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The research on the relationship among market orientation, absorptive capability, organizational innovation climate and innovative behavior in Taiwan's manufacturing industry

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The main purpose of this study was to investigate the influence of the market orientation on innovation behavior in manufacturing industry, the interference of the absorptive capability in the relation between market orientation and innovation behavior, and the interference of organizational innovation climate in the relation between market orientation and innovation behavior. By random sampling, 100 companies became the objects of the research. Five questionnaires were delivered to each of the companies, and 206 questionnaires were recollected. The data of the investigation were analyzed by Confirmatory Factor Analysis, and Hierarchical Regression. Finding of the research is that there is a positive influence of market orientation on innovation behavior in manufacturing industry; in addition, the absorptive capability of the R and D personnel can reinforce the influence of market orientation on innovation behavior, and organizational innovation climate can also reinforce the influence of market orientation on innovation behavior as well. According to the results stated, the industry should emphasize the system of market orientation and the absorptive capability of knowledge, and construct good innovation climate to encourage innovation behavior of employees.

Key words: Market orientation, innovation behavior, absorptive capability, organizational innovation climate.

INTRODUCTION

The manufacturing industry plays a critical role in Taiwan's economy. Research and Development (R and D) is an especially important part in a company's competitive edge, and Mizik et al. (2003) pointed out a positive correlation between R and D departments' expenses and the return on corporate stocks. Therefore, corporate innovation comes from the endless brainstorming and actions by R and D staff. Porter (1985) proposed that the key to stay competitive in the industrial environment is to understand customers' demands and launch new products by studying one's competitors. Augusto et al. (2007) and Laforet (2008) all pointed out

that the development of new products is facilitated if an organization has prospective market information.

The main purpose of knowledge management is to create knowledge, allow members to absorb information and knowledge through the spiral process of knowledge creation, and reinforce an organization's competitiveness (Nonaka and Konno, 1998). The ability to acquire and integrate knowledge influences a company's innovative capacity tremendously.

A company that learns new knowledge and skills faster takes the upper hand in the market, and scholars pointed out that the absorptive capability affects a company's innovation (Kim, 1998; Arbussa and Coenders, 2007). In the knowledge society, the creation, distribution, broadcast, application, and operation of knowledge are crucial (Shapira et al., 2006; World Bank, 2007).

Innovation is one of the ways for enterprises to pursue

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perfection, and the climate of organizational innovation affects the outcome of organizational innovation (Amabile, 1995). When an organization provides support, encouragement, the environment, and resources, the output of individual innovation and organizational innovation is affected. Litwin et al. (1968) indicates that in order for an organization to achieve innovation, it must first create a climate that influences members' motives and behaviors. Wong et al. (2005) believes the manufacturing industry's R and D departments show more innovation than the knowledge-intensive service industry does. Innovation also requires constant efforts from individuals and groups. By applying new knowledge and techniques to existing or innovated products, a company sees specific benefits and becomes more adaptable in the face of challenges.

LITERATURE REVIEW

Implications of market-orientation

According to Narver et al. (1990), market-orientation is an organizational culture, which effectively and efficiently helps a company create and provide exceptional values for consumers and perform well extensively. Market-orientation is about a company gaining long-term profits by considering all stakeholders' interests and giving priority to consumers' interests (Deshpande et al., 1993; Uncles, 2000; Singh and Ranchhod, 2004). Market-orientation is a form of organizational culture that is customer-oriented, considers all stakeholders' interests, and responds to the market through products and services while following the ultimate principle of being profitable and maintaining exceptional customer values.

Narver et al. (1990) proposed the MKTOR scale that is consisted of three behavior elements and two decision-making principles. Under customer orientation, one must fully understand the needs and potential desires of an organization's primary customers and create values on such information.

Competitor orientation: An organization must understand its strengths and weaknesses, verify its current and potential opponents' strengths, weaknesses, long-term development, and strategies, and analyze and take actions.

Interventional coordination: An organization must integrate all its resources and use them effectively and create exceptional values for customers. Effective integration and application require inter-departmental coordination and its entire staff carefully responding to each other's needs in order to create values for customers and the firm itself.

Long-term focus: An organization takes the long-term

perspective of resource-recycling and corporate management.

Profit emphasis: A company's evaluation of objectives and performance is profit-oriented.

Deng et al. (1994) believe profit-orientation is essential to a company's success and thus included it in the MKTOR scale, which now consists of four aspects: customer-orientation, competitor-orientation, cross-functional-orientation, and profit-orientation.

Lado et al. (1998) proposed nine elements that constitute market-orientation, which are market participants (customers, middlemen, competitors, and the environment), the process of market-orientation (analysis and strategic actions), and cross-functional coordination, and the scale is known as the MOS scale. Matear et al. (1998) summarized the MKTOR scale, MAKOR scale, and MOS scale, and modified market-orientation into five aspects, which are cross-departmental-coordination, profit-orientation, competition-orientation, customer-orientation, and market-information-response.

Nystrom et al. (2002) proposed that market-orientation can be divided into three parts. Risk-orientation: risk-related behaviors and attitude; external-orientation: customers' needs; achievement-orientation: an organization's attitude and climate. Given the increasing advancements and the focus on customer satisfaction, a key task is how to know what customers think, analyze competitors' capacity, integrate internal resources, and use the information to launch new products and gain the upper hand.

Implications of the absorptive capability

Innovation requires the development of knowledge, and knowledge comes from learning and absorbing. Cohen et al. (1990) were the first to propose the concept of the absorptive capability, which is defined as: "a company is able to identify new values, acquire external knowledge, absorb and digest the information, and use it for business objectives." Lane et al. (1998) believe the absorptive capability is an important factor that allows the assimilation and internalization of new knowledge. Further, the absorptive capability is a routine or procedure through which one acquires, absorbs, shifts, and utilizes knowledge to generate dynamic organizational capacity (Zahra and George, 2002; Lane and Koka, 2006). Zahra et al. (2009) pointed out that the absorptive capability is about verifying and accumulating external knowledge and turning it into new knowledge.

The absorptive capability consists of three aspects: the ability to understand the values of external new information, the ability to understand and digest an organization's external new information, and the ability to apply the valuable and digested external new information to a

product (Cohen and Levinthal, 1990; Lane and Koka, 2006).

George et al. (2001) pointed out that an organization's knowledge absorption includes efficiency, scope, and flexibility.

Efficiency: How a company verifies, absorbs, and uses new knowledge from the aspects of cost and financial scale.

Scope: The width of the company's knowledge absorption.

Flexibility: The Company is able to use new knowledge and re-construct old and new knowledge. Zahra et al. (2002) divided the absorptive capability into two categories: potential absorptive capacity: knowledge-acquisition and knowledge absorption; realized absorptive capacity: knowledge-conversion and knowledge-use.

Businesses are paying more attention to the importance of knowledge management. When an organization faces issues such as the impact of knowledge-based economy, rapid environmental changes, and issues regarding knowledge, technology, and other domains, the absorptive capability of knowledge becomes ever important.

Implications of organizational innovation climate

Organizational climate refers to a quality experienced by an organization's members and influence them (Tagiuri and Litwin, 1968). The birth of innovation depends on whether organizational climate has the innovation factors. Tesluk et al. (1997) proposed that an organization's innovation climate is the policy, actual practice, and procedures regarding individual knowledge. Objectives are clearly extended to new product development, creativity, services, and procedures in order to achieve innovation.

Amabile (1995) proposed "KEYS: Assessing the climate for creativity," in which the conceptual factors include: encouragement of creativity; autonomy of freedom; resources; pressures; organizational impediments to creativity. In 1988, the environmental factors that promote creativity or hinder creativity were also proposed. The facilitative factors include freedom, encouragement, challenges, identification and feedback, sufficient time, sufficient resources, the right amount of pressure, good project managers, and positive organizational traits. The hindering factors include having too many restrictions, lack of resources, lack of time pressure, inappropriate evaluation, lack of organizational enthusiasm, poor project managers, negative organizational traits, intra-organizational competition, and over-emphasis on the status quo.

Bharadwaj et al. (2002) organizational innovation climate is how an organization encourages innovation

behaviors through official methods, tools, and resources.

Organizational innovation climate is how an organization's employees subjectively perceive the organization's regulations and environment, and such perception influences employees' production, attitude, and behavior regarding innovation. Therefore, organizational innovation climate is a critical factor for an organization to improve its employees' innovation thinking and behaviors. Bellamy (2003) believes organizational innovation climate includes authorization, open thinking, innovation, and managerial efficiency. Organizational climate refers to an organization work atmosphere, and organizational innovation climate refers to how a company provides its employees with a form of perception that in turn affects employees' attitude, behaviors, and sense of value. An organization that is rich in the innovation climate utilizes its innovation spirit and support to develop new technologies, procedures, products, and services.

Implications of innovation-behavior

Given the rapid changes in today's industrial environment, innovation has become an essential capacity for industries to upgrade and stay competitive. García et al. (2008) pointed out that innovation is the most important source of an organization's competitive edge. Nonaka and Takeuchi (1995) believe innovation is a result of the interaction between tacit knowledge and explicit knowledge through the Knowledge Spiral. Hurt et al. (1997) believe innovation is a willingness to change.

Kanter (1988) believe innovation-behavior is a process of using innovative models, to greatly expand, produce, and utilize innovative concepts on a regular basis. Scott and Bruce (1994) proposed that innovation-behavior is the process of seeking support and entering innovation by identifying problems and generating novel, feasible concepts. Innovation-behavior is how an organization or individual converts innovative knowledge, technology, or process into a product or service; this behavior allows an organization to achieve higher R and D performance.

Scott and Bruce (1994) and Janssen (2000) believe innovation-behavior is consisted of three parts: idea generation; idea mobilization; idea realization. Kleysen et al. (2001) further divided innovation-behavior into five aspects: opportunity exploration; generativity; formative investigation; championing; application. Zhou and George (2001) believes a member's innovation-behavior includes the generation of innovative concepts, content of promotion, development plans, and ensuring innovative concepts are effectively implemented.

Innovation-behavior is one of the important behaviors in an organization's development of new products and procedures. Without innovation-behavior, a company cannot launch new products or services in a competitive market. According to Vazquez et al. (2001), market-orientation influences the degree of innovation and product

innovation in an organization. The study by Augusto and Coelho (2007) indicates customers, competitor-orientation, and internal collaboration are important in the development of new products; market-orientation has influences on corporate innovation, competitive strength, and the environment. Laforet (2008) believes that the manufacturing industry can develop new products if it has prospective market opportunities and accepts innovation.

H₁: Market-orientation has significant influences on innovation-behavior.

Caloghirou et al. (2004) discovered a significant correlation between the strength of R and D and employees' innovation, and internal abilities and external knowledge-resources complement rather than replace each other. Arbussa et al. (2007) pointed out that the absorptive capability influences a company's innovative activities, including knowledge and technology.

H₂: A higher degree of absorptive capability among the R and D staff would have more significant influences on market-orientation and innovation-behavior.

In the research by García et al. (2008) on the internal performance and market performance of product-development by the R and D departments in Spanish enterprises, "trust" and "cross-departmental integration" are treated as the variables for measuring organizational climate, and their finding indicates that companies that conduct cross-departmental integration enjoy better values, time, and product performance. In other words, the better the organizational climate, the less time it takes for R and D departments to develop new products.

H₃: R and D staff with a stronger organizational innovation climate has more significant influences on market-orientation and innovation-behavior.

MATERIALS AND METHODS

Population and sample

The R and D departments in the "Top 1000 Manufacturers" published by the Common Wealth Magazine in Taiwan are treated as the matrix, from which 100 companies were randomly selected as the subjects, with 500 individuals working in R and D as the samples. The subjects of the questionnaire are the managers, engineers, and related members working in R and D in the manufacturing industry.

The market orientation scale

For the research, the study adopted the scale proposed by Li et al. (1998) which consisted of 21 question items. Cronbach's alpha value of the original questionnaire are 0.94, 0.95 and 0.95, respectively, and with a confirmatory factor analysis, the range of factor load is 0.52 to 0.91, and construct validity is 0.90, 0.97 and

0.95 respectively.

The absorptive capability scale

For the research, the study adopted the knowledge-acquisition, knowledge absorption, knowledge-conversion and knowledge-use proposed by Jansen et al. (2005) based on Zahra et al. (2002). With a total of 21 question items, Cronbach's alpha values of the original questionnaire are 0.79, 0.76, 0.72 and 0.71 respectively. After a pre-test analysis, the range of factor load is 0.70 to 0.88, and construct validity is 0.85, 0.76, 0.91 and 0.91.

The organizational innovation climate scale

The organizational innovation climate questionnaire is based on the study by Amabile et al. (1996), and the aspects include organizational encouragement, group support, work autonomy and job stress; the range of factor load is 0.51 to 0.92, and construct validity is 0.94, 0.92, 0.75 and 0.82.

The innovation behavior scale

Adopting the scale proposed by Kleysen et al. (2001), the scale consists of 14 question items, and the Cronbach's alpha value are 0.72, 0.72, 0.80, 0.89 and 0.80 respectively. The range of factor load is 0.42 to 0.93, and the construct validity of exploration, contemplation, research, implementation and application is 0.82, 0.88, 0.90, 0.81 and 0.89 respectively.

Control variable

Group dynamic and performance are influenced by the number of people in a team, thus they are treated in many studies as the control variables (Kirkman and Rosen, 1999). Further, members in a larger team may have more diversity or heterogeneity (Bantel and Jackson, 1989). In order to accurately discuss the influences of market-orientation, the absorptive capability, and organizational innovation climate on innovation-behavior, in the study, the number of members in an R and D department is treated as the control variable.

RESULTS

The regression analysis of market-orientation and innovation-behavior is shown in Table 1, and each aspect of market-orientation and innovation-behavior reaches the $p < 0.001$ level of significance. When discussing the exploration behavior, β value is 0.47; when discussing the contemplation behavior, β value is 0.31; for the research behavior, β value is 0.27; for the implementation behavior, β value is 0.40; for the application behavior, β value is 0.34, thus, research hypothesis H₁ is supported.

The regression analysis of the influences of the absorptive capability on market-orientation and innovation-behavior is shown in Table 2. Regarding all aspects of the absorptive capability on market-orientation and innovation-behavior, the correlation of "market-orientation" and "exploration," "contemplation," "research," "implementation," and "application" all reach

Table 1. Regression analysis of market-orientation on innovation-behavior.

Independent variables	Exploration	Contemplation	Research	Implementation	Application
Market-orientation	0.47***	0.31***	0.27***	0.40***	0.34***
R ²	0.29***	0.16***	0.16***	0.23***	0.20***
F-value	84.95***	38.22***	39.07***	59.79***	50.87***

N=206;***p<0.001.

the $p < 0.001$ level of significance, indicating that the absorptive capability has influences on market-orientation and innovation-behavior, thus research hypothesis H₂ is supported.

The regression analysis of the influences of organizational innovation climate on market-orientation and innovation-behavior is shown in Table 3. After the interactions of "organizational encouragement," "group support," "work autonomy," "job stress" and "market-orientation" are incorporated into "market-orientation" and "exploration," "contemplation," "research," "implementation," and "application," all aspects of organizational innovation climate on market-orientation and innovation-behavior reach the $p < 0.001$ level of significance, indicating organizational innovation climate has influences on market-orientation and innovation-behavior, thus research hypothesis H₃ is supported.

DISCUSSION

Facing the ever-changing consumer market, companies need to value customers' needs and preferences, competitors' movements, and a company's own cross-departmental-coordination in order to create products that meet customers and markets and allow better corporate performance. The research points out that a higher level of market-orientation leads to a higher level of innovation-behavior. This finding is consistent with those by Vazquez et al. (2001) and Laforet (2008). In other words, customers, competitor-orientation, and internal collaboration are critical during product-development. Augusto et al. (2007) believe market-orientation has influences on corporate innovation and competition. A company that has more prospective marketing plans would engage in more innovation activities that promote innovation and product-development.

From the perspective of knowledge management, when an organization implements organizational learning, knowledge absorption and organizational innovation, it must also motivate employees to absorb new knowledge before organizational innovation-behavior is increased. Nonaka (1994) proposed that tacit knowledge is crucial to innovation. The finding indicates that with a higher degree of absorptive capability in R and D staff, the positive correlation between market-orientation and innovation-behavior is significantly strengthened. In other words, during the process of innovation, the R and D staffs'

knowledge acquisition, absorption, transformation, and utilization would influence the organization's market-orientation and innovation-behavior. This finding is consistent with that by Vazquez et al. (2001). Therefore, when an organization has a higher level of absorptive capability, the positive influences of market-orientation on innovation-behavior are strengthened. Cohen et al. (1990) also proved that there is a close relationship between a company's absorptive capability and R and D. Research and development, not only promotes innovation and product-development, the absorptive capability is also enhanced as a result. An organization's HR management activities have positive influences on the absorptive capability (Mibaeva et al., 2003). Therefore, through human resource management, an organization would be able to improve its employees' knowledge absorptive capability. In order to continue to innovate, a company should develop a knowledge-sharing platform that allows the organization to acquire, exchange, and apply knowledge, allowing employees to acquire new knowledge, concepts, and/or technology.

A higher level of organizational innovation climate leads to an enhanced positive correlation between market-orientation and innovation-behavior. In other words, an organization that supports and encourages employees and give them autonomy and appropriate pressure would have better innovation-behavior. As pointed out in the study by García et al. (2008), a company that conducts cross-departmental integration enjoys better values, time, and product performance; in other words, under a better organizational climate, R and D departments can save time and develop new products. Therefore, besides valuing external market and environmental changes, a company must also value its internal cross-departmental integration and organizational climate in order to improve its innovation-behavior and innovation performance.

Conclusion

The "CEO Survey" by IBM indicates that the most efficient ideas in the business world come from "business partners" and "customers," taking up more than 70%. This shows that a company should create an innovative organizational culture, value the relationship between internal and external knowledge and information, effectively collect market information and application, including the understanding of customers' needs, competitors'

Table 2. Regression analysis of the absorptive capability on market-orientation and innovation-behavior.

Variable	Exploration			Contemplation			Research			Implementation			Application		
	Model 1	Model 2	Model 3	Model 1	Model 2	Model 3	Model 1	Model 2	Model 3	Model 1	Model 2	Model 3	Model 1	Model 2	Model 3
Number of R and D	-0.51***	-28***	-27***	-0.26***	-0.07	-0.03	-0.21***	-0.07	-0.03	-0.25***	-0.01	0.03	-0.17*	0.01	0.04
Knowledge-acquisition		0.18*	-0.14		0.22**	-0.82***		0.11	-0.82***		0.23***	-0.83***		0.09	-0.70***
Market-orientation		0.22**	-0.02		0.07	-0.72***		0.15*	-0.56***		0.18*	-0.62***		0.25**	-0.34**
Knowledge-acquisition × market-orientation			0.06*			0.20***			0.18***			0.20***			0.15***
R ²	0.19***	0.39***	0.40***	0.06***	0.21***	0.43***	0.06***	0.18***	0.40***	0.05***	0.26***	0.46***	0.03*	0.21***	0.34***
F-value	48.86***	42.44***	33.93***	13.88***	17.74***	39.97***	11.78***	15.05***	35.80***	10.58***	23.91***	42.46***	5.94*	17.47***	25.77***
Number of R and D	-0.51***	-0.33***	-0.32***	-0.26***	-0.14*	-0.11	-0.21***	-0.10	-0.08	-0.25***	-0.08	-0.06	0.04***	0.04***	0.03*
Knowledge absorption		0.02	-0.46*		0.07	-0.99***		0.05	-0.84***		0.08	-0.77***		0.01	-0.68***
Market-orientation		0.37***	-0.04		0.23**	-0.70***		0.21***	-0.56***		0.33***	-0.41*		-0.07	-0.53**
Knowledge absorption × market-orientation			0.10**			-0.23***			0.19***			0.18***			0.15***
R ²	0.19***	0.37***	0.39***	0.06***	0.18***	0.32***	0.06***	0.18***	0.31***	0.05***	0.24***	0.31***	0.25***	0.25***	0.31***
F-value	48.86***	39.29***	32.38***	13.88***	14.60***	24.04***	11.78***	14.26***	22.43***	10.58***	20.69***	22.98***	69.54***	23.11***	22.85***
Number of R and D	-0.51***	-28***	-0.26***	-0.26***	-0.09	-0.02	-0.21***	-0.05	0.01	-0.25***	0.00	0.07	0.04***	0.04**	-0.01
Knowledge-conversion		0.36***	0.00		0.36***	-0.61***		0.34***	-0.55***		0.49***	-0.54***		0.17	-0.61***
Market-orientation		0.06	-0.36*		-0.05	-1.2***		-0.06	1.12***		-0.07	-1.29***		-0.17	-0.83***
Knowledge-conversion × market-orientation			0.08**			0.22***			0.01***			0.24***			0.20***
R ²	0.19***	0.42***	0.44***	0.06***	0.23***	0.50***	0.06***	0.24***	0.54***	0.05***	0.33***	0.59***	0.25***	0.27***	0.43***
F-value	48.86***	47.72***	40.06***	13.88***	20.20***	50.03***	11.78***	21.22***	58.85***	10.58***	32.44***	71.39***	69.54***	24.78***	37.43***
Number of R and D	-0.51***	-0.30***	0.28***	-0.26***	-0.11	-0.06	-0.21***	-0.06	-0.03	-0.25***	-0.04	0.011	0.04***	0.04**	-0.01
Knowledge-use		0.32***	-0.07		0.28***	-0.60***		0.30***	-0.47***		0.34***	-0.58***		0.26***	-0.44***
Market-orientation		0.15*	-0.38*		0.08	-1.13***		0.03	-1.03***		0.14 [†]	-1.12***		-0.19 [†]	-0.85***
Knowledge-use × market-orientation			0.10***			0.22***			0.19***			0.23***			0.18***
R ²	0.19***	0.43***	0.47***	0.06***	0.23***	0.49***	0.06***	0.26***	0.53***	0.05***	0.30***	0.55***	0.25***	0.31***	0.45***
F-value	48.86***	50.31***	44.60***	13.88***	20.06***	48.82***	11.78***	23.51***	56.49***	10.58***	29.01***	61.02***	69.54***	29.56***	41.40***

1. + p < 0.10; *p < 0.05; **p < 0.01; *** p < 0.001; (N = 206).

Table 3. Regression analysis of organizational innovation climate on market-orientation and innovation-behavior.

Predictor variable	Exploration			Contemplation			Research			Implementation			Application		
	Model 1	Model 2	Model 3	Model 1	Model 2	Model 3	Model 1	Model 2	Model 3	Model 1	Model 2	Model 3	Model 1	Model 2	Model 3
Number of R and D	-51***	-0.33***	-0.31***	-0.26***	-0.13	-0.09	-0.21***	-0.10	-0.06	-0.25***	-0.07	-0.02	-0.17*	-0.02	0.02
Organizational encouragement		0.11*	-0.27*		0.16**	-0.70***		0.13**	-0.64***		0.20***	-0.82***		0.09 ⁺	-0.65***
Market-orientation		0.29***	-0.09		0.14*	-0.73***		0.14*	-0.64***		0.21**	-0.81***		0.26***	-0.50***
Organizational encouragement × Market-orientation			0.08**			-0.18***			0.16***			0.21***			0.16***
R ²	0.19***	0.38***	0.41***	0.06***	0.21***	0.40***	0.06***	0.20***	0.40***	0.05***	0.28***	0.51***	0.03*	0.21***	0.36***
F-value	48.86***	41.65***	35.20***	13.88***	18.02***	33.49***	11.78***	16.98***	33.68***	10.58***	25.94***	51.56***	5.94*	18.16***	28.50***
Number of R and D	-0.51***	-0.35***	-0.35***	-0.26***	-0.15*	-0.14*	-0.21***	-0.11 ⁺	-0.10*	-0.25***	-0.08	-0.07	-0.17*	-0.02	-0.02
Group support		0.26***	-0.10		0.12	-0.83***		0.10	-0.74***		0.03	-0.98***		0.02	-0.77***
Market-orientation		0.20***	-0.32 ⁺		0.19**	-1.18***		0.18**	-1.03***		0.36***	-1.110***		0.32***	-0.81***
Group support × Market-orientation			0.09***			0.24***			0.21***			0.25***			0.19***
R ²	0.19***	0.41***	0.44***	0.06***	0.18***	0.44***	0.06***	0.18***	0.44***	0.05***	0.23***	0.48***	0.03*	0.20***	0.38***
F-value	48.86***	46.73***	39.51***	13.88***	15.22***	39.31***	11.78***	14.94***	40.20***	10.58***	20.29***	46.45***	5.94*	16.85***	31.19***
Number of R and D	-0.51***	-0.31***	-0.30***	-0.26***	-0.11	-0.08	-0.21***	-0.07	-0.05	-0.25***	-0.04	-0.02	-0.17*	0.01	0.03
Work autonomy		0.36***	0.01		0.41***	-0.81***		0.38***	-0.70***		0.46***	-0.82***		0.40***	-0.58***
Market-orientation		0.17*	-0.21		0.04	-1.31***		0.02	-1.18***		0.11	-1.30***		0.10	-0.99***
Work autonomy × Market-orientation			0.07*			0.25***			0.23***			0.27***			0.20***
R ²	0.19***	0.43***	0.44***	0.06***	0.27***	0.46***	0.06***	0.28***	0.48***	0.05***	0.33***	0.52***	0.03*	0.30***	0.43***
F-value	48.86***	50.35***	39.56***	13.88***	24.38***	42.11***	11.78***	26.18***	46.18***	10.58***	33.84***	53.36***	5.94*	28.37***	37.41***
Number of R and D	-0.51***	-0.33***	-0.29***	-0.26***	-0.13 ⁺	-0.11	-0.21***	-0.09	-0.07	-0.25***	-0.05	-0.03	-0.17*	-0.01	0.00
Job stress		-0.04	0.82***		-0.08 ⁺	0.34 ⁺		-0.07 ⁺	0.34*		-0.16**	0.33 ⁺		-0.08 ⁺	0.03
Market-orientation		0.37***	0.83***		0.25***	0.47***		0.23***	0.44***		0.33***	0.59***		0.31***	0.37***
Job stress × Market-orientation			-0.16***			-0.08*			-0.08**			-0.09**			-0.02
R ²	0.19***	0.37***	0.45***	0.06***	0.19***	0.21***	0.06***	0.18***	0.21***	0.05***	0.27***	0.30***	0.03*	0.21***	0.21***
F-value	48.86***	39.70***	41.29***	13.88***	15.54***	13.44***	11.78***	15.14***	13.59***	10.58***	25.44***	21.71***	5.94*	18.06***	13.62***

1.+p < 0.10; *p < 0.05; **p < 0.01; *** p < 0.001; (N = 206).

actions, adjustment of internal departments, and cross-departmental collaborations in order to flexibly react to the changing market, achieve innovative values, and improve innovation-behavior.

Therefore, in order to efficiently apply knowledge, a company must work on the communication skill and value the accumulation of knowledge. In order to stay competitive, the manufacturing industry's priority is to improve organizational R and D capacity. Therefore, a company should actively invest in R and D, treat the absorptive capability as a key objective, and regularly hold training in order to improve employees' absorptive capability.

Under a high level of organizational innovation climate, market-orientation and innovation-behavior are significantly increased. The manufacturing industry should create a good "innovation climate" by encouraging and supporting employees' innovative concepts and providing them with job autonomy and resources. As a result, R and D staff would be able to engage in innovation under the innovative climate and develop new products for the organization, ensuring the endless manifestation of employees' innovation-behaviors and ideas.

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