

**A study of the relationship between team
innovation and organizational innovation
in the high-tech industry:
Confirmation of the organizational culture
moderation effect**

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Abstract

The increasingly complex environment, development of technology-based products, and customization of demand challenge the reaction speed of the enterprise; for the success of organizational management, the teams usually reform the enterprise, create new ideas, produce innovative models with better results, and thus make important contributions to the organization through the use of internal operations and organizational culture attribution. Through a literature

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review and statistical analysis, this study has developed a team innovation scale, organizational culture scale, and organizational innovation scale with good reliability and validity; the high-tech industry employees in Taiwan were used as subjects, and 215 questionnaires were issued through purposive sampling. In total, 175 valid questionnaires were collected (81%). Statistical methods such as regression analysis, hierarchical regression analysis, and others were used to verify the assumptions in this study. The study concluded the following: 1) team innovation has a significant and positive relationship with organizational innovation, 2) organizational culture has a significant and positive relationship with organizational innovation, and 3) team innovation has a significant and positive impact on organizational innovation due to the moderating effects of the organizational culture.

JEL classification numbers: M54

Keywords: Team Innovation, Organizational Culture, Organizational Innovation

1 Introduction

1.1. Research background and motivation

There are four research motivations in this study:

(1) The importance of the high-tech industry

With relatively generous taxation and land provided by the government and the active operation of private groups, the high-tech industry has become a mainstream industry as well as an important national economic indicator. The industry's product range includes the integrated circuit, TFT-LCD, LED and solar energy-related industries. However, short product cycles and a high elimination rate are common features among them, and many of the key technologies lie in the countries in Europe, the United States, and Japan, resulting in product design

restrictions or high royalty payments. In view of this, the industry has to continuously make innovations in aspects such as technology, research and development, processing, and organization and must respond rapidly to improve the current situation. Albers and Brewer (2003) pointed out that in the 21st century environment, technology is highly valued, and organizational innovation is the driving force for survival. Making good use of knowledge management experience and professional sharing and integration can promote the generation of new knowledge to achieve the purpose of innovation.

(2) The importance of team

Team formation is important for high-tech industrial development. Team operations can improve technology, research and development, and financial performance in the organization as well as enhance organizational efficiency and quality. When a team-based organizational structure is established, team operations can maintain the flexibility and efficient response of the organization when facing an environment with rapidly changing needs. Most related studies on team effectiveness focus on the result of the task outputs and rarely investigate the factors of innovation and upgrades to products, services, and working methods produced or performed by the team (West, 1998, 2001). The team composition, team tasks, organizational context, team process, the level of effort to perform the task, the strategies for task achievement and resources available to the team, among others. Therefore, in addition to high efficiency, teams can improve their performance by innovating and improving working methods.

(3) Organizational culture

The concept of organizational culture first emerged in the 1970s and 1980s and soon became one of the most influential but also most controversial concepts in management research and practice. The concept has been interpreted very differently and there is a lack of consensus regarding a common definition of the term. Members of an organization are from different backgrounds and have different values and beliefs, and they work hard for the common goal (Jarnagin &

Slocum, 2007). These concepts affect the organization and the structuration and institutionalization of the organization as well as deeply affect the employees' behavior and views, thus forming a common belief, which then becomes the organizational culture. In addition to the common concept of the employees, the leaders in the organization play an important role in the continuation and establishment of the organizational culture. The leaders must convey the organization's vision and mission: to promote transformative reform, motivate members of the organization, strengthen the organizational capacity, and create a highly active working environment. Business organizations each have special characteristics, and these organizational characteristics compose the organizational culture (Robbins, 1994). Therefore, the organizational culture refers to the values, organizational identification, and affirmation of individual responsibility of the members in the enterprise; through long-term nurturing and incubation, this culture gradually becomes a style of behavior and value judgment in the organization, and thus, the organizational culture affects organizational innovation. Many authors assume that corporate sustainability values and principles promoted by top management will be widely shared and held by all organizational members and that changes in the values of top management will translate into changes in actual practice throughout the organization (Howard-Grenville, 2006; Jarnagin & Slocum, 2007).

(4) The business innovation capacity

Innovation is a means of enterprise. It is a new capacity to create wealth from resources and makes resources to become real resources; it is a driving force for a firm's progress (Kanter, 1984; Nonaka & Yamanouchi, 1989; Peter Drucker, 1985). When the environment changes and traditional thinking is challenged, the enterprise needs to pursue innovation in response to challenges for survival in a rapidly changing market (Burpitt & Bigoness, 1997). The firm must have new products and services to satisfy old customers and attract new customers (Al-Beraidi & Rickards, 2003). The enterprise needs to continuously improve service

quality, innovate the management model, and pursue innovation, for example by creating new strategies, products, services, processes, and attractive features, to remain competitive.

Through internal operations to create a more efficient, innovative model (Anderson, De Dreu & Nijstad, 2004; West, 2001), the organization increasingly relies on team innovation in response to the rapidly changing market environment (Edmondson, 1999; Ragazzoni, Baiardi, Zotti, Anderson, & West, 2002). Thus, innovation is required for organizational success. Creativity indicates the ability of an individual or group to generate new ideas; innovation is the implementation of a new idea (Mumford & Simonton, 1997). Therefore, organizations increasingly rely on team innovation to respond to the rapid changes of the market, and continuous innovation can maintain and enhance their advantages (Tjosvold, 2004).

With the over-transmission, sharing, and spreading of information in Taiwan, the time for technological change and all the life cycles are shortened drastically. To maintain sustainable operations, the enterprise needs to improve management performance through continuous organizational innovation. Therefore, organizational innovation has become the key factor in business management. The basis for organizational innovation is derived from the organizational culture; the quality of organizational culture is the key to business success. Therefore, this study uses the impact of organizational culture and job satisfaction on organizational innovation as a topic to study the rapid development of high-tech industries in Taiwan, as they have had made significant advancements. Thus, team innovation affects organizational innovation. The impact generated by different organizational cultures on team and organizational innovation was also studied.

1.2 Objective

The purpose of this study is to discover the correlation between team innovation and organizational innovation in Taiwan's high-tech industry. Organizational culture was used as the moderating variable and the main external factor affecting the results.

- (1) To study the relationship between team innovation, organizational innovation, and the organizational culture.
- (2) To explore the moderator effects of organizational culture on team innovation and organizational innovation.
- (3) To propose the direction of subsequent studies and recommendations for practical application using the empirical research findings.

2 Literatures and hypotheses

2.1 Team innovation and organizational innovation

The environment is becoming more complex. Therefore, the integration of the abilities and advantages of heterogeneous members through teamwork can be used to effectively detect environmental changes and customer needs, improve employee understanding of the situation, and discover possible results that were unexpected before taking action, thus making important contributions to the organization (Ragazzoni et al., 2002), stimulating innovation ability, and improving team and organizational performance (Anderson & West, 1998). In the past, the studies on team performance focused on exploring different job designs, the nature of the team organization, team situational background factors, and the impact of team process variables (Robbins, 2001). Currently, the studies emphasize knowledge sharing and the role of continuous improvements of team effectiveness, that is, they emphasize the interactive process within the group. Anderson and West (1998) used four factors that affected the team atmosphere to develop an evaluation scale and performed empirical studies. The support for

innovation in the group and the integration and dissemination of innovative thinking can promote policy updates in the organization. In addition to unpacking cognitive mediators of team innovation process, we propose two additional factors that may explain the difficulty in pinning down knowledge diversity effects. (Van Knippenberg & Schippers, 2007).

The study found that there is a significantly positive correlation between team innovation and organizational innovation, which indicates that team innovation is an important factor that affects organizational innovation capability. Therefore, this study hypothesizes the following:

H1: Team innovation has a significantly positive impact on organizational innovation.

2.2 The organizational culture and organizational innovation

To encourage employees to participate in developing innovative ideas, organizations should provide sufficient incentives for stimulation, including the commitment from the organization on issues that promise to provide assistance for resources, support, and rewards, and be open-minded to employee feedback. Therefore, the employees can sense the encouragement and support of the organization in the system's design or creativity-related policies, and thus, they will be more willing to contribute innovative work (Ramus, 2001). Amabile (1998) proposed dimensions of creativity, including organizational encouragement and allowing employees to exchange views to develop creative ideas through participation. Zhou and Jennier (2001) found that it would be helpful to enhance the employees' creativity when they perceived organizational support and recognition for innovation; supportive behavior would also reduce the employees' degree of risk aversion with respect to innovation. Ramus (2001) believed that when a good new idea can contribute to the organizational environment, the

manager should give praise or a timely reward and be open-minded to the different ideas, which would be helpful for enhancing creativity.

Amabile (1997) showed that the resource elements include, among others, experts, capital, materials, work systems and processes, related information, and training. Anderson et al. (1998) pointed out that the amount of resources is directly related to the degree of innovation of the task. The amount of resources will indirectly affect employees' motivation; the more resources they have, the more effective their work will be. A lack of adequate resources is a major setback for employees, especially for the development of new ideas. If the organization cannot promise to provide resource support, most of the original support will be used on the inherent activities. With a lack of support, employees will give up easily, and innovation will not occur. Oldham and Cummings (1996) pointed out that the characteristics of task complexity include the following: high autonomy, skill variety, autonomy, importance, and feedback; these characteristics are positively related to the motivation of the employee's innovative behavior. Mumford and Simonton (1997) proposed that autonomy was related to work innovation. Amabile and Grysiewicz (1987) proposed that free space and challenging work enhance creativity and the innovative performance of employees.

Therefore, the characteristics of the organizational environment and organizational innovation are significantly and positively correlated, indicating that organizational characteristics affect the organizational innovation capability. Therefore, this study hypothesizes the following:

H2: The organizational culture has a significant positive impact on organizational innovation.

2.3 Team innovation, organizational culture, and organizational innovation

In addition to the old model that uses the individual's perspective to explore innovative ability, Amabile (1988) further added the construct of the

organizational environment to connect the two concepts of innovation and creativity. She believed that the generation of an individual's or a team's innovative idea was the core component of the innovation process and that organizational innovation was the result of the successful practice of creativity by an individual or a group. That is, the individual's creative process is a core element of innovative activities; the individual's creative performance is a necessary factor in the process of fully achieving the successful practice (Hanson, Schaufeli & Vrijkotte, 2000 ; Schneider, 1997). The process of practice is to operate as an organization or a team.

Past studies on team effectiveness have mainly concentrated on team development; from the perspective of the overall system architecture, expanding from individuals and groups to the organization, the study of team performance across the overall organization and the study of the effect of interference are relatively lacking. Therefore, a related study on the team's innovative performance on organizational innovation is timely and necessary. The present study created research assumptions in three dimensions of team innovation, organizational culture, and organizational innovation and then verified the interaction of their relationships to provide a reference for academia and practitioners. Therefore, this study hypothesizes the following:

H3: The organizational culture has a significant and positive moderating effect on team innovation and organizational innovation.

Research design

3.1 Research framework and hypotheses

A research framework was proposed based on the research background, motivation and purpose, and literature reviews and correlation analysis on team innovation, organizational innovation, and organizational culture and is shown in

Figure 1.

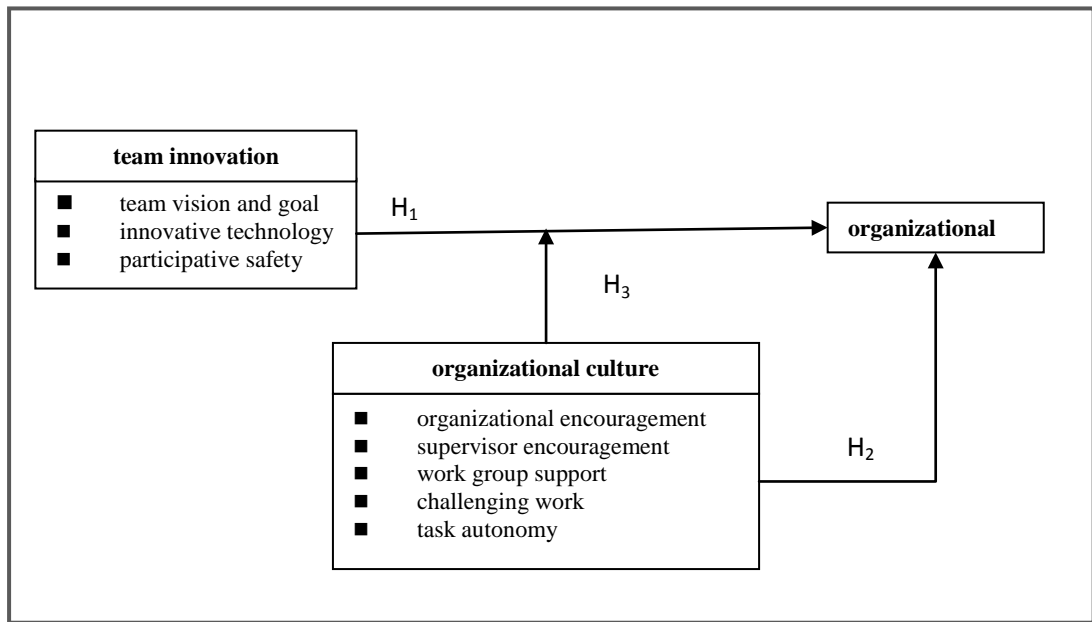


Figure 1: Research framework

3.2 Questionnaire design and measurement

(1) Team Innovation

In this study, team innovation is defined as the following: a working environment of innovative spirit, wherein all members of the team use the experience generated through the accumulation of knowledge individually or within the team to achieve a common vision or expected goals through mutual cooperation. The four-factor model that affects team innovations proposed by Anderson and West (1998) was used; the three main dimensions are vision, participative safety, and innovative technology. The scale items of team innovation were adopted according to the content of the organizational climate scale developed by Anderson and West (1998) and Mika and Kivimaki (1997) and were measured using Likert's seven-point scale.

(2) The organizational culture

Organizational culture has a broad influence. Both the external characteristics and internal policies expressed in the organization belong to the organizational culture. In this study, the environment within the organization, the behavioral factors that affect the creativity of the staff, and innovative behavior were used as the selective factors of the organizational characteristics. The scale for assessing the work environment for creativity (KEYS) developed by Amabile and West (1998) was used as the item source for studying the organizational culture scale, and Likert's seven-point scale was used for measurement.

(3) Organizational innovation

Organizational innovation in this study is defined as the following: the organization has the organizational capacity to encourage employees to look at problems in different ways and integrate knowledge, technology, and creativity to develop new products, materials, processes, or services. The organizational innovation proposed by Damanpour was used as the measurement dimensions. The organizational innovation scale was measured with Likert's seven-point scale in an attempt to determine whether the organizations in Taiwan's high-tech industry have innovative performance.

3.3 Questionnaire collection and sample structure

(1) Subjects

The high-tech industry is on the cutting edge and brings innovative products to consumers. All businesses would like their team members to jump out of the original vertical frame of thinking and to develop innovative and creative ideas from extended lateral thinking. The team may be a group temporarily established within the organization to achieve a goal. However, for long-term benefits, individual achievement in the team cannot create innovation efficiency that can be pursued by the organization. How to recognize the degree of innovation consciousness of the team and how to make the best allocation of scarce resources

are the important issues that affect the innovation ability of the organization. Therefore, this study selected as its focus businesses with a better industrial structure-Taiwan's high-tech industry.

Table 1: The objects of the official questionnaire

Industry	Corporation	Sample size	valid sample	valid questionnaires
Semiconductor Industry	Taiwan Semiconductor Manufacturing Company Limited Stsp Branch	55	54	98%
	United Microelectronics Corporation Stsp Branch	30	24	80%
LCD Industry	Chimei Innolux Corporation Stsp Branch	55	53	96%
	Hannstar Display Corporation Stsp Branch	25	20	80%
Solar Industry	Motech Industries Corporation Stsp Branch	30	25	83%
	Chi Mei Energy Corporation	20	14	70%
total	6(firms)	215	190	84%

(2) The sampling method

There were six surveyed firms in this study, which were listed in Common Wealth magazine's top 500 manufactures in 2010, as shown in Table 1.

(3) Sample collection

The study was carried out between March 5 and April 15 by mail or in person: 20-55 copies of questionnaires were sent to each firm, for a total of 215; 190 were collected (84%); and 11 false and 4 missing and invalid copies were removed, leaving a total of 175 valid questionnaires (76%).

4 Research and analysis

To determine whether a significant correlation exists between the dimensions, regression analysis was conducted on the three constructs—team innovation, organizational culture, and organizational innovation— to identify the correlation between the research variables.

4.1 The correlation analysis of team innovation and organizational innovation

Hypothesis H1: This section verifies the correlation of organizational innovation with the independent variables in team innovation, the three dimensions, team vision and goal, innovative technology, and participative safety. The results are shown in Table 2.

Table 2: The correlation analysis of team innovation and organizational innovation

dependent variable		organizational innovation
independent variable		
team innovation	team vision and goal	0.304**
	innovative technology	0.165*
	<input type="checkbox"/> participative safety	0.336***
R^2		0.534
Adjusted R^2		0.525
F Value		64.448***
p-Value		000
Durbin-Watson Value		1.701
【 *p<0.05 ; **p<0.01 ; ***p<0.001 】		

From Table 2, it is known that the three dimensions of team innovation and organizational innovation have a significant positive correlation; the correlation coefficient ranged between 0.165 ~ 0.336, and the majority were moderately correlated. In addition, it was shown that for team innovation, the correlation coefficient of participative safety was 0.336 (highly correlated). In other words, when the orientation level of participative safety in the team is higher, organizational innovation is improved.

4.2 The correlation analysis of the organizational culture and organizational innovation

Hypothesis H2: This section verifies the correlation between the five dimensions in the independent variables of the organizational culture and organizational innovation. The results are shown in Table 2.

Table 2 showed that the five dimensions of organizational culture and organizational innovation have a significant positive correlation: the correlation coefficients were between -0.25 ~ 0.479, which were moderately or highly correlated. In the dimensions of organizational characteristics, it was found that the correlation coefficient of organizational encouragement was 0.479 (highly correlated). In other words, when the orientation level of organizational encouragement is higher, organizational innovation is improved.

The regression analysis results in Table 3 showed that both team innovation and organizational culture had positive impacts on organizational innovation. Therefore,

Hypothesis 1 (H1): Team innovation was significantly correlated to organizational innovation. → The hypothesis was confirmed.

Hypothesis 2 (H2): Organizational culture was significantly correlated to organizational innovation. → The hypothesis was partially confirmed

Table 3: The correlation analysis of organizational culture and organizational innovation

independent variable		dependent	organizational innovation
organizational culture	<input type="checkbox"/> organizational encouragement		0.479***
	<input type="checkbox"/> supervisor encouragement		0.356***
	<input type="checkbox"/> work group support		0.010
	challenging work		-0.25
	task autonomy		0.121*
R ²			0.743
Adjusted R ²			0.735
F Value			95.822***
p-Value			000
Durbin-Watson Value			1.848
【*p<0.05 ; **p<0.01 ; ***p<0.001】			

4.3 Analysis of the moderating effect of organizational culture

This section conducted an interaction regression analysis based on the concept of hierarchical regression, as shown in Table 3. The aims were to determine whether the five factors—organizational encouragement, work group support, supervisor encouragement, task autonomy, and challenging work—in the construct of organizational characteristics are important moderating factors in determining whether there is a moderating effect of organizational culture on team

innovation, including the three factors– vision, innovative technology, and participative safety–and organizational innovation.

The interaction term of this study is composed of two predictor variables: team innovation and organizational culture. The first layer is the addition of independent variables (three dimensions of team innovation). The second layer is the addition of regulatory variables (five dimensions of organizational culture). Finally, there is the addition of the interaction (the deviation from the average value following the three dimensions of team innovation multiplied by five dimensions of the organizational culture) to verify whether moderating variables of organizational culture have moderating effects on team innovation and organizational innovation. The following is a study of the moderating effect of the five dimensions of organizational culture, including organizational encouragement, supervisor encouragement, work group support, task autonomy, and challenging work.

(1) The moderating effect of team innovation and the organizational encouragement of the organizational culture on organizational innovation.

Table 4 shows that if the interaction between team innovation and organizational innovation are not taken into consideration, some factors in both team innovation and the organizational encouragement of organizational culture have positive effects on organizational innovation. The interaction regression analysis table shows that if the interaction between team innovation and organizational innovation is not considered, some factors of both team innovation and organizational encouragement of organizational culture have positive effects on organizational innovation.

(2) The moderating effect of team innovation and supervisor encouragement of the organizational culture on organizational innovation

Table 5 shows that if the interaction effect between team innovation and the organizational culture is not taken into consideration, some factors of both

team innovation and organizational culture have positive effects on organizational innovation.

Table 4: The moderating effect of team innovation and the organizational culture on organizational innovation

dependent variable		organizational innovation		
independent variable	factors	Model 1	Model 2	Model 3
team innovation	team vision and goal	0.304**	0.317***	0.180
	innovative technology	0.165	-0.192	-0.67
	participative safety	0.336***	0.166**	0.549*
organizational culture	organizational encouragement		0.652***	1.125***
team vision and goal × organizational encouragement				0.237*
innovative technology × organizational encouragement				-0.308
participative safety × organizational encouragement				-0.795
R^2		0.534	0.729	0.738
ΔR^2		0.525	0.722	0.727
F Value		64.448***	112.738***	66.411***
P		0.000	0.000	0.000
ΔF		64.448***	101.504***	60.300.**
F value significantly change		0.000	0.000	0.009
【*p<0.05 ; **p<0.01 ; ***p<0.001】				

Table 5: The moderating effect of team innovation and supervisor encouragement of the organizational culture on organizational innovation

dependent variable independent variable		organizational innovation		
factors		Model 1	Model 2	Model 3
team innovation	team vision and goal	0.304**	0.137	-0.896*
	innovative technology	0.165	0.143	1.404***
	participative safety	0.336***	0.115	0.38
organizational culture	supervisor encouragement		8.471***	0.729***
team vision and goal × supervisor encouragement				1.853*
innovative technology × supervisor encouragement				-2.311***
participative safety × supervisor encouragement				-0.170
R ²		0.534	0.672	0.699
ΔR ²		0.525	0.664	0.687
F Value		64.448***	85.347***	54.536***
P		0.000	0.000	0.000
ΔF		64.448***	80.556***	51.211.**
F value significantly change		0.000	0.000	0.000
【*p<0.05 ; **p<0.01 ; ***p<0.001】				

Table 6 : The moderating effect of team innovation and work group support of

organizational culture on organizational innovation

dependent variable independent variable		organizational innovation		
factors		Model 1	Model 2	Model 3
team innovation	team vision and goal	0.304**	0.227*	-0.775*
	innovative technology	0.165	0.165	0.894
	participative safety	0.336***	0.207	-0.160
organizational culture	work group support		0.229*	-0.311
team vision and goal × work group support				1.7
innovative technology × work group support				-1.183*
participative safety × work group support				0.609
R ²		0.534	0.550	0.571
ΔR ²		0.525	0.539	0.553
F Value		64.448***	51.239***	31.439***
P		0.000	0.000	0.000
ΔF		64.448***	46.446***	27.898**
F value significantly change		0.000	0.000	0.000
【*p<0.05 ; **p<0.01 ; ***p<0.001】				

(3) The moderating effect of team innovation and work group support of organizational culture on organizational innovation

Table 6 shows that if the interaction effect between team innovation and the organizational culture is not taken into consideration, some factors of both team innovation and organizational culture in the organization had positive effects on organizational innovation.

Table 7: The moderating effect of team innovation and challenging work of the organizational culture on organizational innovation

dependent variable independent variable		organizational innovation		
factors		Model 1	Model 2	Model 3
team innovation	team vision and goal	0.304**	0.301**	-0.001***
	innovative technology	0.165	0.159	0.010
	participative safety	0.336***	0.334**	0.329
organizational culture	☐ challenging work		0.015	0.130
team vision and goal × challenging work				0.462
innovative technology × challenging work				0.561
participative safety × challenging work				0.026*
R^2		0.534	0.534	0.535
ΔR^2		0.525	0.523	0.516
F Value		64.448***	48.074***	27.155***
P		0.000	0.000	0.000
ΔF		64.448***	43.553***	22.898**
F value significantly change		0.000	0.000	0.000
【*p<0.05 ; **p<0.01 ; ***p<0.001】				

(4) The moderating effect of team innovation and challenging work of the organizational culture on organizational innovation .

Table 7 shows that if the interaction effect between team innovation and the organizational culture is not taken into consideration, some factors of both team innovation and challenging work of the organizational culture have positive effects on organizational innovation.

Table 8: The moderating effect of team innovation and task autonomy of the organizational culture on organizational innovation

dependent variable		organizational innovation		
independent variable		Model 1	Model 2	Model 3
factors		Model 1	Model 2	Model 3
team innovation	team vision and goal	0.304**	0.217*	-0.725***
	innovative technology	0.165	0.190*	1.937
	participative safety	0.336***	0.136	-0.209**
organizational culture	□ task autonomy		0.370***	0.662
team vision and goal ×task autonomy				1.445*
innovative technology ×task autonomy				-2.775*
participative safety ×task autonomy				0.719
R^2		0.534	0.609	0.634
ΔR^2		0.525	0.600	0.618
F Value		64.448***	65.090***	40.523***
P		0.000	0.000	0.000
ΔF		64.448***	60.223***	32.776**
F value significantly change		0.000	0.000	0.000
【*p<0.05 ; **p<0.01 ; ***p<0.001】				

(5) The moderating effect of team innovation and task autonomy of the organizational culture on organizational innovation

Table 8 shows that if the interaction effect between team innovation and the organizational culture is not taken into consideration, some factors of both team innovation and task autonomy of organizational culture have positive effects on organizational innovation.

Hypothesis 3 (H3): The organizational culture had a significant, positive moderating effect on team innovation and organizational innovation.

4.4 Hypotheses and results

The results of the empirical analysis on the research hypotheses in this study are shown in Table 9.

Table 9: The empirical results of the hypotheses

Hypotheses	results
Hypothesis 1 (H1): Team innovation was significantly correlated to organizational innovation	The hypothesis was partially supported
Hypothesis 2 (H2): Organizational culture was significantly correlated to organizational innovation.	The hypothesis was partially supported.
Hypothesis 3 (H3): The organizational culture had a significant, positive moderating effect on team innovation and organizational innovation.	The hypothesis was fully supported

5. Conclusions and suggestions

5.1. The relationship between the organizational culture and organizational innovation

The results of the regression analysis on organizational culture and organizational innovation showed that the five dimensions—including organization encouragement, work group support, supervisor encouragement, task autonomy, and challenging work—of the independent variables of organizational characteristics have a significant positive correlation with the organizational

innovation dependent variables. Therefore, the organizational culture can, indeed, affect organizational innovation. When the organization more systematically shapes innovation-oriented environmental characteristics, it is more capable of inducing organizational innovation and thus enhancing the overall innovation capability of the enterprise.

5.2 Analysis of the moderating effect of organizational culture

(1) The moderating effect of the organization culture's "organizational encouragement" on organizational innovation

The interaction of organizational encouragement of organizational culture with vision, innovative technology, and participative safety of team innovation has a positive impact on organizational innovation. That is, in the organizational culture, if the organization can give timely encouragement, organizational innovation will be more evident.

(2) The moderating effect of the organizational culture's "supervisor encouragement" on organizational innovation

The supervisor's encouragement of organizational culture and its interaction with vision, innovative technology, and participative safety of team innovation can have positive or negative impacts on organizational innovation. In other words, when supervisors in the enterprise provide more encouragement, the degree of organizational innovation will be strengthened through the integration of an internal communication environment.

(3) The moderating effect of the organizational culture's "work group support" on organizational innovation

The interaction between the work group's support of the organizational culture and the vision, innovative technology, and participative safety of team innovation has positive impacts on organization innovation. In other words, when the company gives more support to employees, the level of organizational

innovation is strengthened through the integration of individual visions within the team.

(4) The moderating effect of the organizational culture's "challenging work" on organizational innovation

The interaction between the challenging work of the organizational culture and the vision, innovative technology, and participative safety of team innovation have positive impacts on organizational innovation. In other words, when the organization offers an environment that fosters innovation, the self-goals of the team will be strengthened, and the degree of innovation of the enterprise will be increased.

(5) The moderating effect of the organizational culture's "task autonomy" on the organizational innovation

The interaction between the task autonomy of the organizational culture and the vision, innovative technology, and participative safety of the team's innovation has positive or negative impacts on organizational innovation. In other words, when the organization offers more innovation autonomy, its organizational innovation is strengthened.

5.3 The management implications and practical suggestions

This study explored the relationship model of team innovation and organizational innovation from the viewpoint of the service industry, and it verifies the moderating effect of the organizational culture. Based on the findings, the contributions to academia and practitioners are as follows:

(1) The academic implications

(a). A scale for team innovation, organizational culture, and organizational innovation was created through a literature review

A scale for team innovation, organizational culture, and organizational innovation, which is applicable to the high-tech industry in Taiwan, was compiled

through a literature review and citations, a rigorous screening of appropriate items during the process of constructing the scale, and the re-composition of dimensions. After the pre-test and the official test, good reliability and full content validity were obtained, which can provide empirical reference for scholars in the study of team innovation, organizational culture, and organizational innovation in Taiwan's high-tech industries.

(b) Verification of the relationship between team innovation, organizational culture, and organizational innovation

The empirical analysis in this study verified the pattern of the relationships between team innovation, organizational culture, and organizational innovation. These three variables are correlated in Taiwan's high-tech industries, and team innovation and organizational culture have positive impacts on organizational innovation. Therefore, these results can also be an effective reference to researchers.

(c) The verification of the moderating effect of organizational culture on team innovation and organizational innovation

The empirical analysis in this study verified that the interaction between team innovation and organizational culture has some significant impacts on organizational innovation. Therefore, the organizational culture variable in Taiwan's high-tech industries has some moderating effects, which indicates that team innovation will have a positive reinforcement effect when it interacts with organizational innovation due to organizational culture. This result will provide effective theoretical and empirical bases for subsequent researchers.

5.4 Management implications

(1) Strengthening the foundation of team development

This study verified that team innovation can, indeed, affect and positively promote the innovation ability of an organization. The creation of a good team atmosphere and an innovative team vision is the key element to promote the

performance of internal members and strengthen the future competitive advantages of the organization. In other words, the entire enterprise has a consensus of innovation and works together as a team to increase team members' spontaneous motivation for innovation. This environment will help the organization effectively achieve optimal performance and meet goals, thereby enabling the increase of the innovation value of the enterprise.

(2) Focus on developing an environment that is favorable for organizational development and innovation

This study shows that organizational characteristics can affect organizational creativity, and team innovation can have a positive reinforcement effect that is favorable for organizational discovery and innovation through the interaction with the organizational culture. Conversely, if the enterprise does not have an innovative culture, a supervisor to support innovation, a related management mechanism, and resource support, then even if there is an internal high-performance innovation team, the generation of innovative values cannot be promoted. From a step-by-step perspective, when the companies understand that innovation is a competitive advantage in the 21st century, every leader and executive will shape his or her company into an organization capable of innovation. It must be understood that innovation and creativity are not formed overnight. To achieve innovation and creativity to create an innovative organization, the enterprise needs to develop a creative organizational culture, the advocates of ideas and innovation should support innovative project plans and supply resources, creative team members should reach a consensus on innovation and communicate effectively, and related management mechanisms should supplement coordination.

(3) Providing the key concepts of organizational innovation

This study provided a scale for practitioners to measure team innovation, organizational culture, and organizational innovation. This scale can be used as an important reference for leaders and innovators in Taiwan's high-tech industry to

examine their innovative ability and improve the organizational behavior model. Ultimately, through the coordination of organizational vision, enterprise operation strategy, and performance guidelines, it can help high-tech industries in Taiwan to create new competitive advantages and work towards the development of sustainable operations in the future.

5.5 Practical recommendations

(1) Strengthening the interaction between leaders and organization members

On the one hand, when the leaders pay attention to and maintain good relations with the organization members, they can better understand the employees' personalities, characteristics, and abilities. On the other hand, the organization members can more easily provide psychological feedback and thus generate a sense of belonging and loyalty to the organization. In the high-tech-oriented enterprise system, despite the importance of the diversity of thinking and skills of the members in the company, the leader still has to listen, interact, and communicate to resolve conflicts between members and transform it into the capacity for enhancement of innovation. It is suggested that the enterprises can enhance the interaction opportunities between leaders and organization members and promote familiarity by holding holiday leisure activities, such as hiking or walking activities, or establishing a relaxing, interactive space within the organization, such as a tea room or a tea lounge.

(2) Establishing a perfect system for recruiting creative talent and exerting excellent human resource management

For an enterprise to maintain a sustainable competitive advantage, the staff is its most trusted resource; their judgment, experience, and ability are the key to the success or failure of the enterprise. Knowing people well and assigning them jobs commensurate with their abilities cannot have significant effects in a short period of time, as opposed to other organizational strategies such as corporate

mergers. However, if the enterprise has a vision for the future, the support of the enterprise's sustainable advantages requires innovative talent to enrich the human resources system of the enterprise. In other words, the organization should evaluate and recruit innovative talent based on its own constitution and main operation models, such as first screening by 104 manpower bank followed by interviews and appointments or open recruitment by staffing companies, followed by employee selection based on a match with the enterprise culture and qualities from the short-term contracts.

In human resources management, the company's performance should be used as the main guidance to identify the key duties and select appropriate employees through internal competition and evaluation. In addition, it is necessary to establish the operation goals for long-term human resource development such as educational training and in-service training for the employees. This process will help employees absorb new knowledge and new ideas and facilitate the cultivation of innovative and creative members in addition to developing their potential and stimulating their creativity.

(3) Emphasizing the authorization mechanism

In an era of great change, high-tech industries must come out of self-differentiation and meet the customers' needs in a timely manner. Therefore, the self-motivation of the employees and the process of learning by analogy should be the main considerations. It is also important that the enterprise authorize employees to manage customer needs in a timely manner. That is, the leader should observe the capacities of members and delegate appropriately according to their ability and periodically encourage and guide the staff to provide the employees with sufficient development opportunities. Of course, the leader must also observe the performance of the members or teams to decide whether to expand their authority or offer additional training. Therefore, the authorization mechanism used to develop abstract concepts and the creative ability of the

employees not only can discover leadership but also can facilitate the development of innovation.

5.6 The limitations of the study and directions for future research

(1) The limitations of the study

The core structure of the thesis of this study was based on a literature review; the process was as objective and strict as possible. Due to the factors described below, the understanding of the actual situation in this study was affected.

(a) When designing the questionnaire, too many questions and an insufficient amount of time were given to the interviewees, which reduced the desire for participants to answer the questions. As a result, many answers were incomplete, leading to invalid questionnaires. The authenticity of the answers was also affected to some extent.

(b) There are many factors that affect organizational innovation. In the choice of dimensions, this study aimed to provide positive goals or encouragement methods to enterprise leaders as a reference. Therefore, this study targeted the promoting factors that affect innovation, which resulted in some factors not being represented. In addition, the selection of questionnaires was based on past studies, which lack interviews for real-world situations. It is inevitable that there are some distortions of the situation.

(c) This study was a cross-sectional study, but team innovation should be based on the accumulated feeling of the members over a long period of time. Therefore, in the future, longitudinal studies may yield more persuasive results.

(2) Suggestions for future studies

(a) Universal verification of theoretical models

This study used the high-tech plants in the Southern Taiwan Science Park as the subjects, but for Taiwan enterprises, team interactive development and a consensus for innovation are the essential factors for the organization to enhance

the overall performance and competitive advantage. A follow-up study can explore other industries in-depth or use middle- and high-level executives from the enterprise as research subjects to verify the reliability, validity, and applicability of the scale and whether the theoretical model is generalizable.

(b) Adopting different research methods

This study adopted the quantitative research method. Follow-up studies can use qualitative research methods or combine quantitative and qualitative methods, such as the focus group method, focus interviews, or group interviews, to further explore research topics related to team innovation, organizational culture, and organizational innovation and to understand the phenomenon and its context.

(c) Exploration of different moderating effects

This study explored the moderating effect of organizational culture on team innovation and organizational innovation. However, there are many factors that affect organizational innovation. This study only focused on enterprise culture, the climate factor, to explore this phenomenon. Future studies can follow this research model and couple it with situational factors, such as the personality traits of the team members, motivation for innovation, and factors that suppress organization innovation, to study the effect on the main variables in this study using the moderating methods.

(d) To avoid the generation of common method variance

When the self-reporting measurement of the independent variables and the dependent variables are from the same source, they are prone to generate common method variance. The results of the study will have additive bias due to linear confounding (Podsakoff & Organ, 1986). The questionnaire used in this study was created through a literature review and based on the measurement of various dimensions by past scholars or amendments of the employed measurement scales. During the editing, the questions were written to provide full coverage, and more stringent procedures were used to construct the variables as a measurement tool to reduce common sources of bias. However, it is suggested that in future studies,

independent variables and dependent variables be obtained from different sources to avoid the occurrence of this bias.

(e) Hierarchical linear model

There are many concepts related to enterprise hierarchies, including the individual, team, department, and the entire organization. Therefore, it is obvious that some variables at a particular level will affect variables at another level. The main advantage of the hierarchical linear model is to permit researchers to test relationships between different levels at the same time and to adjust the variances within a group and between groups to test the impact of the high levels on the low levels when the proper analytic hierarchy process is maintained. Therefore, it is suggested that follow-up studies use a hierarchical linear model to verify whether cross-level effects occur between the variables.

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