficient (Lee et al, 2010). In Table 2, none of the constructs correlation coefficients is bigger than the corresponding square roots of AVE, which means all constructs are more correlated with their own measuring items than with any other constructs.

A test of multicollinearity was also conducted. The highest variance inflation factors (VIF) is 2.29, which is well below the threshold value of 3.3, suggesting that multicollinearity is unlikely to be a problem for our data (Diamantopoulos and Winklhofer, 2001).

5.2 Tests of Structural Model

Figure 2 shows the results of the structural model. One tailed t-test is used to assess the hypotheses. We found that H1a, H1b, and H1c are strongly supported at $p<0.01$. Employees who hold positive attitude towards innovation ($\beta=0.24$), perceive pressure from relevant social referents to carry out innovative activities ($\beta=0.30$), and feel that they have necessary

Table 2: Psychometric Properties of Constructs and Construct Correlations.

Construct	Cronbach's Alpha	AVE	CR	Construct Correlation				
				IB	ATT	SN	BC	EIA
Employees' Innovation Behavior (IB)	.89	.75	.92	**.87**				
Attitude towards Innovation (A)	.92	.81	.94	.54	**.90**			
Subjective Norm about Innovation (SN)	.80	.63	.87	.48	.44	**.79**		
Perceived Behavioral Control to Innovation (PBC)	.83	.66	.88	.54	.57	.41	**.81**	
External Information Awareness (EIA)	.84	.62	.89	.36	.25	.26	.24	**.79**
Proactiveness of Innovation Strategy (PIS)*	-	-	-	.37	.38	.39	.40	.19
* The Cronbach's alpha, AVE, and CR of PIS is not computed as it is measured with a Guttman scale								

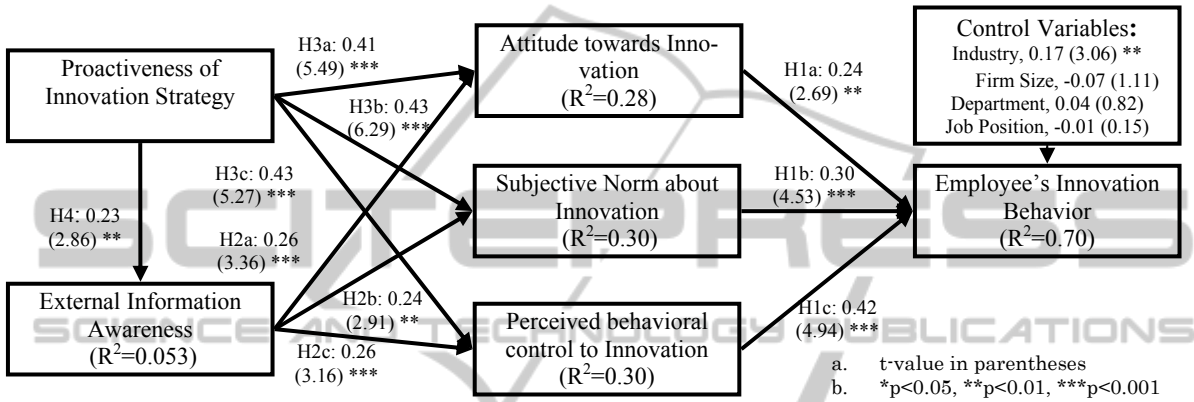

Figure 2: Results of Structural Model.

resources or support for innovation (β=0.42), are likely to engage in more innovation behaviors. Among the predictors, perceived behavioral control to innovation has stronger influence on innovation behavior than the other two factors. None of the control variables are significant to influence employees' innovation behaviors. All these factors explained 70% of the variance in employees' innovation behavior.

Furthermore, the influence from external information awareness and proactiveness of innovation strategy to three antecedents: attitude, subjective norm and perceived behavioral control are all significant at p<0.01 (See Figure 2). External information awareness and proactiveness of innovation strategy explain about 30% in employees' attitude, subjective norm, and perceived behavioral control. Hence, H2 (a, b, and c) and H3 (a, b, and c) are also supported by the data. In firms, which tend to do proactive innovation as an innovation leader and focus on external information capturing and sharing within organizations, employees develop higher psychological stimulus to do innovation than in the other. In addition, the coefficient from proactiveness of innovation strategy to external information awareness (β=0.23) is also significant at p<0.01 (H4). So firms with proactive innovation strategies are likely to process high awareness of information about the external environment.

In addition, to test the mediating role of attitude, subjective norm, and perceived behavioral control, we calculated the Sobel mediation test statistic (see Table 3). Results indicate that they are all significant at p<0.05. This suggests that psychological factors: attitude, subjective norm, and perceived behavioral control, mediate the effects of external information awareness and proactiveness of innovation strategy on employees' innovation behavior.

Table 3: Sobel Test Statistic.

Independent Variable	Mediator		
	Attitude	Subjective Norm	Perceived Behavioral Control
External Information Awareness	2.08*	2.53**	2.53**
Proactiveness of Innovation Strategy	2.74**	3.88***	3.74***
*p<0.05, **p<0.01, **p<0.001			

6 DISCUSSION

6.1 Implications for Research

The results from SEM support all our hypotheses and help us to answer our two research questions. Attitudes, subjective norms, and perceived behavior control are three primary social psychological factors influencing employees' innovation behavior. External information awareness and proactiveness of innovation strategy, as two important organizational characteristics, is positive related to employees' innovation behavior through improving three mediating social psychological factors.

As employees own limited ability to process all kinds of stimuli around them, they use affective and cognitive representations of related information to handle the complexity (Fagerberg, 2005). Although prior studies have examined employees' innovation behavior (De Jong and Den Hartog, 2007, Scott, 1994), and highlighted "intrinsic motivation" as a critical antecedent (Amabile, 1997; Scott and Bruce, 1994), there are few empirical studies on the psychological analysis of employees' innovation. In this research, we applied the theory of planned behavior as a basic structure to better understand how to encourage employees to innovate by providing empirical evidence of mediating effects of three psychological antecedents.

The first contribution of this study is to examine the power of TPB model in explaining the innovation behavior of employees. While prior research only focuses on the influence of some psychological factors, TPB provides a strong theoretical structure to this study to understand the effects of psychological factors to employees' innovation behavior. Through comparing path coefficients of the three psychological antecedents, our results show that perceived behavioral control to innovation has the strongest influence on employees' innovation among the three antecedents. This supports findings in prior research (Scott and Bruce, 1994). Therefore, future studies may examine ways to improve perceived behavioral control.

The second contribution of this paper is examining the effects of two organizational factors: external information awareness and proactiveness of innovation strategy on employees' innovation behavior. In empirical studies of TPB, only the individual psychological factors are considered and the potential influences of other factors, especially organizational factors, have been neglected. But in practical management, those organizational factors are likely to be more controllable by managers than individual factors. Hence, this study addresses a limitation of prior research. TPB also suggests that organizational factors may influence the way that employees perceive things or actions, and, as a result, affect behavior (Ajzen, 2005). Similarly, we have shown that the effects of external information awareness and proactiveness of innovation strategy are mediated through attitude, subjective norm and perceived behavioral control. Understanding this mediating relationship is important because it empirically demonstrates of the underlying mechanism through which organizational factors influence employees' behavior. Our results also suggest that external information awareness and proactiveness of innovation strategy are important triggers for employees' innovation. This may also help to explain the importance of external information, and the positive relationship between proactive innovation strategies with firm performance, when employees' innovation behavior becomes an important strategic resource to gain and maintain competitive advantage.

Third, this study is among the first to collect data from Japanese companies. Based on its unique continuous innovation strategy, Japan owns a big market share in some industries like automobiles and electronics (Fagerberg, 2005). Recent studies on employees' innovation behavior focusing on the effect of factors such as job design and leadership have mainly been conducted in the United States (Scott and Bruce, 1994, 1998), Netherlands (De Jong and Den Hartog, 2007; Pieterse et al, 2010) and Spain (Martin et al, 2007). However, Japan is generally considered to be culturally different from these countries in terms of social collectivism, privilege preference, seniority-based social status, tolerance of hierarchy and risk aversion (Hofstede, 2004). It is therefore interesting to examine whether their findings apply to Japan. This study suggests that the fundings of studies in other countries is possible to apply to Japan, but the careful reconsideration based on Japanese culture is also needed.

6.2 Implications for Practice

Our results show that attitude, subjective norm, and perceived behavioral control are important to predict employees' innovation behavior. Among them, perceived behavioral control has stronger effect on employees' innovation behavior than the others. Thus, in order to effectively encourage employees' innovation behavior, managers may play supporting role rather than deciding and persuading role to increase employees' perceived controllability and self-efficacy for innovative behavior. Some ways include

providing innovation freedom, innovation opportunities, innovation-related resources, and training to employees.

This research focuses on two important organizational factors: external information awareness and proactiveness of innovation strategy. Our results suggest managers to improve external information awareness of their companies, for its positive influence to employees' attitude, subjective norm, and perceived behavioral control. Hence, organizations should establish strong relationships with external innovation partners, and share the captured information and knowledge within organizations. Existing knowledge management technology may be helpful for its capability to capture information from external environment and share them within organizations.

The potential influence of proactiveness of innovation strategy may also be important in practice. Therefore, organizations should firstly emphasize to be an innovation leader rather than an innovation follower, and change to be research-oriented. Then they also should generate and access a wide range of new ideas and bravely invest in the quick implementation of them to capture new opportunities. Although there is a high risk in proactive innovation strategy, its benefits to increase employees' innovation behavior also need to be taken into account. As recent research considers human resources and business processes to be unique resources to gain competitive advantages, an innovation leader will be difficult to be copied and surpassed by an innovation follower.

6.3 Limitations and Future Research

The findings in this study should be interpreted in view of its limitations. First, most of the respondents are from the manufacturing sector. More studies of other sectors are needed to assess the proposed model. Second, this study focuses on Japanese companies, so there may be some geographical or cultural specificities and the findings may not generalize to other settings. It may be interesting to assess the proposed model in other countries, especially those with different culture compared to Japan, like China, Finland and Australia. Third, only perceptive measures have been used in our research. Self-reports may contain some presentational biases (Gaes et al, 1978). Hence, future research may consider using objective measurement of employees' innovation behavior. Fourth, there may be other organizational and environmental factors influencing employees' innovation behavior. Examples include organizational factors like organizational structure, risk-taking tendency, job and business process orientation, and environmental factors such as environmental dynamism. Future research may consider studying the effects of these factors to better understand the phenomenon.

7 CONCLUSIONS

The TPB-based psychological analysis of employees' innovation behavior deepens our understanding of employees' innovation behavior by considering the effects of two organizational characteristics: external information awareness and proactiveness of innovation strategy. In this knowledge-intensive economy, in order to effectively encourage employees' innovation, managers need to ensure that necessary organizational resources are available to support employees. As efficient flow of information and knowledge within organizations is critical for firms, our findings about the importance of external information awareness suggest that it is an important characteristic of a innovative organization. At the same time, managers should consider the benefits of proactive innovation strategy on employees' innovation because it creates the necessary condition for encouraging employees' innovative behavior.

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APPENDIX

Factor Analysis.

Construct Items	Components				
	IB	ATT	SN	PBC	EIA
IB1	***.54***	.39	.25	.45	.19
IB2	***.52***	.22	.37	.34	.27
IB3	***.65***	.24	.26	.26	.23
IB4	***.68***	.21	.16	.39	.11
ATT1	.32	***.65***	.17	.42	.17
ATT2	.16	***.79***	.25	.23	.08
ATT3	.26	***.71***	.27	.30	.11
ATT4	.23	***.79***	.31	.21	.08
SN1	.05	.14	***.82***	.24	.16
SN2	.26	.26	***.77***	.16	.03
SN3	.49	.21	***.40***	.13	.08
SN4	.40	.21	***.39***	.01	.17
PBC1	.34	.39	.34	***.48***	.07
PBC2	.41	.29	.16	***.46***	.14
PBC3	.07	.20	.23	***.82***	.12
PBC4	.31	.24	.15	***.61***	.08
EIA1	.04	.10	.13	.10	***.68***
EIA2	.13	.09	.04	.07	***.89***
EIA3	.20	.06	.19	.02	***.82***
EIA4	.10	.01	.09	.10	***.62***
EIA5	.15	.22	.07	.25	***.46***