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EXPLORING THE EFFECTS OF INDIVIDUAL EMOTIONAL REGULATION, INTERPERSONAL INTERACTION, AND COLLABORATION ON LEARNING BEHAVIOR IN TECHNOLOGY INDUSTRY

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ABSTRACT

This study adopts social cognitive theory (SCT) and control-value theory to select variables. It aims to investigate the effects of emotional regulation, interpersonal interaction, and collaboration on learning behavior, and assesses the moderating effects of the relationship between emotional regulation and learning behavior. This study collected 216 questionnaires from 43 Taiwanese technology companies, but only 194 could be used to perform hierarchical linear model (HLM). The results indicate that emotional regulation and collaboration significantly influence learning behavior; the effect of interpersonal interaction on learning behavior is not significant; and interpersonal interaction positively moderates the relationship between emotional regulation and learning behavior. For technology companies and workers, this study finds that individual emotional regulation and collaboration in an organization are critical factors for learning behavior, so organizations should pay more attention to workers' emotional regulation, and develop a collaborative culture.

Keywords: Social cognitive theory, Control-value theory, Emotional regulation, Interpersonal interaction, Collaboration, Learning behavior, Hierarchical linear model.

Contribution/ Originality

This paper's primary contribution is exploring the workers' learning behavior from their psychological side and the organizational context in Taiwanese technology industry.

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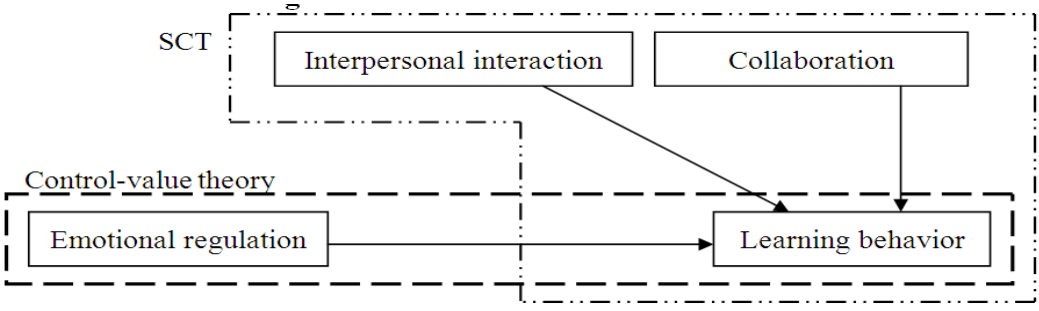
1. INTRODUCTION

This study selected variables based on social cognitive theory (SCT) and control-value theory. SCT involves reciprocal determinism and three-way interaction between behavioral, personal, and environmental factors (Young *et al.*, 2005). SCT is used to examine the self, personality, and interpersonal relations. It was initially used to describe the individual level, and was then extended to the organizational level (Andersen and Chen, 2002; Revilla *et al.*, 2005). In addition, collaborative environments have been evaluated through investigating the extent to which learners share knowledge, and the resulting effect on individual outcomes (Ma and Yuen, 2011). Pekrun *et al.* (2010) suggest that boredom negatively influences course performance, based on control-value theory. Emotions of anxiety and inadequacy inhibit learning, and emotional competence generates a learning experience (Antonacopoulou and Gabriel, 2001). Therefore, this study aims to explore the relationship between emotional regulation and learning behavior in technology industry.

Exploratory organizational learning is a path-breaking learning behavior, and this learning method acquires new knowledge from external sources, or creates novel knowledge via the learner's own, or collective, efforts (Liao *et al.*, 2008; Li, 2010). So, exploratory organizational learning is a learning behavior that allows users to search for novel knowledge, and people have used this approach to create new organizational activities. However, individuals have to utilize skills of observation, cooperation, communication, learning, and interaction with others. Wang and Noe (2010) demonstrate that the beginning point of knowledge management is knowledge sharing (KS). KS can be defined as the conditions of task information and the techniques involved in helping others, solving problems, developing new thoughts, and implementing policies or procedures. Furthermore, KS includes written correspondence and face-to-face communication, and occurs among individuals that help to create knowledge (Bartol and Srivastava, 2002). Following the definitions of exploratory organizational learning and knowledge sharing, and Law and Ngai (2008) propose that sharing knowledge acts as an integral part of an organizational learning activities. Thus, the researchers integrate exploratory organizational learning and knowledge sharing and use a new term ─ learning behavior ─ to represent these together.

This study investigates the Taiwanese technology industry. The technology industry was selected for the following reasons, as proposed by Lin (2008): (1) the industry contains a high number of companies; (2) the companies in the industry use knowledge to a very great extent; (3) employees within the industry work autonomously; (4) the industry is knowledge-intensive, and (5) the potential sample size is large. The above reasons were provided which aim to the perspectives about learning behavior. We combine SCT and control-value theory to select variables and discuss the effects of individuals' emotional regulation, as well as interpersonal interaction and collaboration in organizational environments, on learning behavior. Figure 1 shows the variables' relationships with respect to both theories. Thus, the purposes of the research are to explore: (1) the effect of individual emotional regulation on learning behavior in technology companies; (2) the effect of interpersonal interaction in technology companies on learning behavior; (3) the moderating effect of interpersonal interaction and the influence of emotional regulation on learning behavior; (4) the effect of collaboration in technology companies on learning behavior; and (5) the moderating effect of collaboration and the influence of emotional regulation on learning behavior.

Figure-1. Research Variables and Theories



2. LITERATURE REVIEW AND HYPOTHESES

2.1. Emotional Regulation and Learning Behavior

Control-value theory proposes an integrative framework to explain the antecedents and outcomes of emotions experienced in achievement and academic settings. Moreover, this theory considers emotion to influence aspects including learning strategy and motivation to learn (Pekrun, 2006). Emotion includes both positive and negative aspects; in this regard, Marchand and Gutierrez (2012) investigated graduate students' positive and negative emotions on learning strategy, and found a significant and positive correlation between positive emotion and learning strategy, though the correlations between negative emotions and learning strategy were not significant. Additionally, positive emotions significantly and positively influence learning strategy. However, the impact of emotion prevents learning in organizations (Vince, 2001). Individuals feel anxious and emotionally unstable when they are not able to share knowledge in an organization, and this relates to "emotional arousal" (Tsai and Cheng, 2010). Emotion regulation strategy predicts some of individual and organizational outcomes, but a broader and more detailed set of emotion regulation strategy may better depict the ways where individuals manage their emotions at work (Diefendorff *et al.*, 2008). Hence, the first hypothesis in the current study is:

H1: Individual emotional regulation positively influences learning behavior.

2.2. Interpersonal Interaction and Learning Behavior

Interpersonal interaction acts an important role for trust among team members (Greenberg *et al.*, 2007) and often makes the movement of two interactants being coordinated (Richardson *et al.*, 2005). Trust formation is most often considered as a process of experiential learning (Andersen and Kumar, 2006), and Argyris and Schon propose that organizational learning theory must take into account the mutual contact between actions and interactions. The interactions between individuals, or interpersonal relationships, are associated with organizational learning (Beeby and Booth, 2000). Moreover, learning primarily occurs in the setting of social relations and as a result of complex interactions (Vince, 2001). Tseng and Kuo (2010) state when the interpersonal relationship is stronger, and moral responsibilities and common interests are promoted, this facilitates KS (Lin *et al.*, 2012). Because sharing efficiency is highly associated with interaction (Chen *et al.*, 2012), the second hypothesis is:

H2: Interpersonal interaction positively influences learning behavior.

2.3. Collaboration and Learning Behavior

Collaboration is studied by the scholars in organizational behavior, sociology, and anthropology as a process, and involves interaction among people or organizations. The purpose of collaboration is achieving at least one sharing goal through joint activities (Bedwell *et al.*, 2012). Collaborative activities provide learners with more opportunities to increase their social presence, and also facilitate learning. Insufficient knowledge of the activities or coordination reduces the potential advantages of working in groups (Benbunan-Fich and Arbaugh, 2006). Collaboration is a learning strategy; it can be used to web environment and improve new information and communication technologies (Anaya and Boticario, 2011). Furthermore, a collaborative climate and collaboration are the central elements for promoting knowledge sharing in organizations (Abdullah *et al.*, 2011). Research conducted by Abdullah *et al.* (2011), shows that a high correlation exists between collaboration and knowledge sharing. The concept of cognition-based trust proposes that professional collaboration and developing shared professional experience should be promoted (Huang *et al.*, 2011). According to the above statements, the third hypothesis is:

H3: Collaboration positively influences learning behavior.

2.4. Cross-Level Interactions

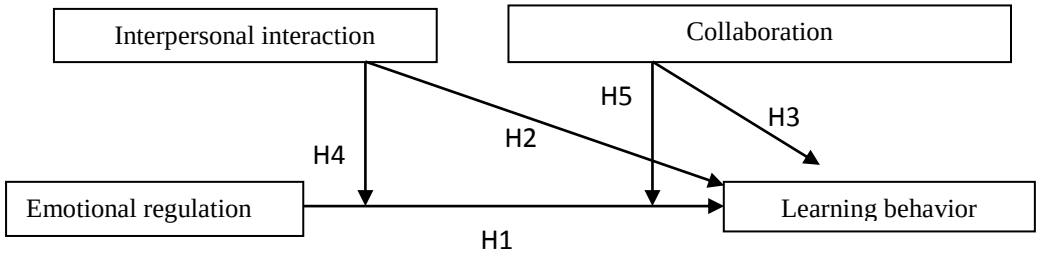
Based on the concepts of the social interaction model, individuals belong to a group; they may interact with each other and this may lead to collective or similar behavior within the group (Li and Lee, 2009; Lee *et al.*, 2010). Knowledge resulting from interactions, and the affective reactions or emotions therein, have been used to analyze the interactions that occur in virtual learning environments (Scherer Bassani, 2011). In an organization, employees' willingness to share is affected by their relationships with other colleagues. People's mutual cooperation can facilitate the use of technology and completing tasks. Task inter-dependence and cooperation time moderates the relationship between communal sharing, equality matching, market pricing and willingness regarding KS (Lin *et al.*, 2012). Scherer Bassani (2011) proposes that cooperative relationships are the foundation of online learning based on communities. Interorganizational networks are based around cooperation between organizations, and facilitated organizational capabilities in complex and changing settings through cooperative learning (Williams, 2005). As stated earlier, according to Marchand and Gutierrez (2012), positive emotion affects learning strategy performance, but negative emotion is not related to learning strategy; however, Vince (2001) proposes that emotion may prevent learning leading to call for exploration of the moderators of emotion regulation-learning behavior relationships. This is a challenge we address in this study. We follow the concepts Järvenoja and Järvelä (2009) to decide the moderators, they argue that emotion regulation is important for successful collaboration at individual and group level, and report that emotions relate to interpersonal interaction. Hence, the present study expects that interpersonal interaction and collaboration moderate the relationship between emotional regulation and learning behavior, and puts forth the following two hypotheses:

H4: Interpersonal interaction positively moderates the effect of emotional regulation on learning behavior.

H5: Collaboration positively moderates the effect of emotional regulation on learning behavior.

Following the above statements, the research framework is presented in Figure 2.

Figure-2. Hypothesized Research Model



3. METHODS

3.1. Participants and Data Collection

In 2011, the data for this study were collected from 43 companies from within the technology industry in Taiwan. The companies were selected using 2011 INFO TECH 100. A translation-back translation procedure was applied. One of the authors translated the original English-based scales into Chinese and asked one bilingual Taiwan person back-translated the Chinese version into English. Following the iterative process, the Chinese version of the scales was modified by the authors to make the final version of this survey.

One contact individual was located in each company, or other trusted individuals contacted the companies to deliver the questionnaires. The respondents were basic-level employees and middle managers across forty-three technology firms (n = 250). Each firm received a sealed package including a cover letter, which described that the survey was voluntary and assured them confidentiality; a return envelope, and a numbered participant survey. Of the 250 surveys distributed to both samples, 216 were returned, or an 86.4% response rate.

One hundred and twenty seven basic-level employees (58.8%) and 86 middle managers (39.8%) returned completed surveys, but three questionnaires left this section blank, the data were missing. The sample includes 131 males (60.6%) and middle managers. The majority respondents (64.9%) were between the ages of 28 and 38, on average, 34.5 years old (SD = 7.93). The mean tenure within the present firms for respondents was 5.52 years (SD = 4.62). Furthermore, 53.7% of the respondents were married, and 55.6% of the respondents obtained the bachelor's degree.

3.2. Variables and Instruments

Previously applied, validated scales were employed to measure different concepts included in this paper. We distributed 22 questionnaires for pilot study, but one questionnaire was lost. So, 21 ones were valid. This study used Likert 7.0 scales to measure all research variables, with a range from *1 = strongly disagree* to *7 = strongly agree*.

This study employed exploratory organizational learning and KS to measure learning behavior. The scale of exploratory organizational learning has been outlined by Li *et al.* (2010). This scale contained five items, all of which had standardized factor loadings exceeding .60, and a Cronbach's α value of .81. A sample question is 'Our team looks for opportunities to employ entirely new skills and knowledge to solve new product problem'. KS was measured and applied using scales from the studies by Yang and Farn (2009) and Lai *et al.* (2011). Both of these studies used three individual

items to measure KS. Yang and Farn (2009) used CFA to analyze convergent validity, and the factor loadings of KS behavior were .944, .960, and .939; Lai *et al.* (2011) used a seven-point Likert scale to measure three items of KS, and the Cronbach's á was .882. A sample question is 'He/she always shares his/her working experience or know-how with other group members'. This measure has a reliability coefficient of .94.

Emotional regulation was measured using the ten-item scale outlined by Balzarotti *et al.* (2010). This scale includes reappraisal (six items) and suppression (four items), and the reliabilities of these were .84 and .72, respectively. In addition, Balzarotti *et al.* (2010) applied test-retest reliability to measure reliabilities again and obtained the values of .67 for reappraisal and .71 for suppression. A sample question is 'When I want to feel more positive emotion (such as joy or amusement), I change what I'm thinking about'. This measure has a reliability coefficient of .87.

Interpersonal interaction was measured by conflict management (four items) and communication (two items), using scales proposed by Ahmed *et al.* (2007) and Chen and Huang (2007), respectively. Both studies employed internal consistency to measure reliability, and the values obtained were .73 and .822, respectively. A sample question is 'The organization has setup a policy to handle conflicts within the organization'. This measure has a reliability coefficient of .76.

This study employed a six-item scale developed by Rodríguez *et al.* (2008) to measure collaboration. This variance was measured using a Likert 7.0 scale, and the reliability was .940, with the loadings of the six items ranging from 0.73 to 0.88. A sample question is 'Marketing and R&D helped each other to accomplish their tasks in the most effective way'. This measure has a reliability coefficient of .95.

3.3. Analysis Method

Data for this study is hierarchical because workers worked in different technology companies and each company has different workplace environments, and influences employees' learning behavior. The hierarchical linear model (HLM) is a cross-level analysis method, but it is not straightforward. The most important characteristic of HLM is that it estimates intra-group relationships and models the relationships using inter-group variables. In addition, it builds regressions into sub-models at each level and within an overall model in HLM (Ho and Huang, 2009). HLM includes three models to test: the null model, the random-coefficient regression model, and the intercepts and slopes -as-outcomes model. HLM includes a two-stage strategy. In the first stage, relationships among level 1, i.e. individual-level variables are estimated separately for each higher-level unit, i.e. company-level (Magoshi and Chang, 2009), this stage is used to examine H1, namely, individual's emotional regulation facilitates learning behavior. In the second stage, the higher-level variables are applied to predict the intercepts (i.e. main-effect model) and slopes (cross-level interaction) found at the first stage (Magoshi and Chang, 2009). Moreover, parameter estimates (intercepts for each company) produced from the first stage were employed as outcome variables in higher-level in order to confirm company-level effects (Li *et al.*, 2012). H2 and H3 suggest that interpersonal interaction and collaboration enhance learning behavior, respectively. Therefore, we check main-effect model. In H4 and H5, we anticipate that the interactions between emotional regulation and interpersonal interaction, as well as emotional

regulation and collaboration are related to learning behavior. In order to examine both hypotheses, we have to test the interaction effects between emotional regulation and interpersonal interaction and collaboration on learning behavior.

4. RESULTS

4.1. Descriptive Statistics

Table 1 reports the means, standard deviations (SD), internal consistencies, and correlations. At the individual level, emotional regulation significantly correlates with learning behavior (r = .34, p < .01); at the company level, learning behavior is significantly correlated with interpersonal interaction (r = .46, p < .01) and collaboration (r = .56, p < .01).

Table-1. Descriptive Statistics and Correlations Among Study Variables

	Means	SD	1	2	3	4
1. Emotional regulation	4.78	0.79	(.87)			
2. Interpersonal interaction	4.90	0.85	.34**	(.76)		
3. Collaboration	5.09	1.08	.38**	.56**	(.95)	
4. Learning behavior	5.56	0.93	.34**	.46**	.56**	(.94)

Note: Workers n = 194, Companies n = 43. **p < .01

4.2. HLM

The significant correlations exist between all research variables, and this makes us to examine the direct effects of independent variables at both levels on learning behavior and moderating effects of the variables at level 2. In order to complete these issues, we used HLM technique by applying SPSS 17.0 and HLM 6.02. We have two sets of data within HLM, one is the data at individual level; the other is at company level through aggregating the data at level 1.

4.2.1. ICC[1], $r_{WG(j)}$

Two values should be computed, ICC [1] and $r_{WG(j)}$, before performing HLM. ICC [1] is the intraclass correlation coefficient, and $r_{WG(j)}$ refers to reliability with a group interrater agreement.

This study obtained the values τ_{00} = 0.098 and σ^2 = 0.780; therefore, ICC[1] = 0.1113, indicating 11.13% of the variance in learning behavior resided between companies, and 88.87% of the variance resided within companies. Because ICC[1] is larger than 0.059 (Ho and Huang, 2009), learning behavior can be said to reside among technology companies, and using HLM to analyze this study is thus acceptable. Furthermore, $r_{WG(j)}$ should be computed and this value demonstrates reliability with respect to the group interrater agreement of the organization-level variable. Hence, the value for $r_{WG(j)}$ of interpersonal interaction in organizations is 0.965, and of collaboration is 0.935. Both $r_{WG(j)}$ values exceed 0.70 (Liao and Chuang, 2004), so the aggregation is justified.

4.2.2. Null Model

The research hypotheses of this study aimed to predict the extent to which individual- and company-level variables are associated with learning behavior. To test the effects of cross levels,

the null model of HLM was used to analyze the data. In a null model, no predictors are entered, and this model only contained learning behavior.

As stated earlier, ICC[1] = 0.1113, and this value refers to the differences between companies, which could explain the variance across organizations. Hence, the variance of workers' learning behavior is 0.878, in which the variance of differences of companies is 0.098 (about 11.13%). Additionally, ICC[2] represents the reliability of the mean, the value of ICC[2] is 0.9608, and exceeds 0.70. From these values it can be seen that the data are dependent, so the aggregation is justified for the research variables.

Through HLM, we found that $\gamma_{00} = 5.685$ ($t = 61.203$, $p = .000$). This result is significant, so a random-coefficient regression model should be applied. Table 2 shows the results of the null model.

Table-2. The Results of the Null Model

Fixed effect	**Coefficient**	**Standard error**	**t**
Intercept 1, β_0			
Intercept 2, γ_{00}	5.685	0.093	61.203***
Random effect	**Standard deviation**	**Variance component**	χ^2
Intercept 1, τ_{00}	0.312	0.098	57.935†
Level-1, σ^2	0.883	0.780	
Deviance = 517.365			

Note: ***$p < .001$; †$p < .10$

4.2.3. Random-Coefficient Regression Model

After testing the null model, we examine whether significant between-company variance exists in the intercepts and slopes employing a random-coefficient regression model. H1 predicts the effect of emotional regulation on learning behavior.

Table-3. Random-Coefficient Regression Model

Fixed effect	**Coefficient**	**Standard error**	**t**
Intercept 1, β_0			
Intercept 1, γ_{00}	5.694	0.092	61.983***
Emotional regulation slope, β_1			
Intercept 2, γ_{10}	0.325	0.074	4.397***
Random effect	**Standard deviation**	**Variance component**	χ^2
Intercept 1, τ_{00}	0.322	0.104	45.734***
Emotional regulation slope, τ_{11}	0.047	0.002	15.846
Level-1, σ^2	0.845	0.713	
Deviance = 505.991			

Note: ***$p < .001$

This model allowed us to check H1. The analysis results show that emotional regulation ($\gamma_{10} = 0.325$, $\tau_{00} = 0.104$, $p < .001$) significantly positively influences learning behavior, so H1 is supported. According to information is showed from null and random-coefficient regression models, we calculate R^2 for the relationship between workers' emotional regulation and learning

behavior, and we obtain that emotional regulation explains 6.12% of the within-company variance. Table 3 presents the result of random-coefficient regression model.

4.2.4. Intercepts and Slopes-As-Outcomes Model

After establishing that significant variance exists across companies in the level 1 intercepts, and the cross-level hypotheses are directly examined. In order to check H2 and H3, we assess an HLM model where individuals' emotional regulation variable is the predictor at level 1 and then regress the intercept coefficient which is obtained from level 1 on the measures of aggregated interpersonal interaction and collaboration at level 2.

The first step aimed to test H2 and H3 through the intercepts-as-outcomes model; therefore, this step checked γ_{01} and γ_{02}. The results showed that γ_{01} is -0.115 ($p > .05$) and γ_{02} is 0.511 ($p < .001$). Therefore, γ_{01} is not significant, and H2 is not supported; γ_{02} is significant, so H3 is supported. In other words, collaboration positively influences learning behavior. As reported in Table 4, aggregated interpersonal interaction and collaboration indicated a significant effect on learning behavior ($\tau_{00} = 0.061$, $p < .01$), after accounting for the predictors at individual level. As a technology company, the specified company-level variables account for 37.8% of the between-companies variance in learning behavior. After estimating that significant company variance in the slopes are showed in the random-coefficient regression model, and then we checked whether the variance in the slopes across technology companies are significantly associated with learning behavior. Thus, this is the direct tests for the cross-level moderators and examines H4 and H5. We further research whether aggregated interpersonal interaction and collaboration are associated with learning behavior, and HLM is used.

H4 and H5 are used to check the moderating effects of interpersonal interaction and collaboration regarding the relationship between emotional regulation and learning behavior, and therefore used the slopes-as-outcomes model. An HLM analysis method is employed, with emotional regulation as the level-1 variable, aggregated interpersonal interaction and collaboration as the level-2 variables, and learning behavior as dependent variable. Thus, γ_{11} and γ_{12} were checked. The results indicate that γ_{11} is 0.841 ($p = .004$) and γ_{12} is -0.121 ($p = .163$). Only interpersonal interaction is significant, and therefore H4 is supported, but H5 is not. Table 4 describes the results of the intercepts and slopes-as-outcomes model.

This study provided complete HLM results and a research results model. The HLM results are presented in Table 5, and the research results model is shown in Figure 3.

Table-4. Intercepts and Slopes-As-Outcomes Model

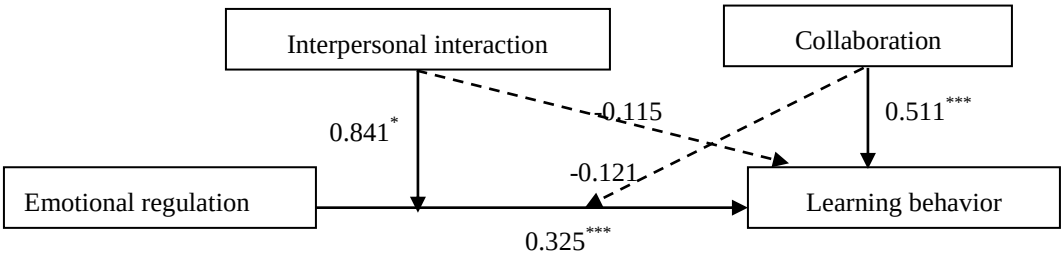
Fixed effect	Coefficient	Standard error	t
Intercept 1, β_0			
Intercept 2, γ_{00}	5.670	0.078	72.861***
Interpersonal interaction, γ_{01}	-0.115	0.152	-0.759
Collaboration, γ_{02}	0.511	0.095	5.376***
Emotional regulation slope, β_1			
Intercept 2, γ_{10}	0.322	0.053	6.090***
Interpersonal interaction, γ_{11}	0.841	0.270	3.116*

Continue

Collaboration, γ_{12}	-0.121	0.085	-1.422
Random effect	**Standard deviation**	**Variance component**	χ^2
Intercept 1, τ_{00}	0.247	0.061	31.580**
Emotional regulation slope, τ_{11}	0.104	0.011	12.023
Level-1, σ^2	0.818	0.670	
Deviance = 491.040			

Note: $^{***}p < .001$ $^{**}p < .01$ $^{*}p < .05$

Figure-3. Research Result Model



Note: ⟶ Significant result

⇢ Non-significant result

$^{***}p < .001$ $^{*}p < .05$

5. DISCUSSION

Clarke (2010) demonstrated that individuals' emotional states affect their own team behaviors. We proposed a model involving emotional regulation, interpersonal interaction, collaboration, and learning behavior in Taiwanese technology industry context. Our first finding is that the effect of emotional regulation on learning behavior is shown to be significant. Table 5 indicates that individuals have higher emotional regulation ability, and they are more likely to perform learning behavior. So, emotional regulation increased by 1 unit, and learning behavior increased by 0.325 units. The results regarding H1 are consistent with the concepts set forth by Marchand and Gutierrez (2012) and Pekrun (2006). Interpersonal interaction in this study includes communication and interpersonal conflict. The result shows that H2 is not supported. From statistical perspective, we employ communication and interpersonal conflict to predict learning behavior through univariate analysis. The results indicate that interpersonal conflict positively influences learning behavior (F = 2.218, p < .01), but communication does not (F = 1.564, p > .05), and we find that the mean of communication is higher than interpersonal conflict through paired-samples t test. So the influence of communication is stronger than interpersonal conflict on learning behavior. Form managerial viewpoint, effective communication is improved by senior managers or leaders (Lee and Chen, 2007), but the samples in this study are middle managers and employees. The items of communication target on workers' willingness, and they express high willingness to communicate with others (μ = 5.06). Thus, we consider that workers have onerous workloads or companies do not establish appropriate communication channel. We conclude that learning behavior of workers in technology industry does not depend on communication. On the basis of the research results regarding H4, interpersonal interaction positively moderates the effects of emotional regulation on learning behavior. However, this result does not clearly explain the moderating effect. Hence, this

study splits interpersonal interaction into three groups (bad, middle, good) based on 33rd percentile, and does the same for emotional regulation (low, middle, high) to describe the moderating effect. When interpersonal interaction is good, emotional regulation positively influences learning behavior. For middle interpersonal interaction, the effect of low emotional regulation is stronger than that of middle emotional regulation on learning behavior. For bad interpersonal interaction, the effect of middle emotional regulation on learning behavior is strongest. As reported earlier, interpersonal interaction could facilitate KS, and was related to organizational learning (Beeby and Booth, 2000; Tseng and Kuo, 2010). However, this study found that even when interpersonal interaction is bad, individual emotion can be controlled, and the grade of learning behavior is higher than that of middle interpersonal interaction. The moderating effect is shown in Figure 4.

Based on the perceptions of collaborative learning, lots of learning behaviors occur via interaction with others, through task completion and shared reflection (Francescato *et al.*, 2006), so this viewpoint supports H3. Collaboration is directly related to learning behavior, but no moderating effect is found in regards to the relationship between emotional regulation and learning behavior, H3 is supported, but H5 is not. The result of H3 means that individuals are more likely to perform learning behavior if the workers are willing to work together and solve problems. However, collaboration does not affect the relationship between emotional regulation and learning behavior. Individual performs learning behavior dependent on his/her cognitive reappraisal and expressive suppression rather than other workers' influence. Thus, managers should set collaborative culture in their companies. This supports the claims of Sanz-Valle *et al.* (2011) and Wang *et al.* (2011), organizational culture plays an important role in organizational learning process, guides organizational members' behaviors and facilitates knowledge creation capability.

Figure-4. Moderating Effect

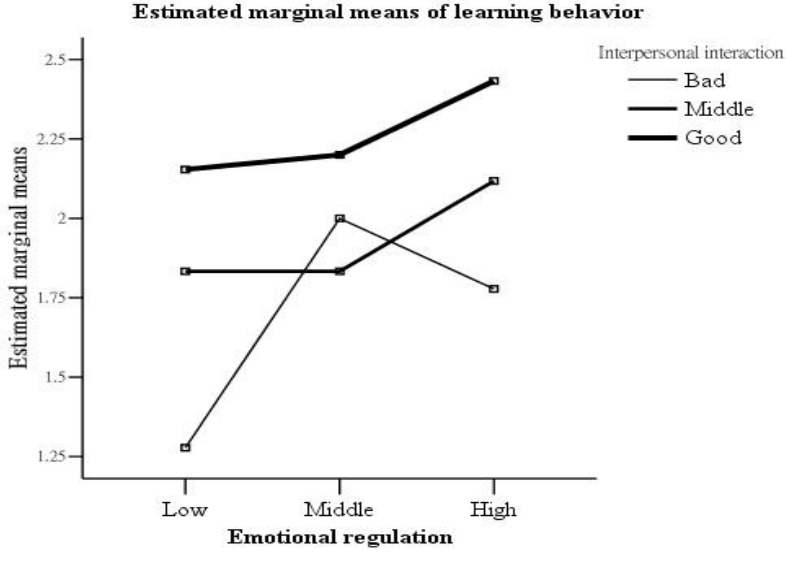


Table-5. Hierarchical Linear Modeling Results

	Null model	Random coefficient regression model	Intercepts and slopes-as-outcomes model
Level 1			
Interception	5.685*** (0.093)	5.694*** (0.092)	5.670*** (0.078)
Emotion regulation		0.325*** (0.074)	0.322***(0.078)
Level 2			
Interpersonal interaction			-0.115(0.053)
Collaboration			0.511***(0.095)
IR× ER			0.841* (0.270)
C× ER			-0.121 (0.085)
Level 1 residual	0.098	0.104	0.061
$R^2_{within\text{-}company}$		0.061	
$R^2_{between\text{-}companies}$			0.378
Deviance	517.365	505.991	491.040

Note: Workers n = 194, Companies n = 43. Standard errors are in parentheses. ER: Emotion regulation, IR: Interpersonal interaction, C: Collaboration. $^{***}p < .001$ $^{*}p < .05$

5.1. Managerial Implications

In this study, we conclude that individual emotional regulation and collaboration in an organization are found here to be the critical factors for learning behavior. Leaders should develop workers' absorptive capacity, since Santangelo (2000) demonstrate that absorptive capacity facilitate workers to acquire the outside capacity from technological area or learn from other firms. Therefore, the conditions for learning behavior include within- and between-firms. Emotional regulation is associated with burnout and job stress because of the unpleasantness and effort that is often involved. The employees input more effort who must invest in expressing and suppressing emotional responses at work. Hence, negative side of emotional stability has negative relationship with job satisfaction (Diefendorff and Richard, 2003; Yagil *et al.*, 2008). Additionally, emotional stability is very important for both people and organizations, because low emotional stability might increase individuals' intentions to leave the organization (Zimmerman, 2008), and influence performance in a team (Morgeson *et al.*, 2005). Kammeyer-Mueller *et al.* (2009) demonstrate that individuals with high emotional stability perceive their work environment positively. Therefore, organizations must pay attention to workers' emotional regulation ability, and reduce strains and stressors for them. On the other side, companies should develop a collaborative culture. Organizational culture involves beliefs and attitudes, which influence organizational behavior (Aktaş *et al.*, 2011). Thus, collaboration belongs to organizational culture, and an organization is easily to perform this culture. Hence, the above statements indicate that individual emotional regulation and collaborative culture are found here to be critical factors for an organization.

As stated earlier, interpersonal conflict facilitates learning behavior. In the previous studies (Meurs *et al.*, 2010; Liu *et al.*, 2011), interpersonal conflict is considered as a negative concept and generates negative outcomes. Although managers and employees consider that this conflict negatively influences operations of companies, they are willing to deal with interpersonal conflict, and facilitate learning behavior. Thus, conflict management is important and involves the strategies that are employed to deal with disagreements (Cingöz-Ulu and Lalonde, 2007), and not to avoid it.

The main contribution of this study is exploring the workers' learning behavior from their psychological side and the organizational context in Taiwanese technology industry. Because workers in technology companies have heavy workloads, the psychological health becomes an important issue. Managers not only focus on performance, innovation, learning behavior and organizational culture, but also on mental, emotional status and attitude. Therefore, managers test the emotional regulation ability when they recruit and select a newcomer, as well as pay attention to workers' psychological health and perform psychological assessment.

Wu and Lin (2010) investigate Taiwanese technology firms and propose that learning infrastructure and processes can integrate and develop knowledge. Lin (2008) depicts that Taiwan's technology industry is a knowledge-intensive industry. Thus, learning and knowledge management are key issues for technology companies in Taiwan. So, the implications can thus be summarized as follows: (1) in terms of human resource management, employers should focus on the emotional stability of individuals right from when they are recruited; and (2) in terms of organizational development, a collaborative culture should be developed.

5.2. Theoretical Implications

Although emotional issues have been conceptually linked to learning in educational area, the empirical evidence in business area has been lacked. In order to compensate for this gap, we test the effect of emotional regulation on learning behavior. We theorize and find that emotional regulation positively influences learning behavior, and this result refers to the psychological factor affects behavior.

In addition, the previous studies have investigated Taiwan's technology companies, and they focus on new product development (Lee and Chen, 2007) or innovation (Ho, 2011). However, both issues are depended on learning, discussing, and sharing with others. Hence, we explore the factors which influence learning behavior. Furthermore, we bridge the gap between individual level and company level factors and discuss the effects of these factors on learning behavior through HLM.

We combine SCT and control-value theory to shape this study, so several theoretical implications should be noted. First, from SCT viewpoint, we consider that not all environmental factors have the same effects to one behavior and form a causal chain. Second, control-value theory is often used to explain students' emotion and learning situation (Pekrun *et al.*, 2011; Daniels and Stupnisky, 2012); however, we apply it to explore the workers' emotion regulation on learning behavior. Hence, workers' psychological status should not be ignored and influences the willingness of learning. We consider that control-value theory can be applied to explore a worker's thought, and the outcome can show the learning situation and the willingness of learning in firms.

5.3. Study Limitations and Future Research Suggestions

This study conducts HLM to analyze technology companies and workers. The technology industry is a rapidly changing environment that is constantly developing (Ratten and Ratten, 2007). Hence, workers have to learn novel things, ideas, skills, and knowledge on an ongoing basis; this can be achieved via exploratory organizational learning and knowledge sharing. The research results show that SCT discusses the interactions between the personal, environmental, and

behavioral levels, but not all issues belonging to individual or environmental factors have the same effect on behavior. Thus, in this study, interpersonal interaction has been seen to positively moderate the effects of emotional regulation on learning behavior. On the other side, collaboration does not play a moderating role, but it can facilitate learning behavior. Both interpersonal interaction and collaboration are environmental factors; however, these have different influences on learning behavior.

The following limitations of this study should be noted. First, only 216 participants completed the research questionnaire in this study. The present study obtained the agreement of the technology companies involved, and then dispatched questionnaires to these companies; however, several companies did not complete the questionnaire, so the data were not easily to collect. Second, HLM could not be performed on missing data; a datum should be removed when one or more items are missing, and therefore this study used 194 questionnaires to perform HLM. Third, we were not able to control the number of questionnaires returned, and this meant we did not receive equal numbers of questionnaires from each technology company. Forth, selection bias may occur, because the deliverers may invite their favorite colleagues to complete the questionnaire, and the viewpoints of these colleagues may be the same.

We discuss the effects of individual emotion regulation and two environment factors on learning behavior. Thus, we explore the direct and moderating effects. But this questionnaire is a self-report measurement, respondents only response the items. In the future research, we decide to interview the workers, and understand their viewpoints about emotional regulation, interpersonal interaction, collaboration, and learning behavior in companies. Furthermore, we desire to explore if workers' performance is improved when workers apply the knowledge which is obtained from other people to their works.

Morgeson *et al.* (2005) state that emotional stability positively influences performance, the relationship between work performance and emotional regulation is not clear. However, workers are required to perform highly, and they may face situations of heavy stress and negative emotions. Thus, individual work performance should be discussed in future research.

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