

# *Customer Knowledge Management and Its Impact on Enterprise Product Innovation Performance*

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**Keywords:** Product or technical customer knowledge, System-level customer knowledge, Strategic customer knowledge, Marketing dynamic capability, Product innovation performance

**Abstract:** From the perspective of organization market, this paper mainly studies the relationship between customer knowledge management and enterprise product innovation performance, explores the intermediary role of marketing dynamic capabilities between the two, and builds a theoretical framework of customer knowledge management-Marketing Dynamic Capability—Product Innovation Performance. Based on the empirical research of enterprise-based high-tech industry, this paper shows that three dimensions of customer knowledge have positive and significant impact on product innovation, but at different levels, and it also shows that marketing dynamic capability plays an intermediary role in customer knowledge management capability and product innovation performance.

## **1. Introduction**

In the era of the knowledge economy, many enterprises start to realize that only meeting customers' needs and investing in customer relationship management is far from enough. Since customer knowledge is a kind of unique, inimitable, valuable strategic resource, which can be used to gain competitive advantage, it is necessary for enterprises to improve the level of customer knowledge management <sup>[1]</sup>. Moreover, the value which is created for customers and the way how to deliver the value to customers should be constantly changing with the dynamic marketing environment. Some researchers believe that customer knowledge process is the key factor for the product innovation. Sanchez and Elola note that the creativity in finding the opportunity of market comes from the process of customer knowledge management. Many scholars have studied the importance of corporate use of external knowledge sources in the innovation process which can improve their competitive advantage and innovation performance <sup>[2]</sup>. For example, Mowery, Oxley and Silvermanc point out it is significantly important to acquire new technical knowledge through interaction with external groups (such as customers, competitors, partners, etc. ) in the innovation process <sup>[3]</sup>. Zhang Hongqi and Lu Ruoyu have made an empirical study of the impact of customer knowledge management on service innovation ability, which finds that customer knowledge management in customer participation has a significant impact on the business service innovation capability <sup>[4]</sup>. Customer Knowledge Management focuses on reshaping corporate value which will positively affect the performance of the product <sup>[5]</sup>. As product homogeneity is increasingly evident

in the market, Customer knowledge is an important resource for enterprise to deal with the dynamic changes in marketing environment, promote the sustainable development of enterprises, enhance the core competitive advantage, and to pursuit enterprise innovation performance. Therefore, managing customer knowledge and improving customer response speed can significantly enhance the company's marketing strength. In addition, it is necessary to have the ability to innovate for the enterprise to achieve leapfrog development. Thus, based on the intermediary role of marketing dynamic capabilities, this paper will explore the relationship between customer knowledge management and enterprise product innovation performance.

## 2. The Theoretical Foundation and Research Hypotheses

The Researches on "customer knowledge" can be found in the early 1990s. Li and Calantone propose that customer knowledge is the organized and structured knowledge accumulated from customer data, information and experience, which is derived through analysis, systematic collation and verification in the process of communicating with customers and transactions <sup>[6]</sup>. Michael Gibbert <sup>[7]</sup> believes that customer knowledge is a dynamic combination of experience, value, situation information and expert insight in an interactive process between customers and companies, which can provide evaluation and absorption of new experiences and information. In the process of innovation, customer knowledge is a very important asset, which occupies the most important position in all customer value <sup>[8]</sup>. Therefore, the effective management of customer knowledge has an important strategic significance for the enterprises. Gibbert <sup>[7]</sup> believes that customer knowledge management is about how companies acquire and share tacit knowledge within the customer, which is a strategic process to enhance customer value and create competitive advantage through the use of these knowledge. Based on the research from a large number of enterprises, Smith and Mckeen<sup>[9]</sup> propose that customer knowledge management is the management of customer need knowledge, customer having knowledge, knowledge about customer, and knowledge creating with customer. Shang Xiaoyan, Wang Yonggui (2015) <sup>[10]</sup> develop Hong and Nguyen's <sup>[11]</sup> idea of classifying the knowledge, and improve the structure of customer knowledge through empirical analysis to verify the constructing organization market customer knowledge of three-dimensional model, which includes product and technical customer knowledge, system-level customer knowledge, and strategic customer knowledge.

Dynamic capability based on RBV combined with marketing capability based on knowledge-based view, is one of the key paths to realize the structure of the polymer. In recent years, marketing scholars continue to promote researches on marketing dynamic capabilities based on Dynamic Capabilities Theory. Fang and Zou <sup>[12]</sup> first propose the concept of "marketing dynamic capability" in the study of enterprise management performance, and define it as the response and efficiency of the enterprise to create and deliver customer value in response to market changes ". Based on the view of the process, Xu Hui, Li Wei and Wang Liang <sup>[13]</sup> define marketing dynamic capabilities as the enterprise to marketing related assets and knowledge of dynamic integration and configuration to create and deliver customer value, and ultimately to obtain and maintain the competitive advantage of high reactivity and high efficiency organizational process".

From the constitutive dimension perspective, Li Wei(2015) <sup>[14]</sup> defines marketing dynamic capability as enterprises' integrated organization process to establish, link and configure market resources, so as to identify, create and deliver customer value, and to build an integrated scale encompassing market perception (including environmental scanning and knowledge absorption), interface interoperability (flexible decision-making and coordination functions), customer responsiveness (marketing communications and channel integration).

Product innovation performance refers to the profit and market reaction after the company's

products innovations being introduced to the market. (Gima, Slater, and Olson, 2005). Generally speaking, product innovation performance can be measured by the degree of innovation gain and the degree of its commercialization. Moreover, HanYi <sup>[15]</sup> regards the product innovation performance can be analysed from the individual level and enterprise level, the former is the creation of innovative and feasible ideas, while the latter is a set of ideas and planning for achieving high value and commercial rate.

Literature review shows that there are few studies on the combination of customer knowledge management capability, marketing dynamic capability, and product innovation performance <sup>[16]</sup>. In the existing literature, there have been some research results <sup>[17-19]</sup> about customer knowledge affecting enterprise performance and empirical studies about marketing dynamic capability and enterprise performance <sup>[20]</sup>. Thus, this paper explores the relationship between organizational customer knowledge management and product innovation Performance, with the marketing dynamic capability being a mediating variable. The research framework to be constructed is shown in Figure 1.

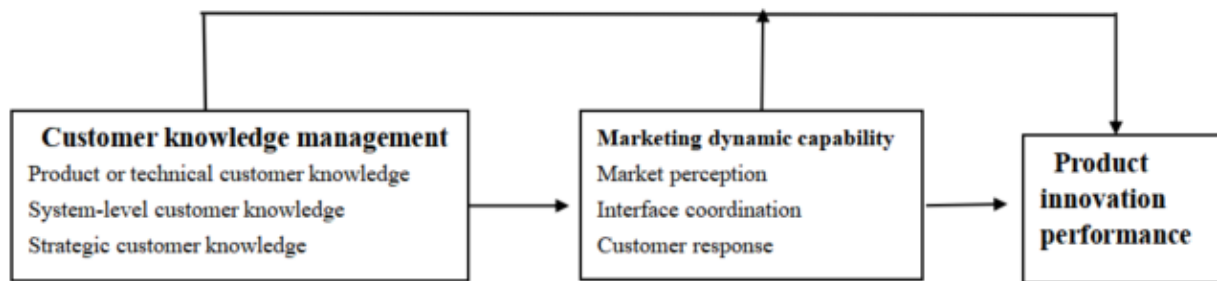


Figure 1: Research Framework

## 2.1 Customer Knowledge Management and Product Innovation Performance

Since the customer knowledge has become one of the important external resources to gain competitive advantage, more enterprises have applied customer knowledge to enterprise innovation activities, especially in the process of product innovation. Gibbert <sup>[7]</sup> points out that if customers can fully share their "successful" or "failed" experience and knowledge with enterprises which can actively participate in the product innovation process, they will achieve a win-win situation. Weiss <sup>[21]</sup> takes the global famous companies Google and E-bay as an example and proposes that the effective management of customer knowledge will make the company's products more creative. Murschetz <sup>[22]</sup> points out that if customers fully participate in every aspect of product innovation value chain and even become the company's knowledge partners, they can significantly boost the innovation and quality. Joshi & Sharma <sup>[23]</sup> do empirical research on the role of customer knowledge development in the new product development process, and make the conclusion that customer knowledge development can significantly improve the ability of its new product development performance. Customer knowledge in product level requires enterprise to master the knowledge of customers' perception of the technology, product and service, and their preferences about product innovation, service optimization, competitive products and other knowledge, which enables to enterprises to acquire customers' needs and value, to assist enterprise product improvement and innovation, and to create better customer value. System-level customer knowledge refers to the knowledge of customer purchasing decision and purchasing process, which requires the marketing staff to implement a unique strategy for the participants, buyers and decision makers. This kind of customer knowledge acquisition needs a long-term communication and understanding between the marketing staff and the team in order to achieve the win-win goal of smooth sales and customer satisfaction. Gordon <sup>[24]</sup> points out that the customer knowledge such as

customer's competitors, the customer's differentiation strategy, market positioning and long-term vision, customer marketing strategy, and the relationships between customer and other suppliers, is extremely difficult to obtain due to the fact that such information exists in the minds of senior managers, which is very important for enterprises. As a result, the strategic level of customer knowledge requires companies to adjust marketing strategy timely, to respond market changes effectively, and to promote product innovation performance. Thus the study hypothesised that:

H1: Customer knowledge has a positive impact on product innovation performance

H1a: Customer knowledge of product and technology has a positive impact on product innovation performance

H1b: System-level customer knowledge has a positive impact on product innovation performance

H1c: Customer knowledge in strategic level has a positive impact on product innovation performance

## **2.2 Customer Knowledge Management and Marketing Dynamic Capabilities**

Marketing dynamic capability as a specific form of dynamic capabilities in the field of marketing functions effectively focuses on the allocation and integration of market related resources, and better adapts to the evolution of the competitive environment through market perception, interface coordination, customer response to create and deliver customer value. Zhang Rui et al. (2008) [22] carries out an empirical research on Chinese equipment manufacturing enterprises and the conclusion shows that the ability of customer knowledge management positively affects the ability of market. If the enterprise obtains sufficient product-level customer knowledge, it can rapidly adjust the changing market in time, identify the direction of product improvement or innovation, explore new market opportunities and customer demands, and improve the dynamic capability of market. Being highly implicit, the system-level customer knowledge is difficult to obtain, so it needs long-term communication and exchange between business marketing personnel and participants, buyers, decision makers in the process of customer purchasing, coupled with coordination of the organization's internal development, manufacturing, finance and other key functional departments in ideas and actions, so as to design sales program to meet customers' needs, and to get the customer's positive response in sales support and after-sales service. The strategic level of customer knowledge involves customer's competitors and customer's differentiation strategy, market positioning and long-term vision, customer marketing strategy, which requires companies to have been market-conscious, to take full account of the customer's real needs in making a strategic design, which can significantly enhance the enterprise's marketing dynamic capability. Thus the study hypothesised that:

H2: Customer knowledge has a positive effect on the construction of marketing dynamic capabilities

H2a: Customer knowledge of product and technology level has positive influence on the construction of marketing dynamic capability

H2b: Customer knowledge of system level has positive impact on the construction of marketing dynamic capability

H2c: Strategic-level customer knowledge has a positive impact on the construction of marketing dynamic capabilities

## **2.3 Marketing Dynamic Capability and Product Innovation Performance**

The enterprise capability theory points out that the main reason of the performance variation between enterprises lies in their different capabilities. Dynamic capability based on the

resource-based view focuses on explaining how to get the competitive advantage in the external environment and how to obtain high level performance. Eisenhardt and Martin (2000) points out that the ability to adapt to the environment of resource reconfiguration helps enterprises to obtain sustainable competitive advantage. Marketing dynamic capability as a specific form of dynamic capabilities in the field of marketing functions effectively focuses on the allocation and integration of market related resources, and better adapts to the evolution of the competitive environment through market perception, interface coordination, customer response to create and deliver customer value. From the constitutive dimension perspective, Li Wei (2015) <sup>[14]</sup> defines marketing dynamic capabilities as enterprises' establishing, linking and configuring market resources, to identify, create and deliver customer value of integrated organization process. Moreover, the innovative products, as the direct embodiment of the enterprise's competitive advantage is more intuitive to reflect the customer value maximization, which helps to enhance the enterprise product innovation performance. Hence the study hypothesized that:

H3: The construction of marketing dynamic capabilities has a positive impact on the product innovation performance

## 2.4 The Intermediary Role of Marketing Dynamic Capability

Enterprise knowledge is an important resource for enterprise to use and rich reserve of knowledge is the foundation of product innovation activities, which contains both their own system of the original knowledge and external knowledge involving customers, partners, competitors etc. . In fact, customer knowledge gained through the development of the enterprise has been incorporated into the category of enterprise knowledge, and has become a part of the enterprise knowledge system, offering service for business management. Mowery, Oxley, etc. , note that it is important for companies to obtain new technical knowledge through interacting with external parties (such as customers, competitors, partners, and so on) in the process of innovation <sup>[23]</sup>. The enterprises develop and smoothly transform customer knowledge into commercially valuable product output, which is inseparable from the role of enterprises to build highly efficient marketing processes. The enterprise marketing dynamic capability not only implies the dynamic ability to emphasize the enterprise to adapt to the environment evolution process, but also highlights the marketing process of the customer knowledge, the development of knowledge, with an aim to master target customer demand, and centers around customer value in pricing, advertising, and integrating marketing activities. The purpose of building marketing dynamic capability is to make more efficient coupling and allocation of resources, especially the management of customer knowledge resources, to enhance the ability of enterprises to respond to market changes. And the core value concept is to create and deliver more customer value and to improve product performance. Hence, the study hypothesized that:

H4: Marketing dynamic capability in customer knowledge management plays an intermediary role in the impact of enterprise product innovation performance.

H4a: The construction of marketing dynamic capability has the intermediary effect on the customer knowledge of the product level and the innovation performance of enterprise products.

H4b: The construction of marketing dynamic capability has a mediating effect on the customer knowledge of the system level and the innovation performance of enterprise products.

H4c: The construction of marketing dynamic capability has a mediating effect on the strategic level of customer knowledge and the innovation performance of enterprise products.

### 3. Research Design

#### 3.1 Research Samples

Reasonable questionnaire design is related to the value of the research content, and to a certain extent ensures the reliability and validity of the scale. On the basis of strict theory, the maturity scale of the used in the domestic and foreign documents is adopted, and it should be adjusted according to the actual need. The measurement of the variables should be set to multiple items, which is easy to measure subjects' attitude and opinion (Li Huaizu, 2004) <sup>[24]</sup>. The questionnaire is about four parts: basic information, customer knowledge management, marketing dynamic capability, and product innovation performance. The scale of customer knowledge management uses the developed maturity scale of Shang Xiaoyan and Wang Yonggui (2015). The scale of marketing dynamic capability is the main content of Li Wei's (2015), which is cut according to the actual needs. Product innovation performance scale Integrates Lin, Chen (2006) <sup>[25]</sup>, Gima, Slater, and Olson's (2005) scale to form four measurement items. The questionnaire was used high frequency Likert 5 levels of Scale, which was from 1-5 followed by "strongly disagree, disagree, in general, agree, and strongly agree", and let the subjects choose according to the actual circumstance of the enterprise.

The questionnaire survey objects of the target enterprises are the high-tech industries, and the respondents are mainly from the company's top management. The survey method is the scene and network synchronization, and the main objects of the scene investigation are MBA students (working in the enterprise) from the author's university and acquaintances' universities. The network survey sent electronic version of the questionnaire via e-mail to the specified respondents, which is also gathered around the teacher, relatives and friends' power. Due to the advance telling, the final effect is good. In the end, a total of 328 questionnaires were distributed, and 235 questionnaires were collected. After Preliminary analysis of the collected questionnaire, 53 copies were removed. The effective questionnaires were 182, and the effective rate was 55. 49%.

#### 3.2 Defining Variables and Measurement

In this paper, the scale of measuring customer knowledge is based on the researches of Hong and Nguyen (2009), Shang Xiaoyan, Wang Yonggui (2015). Besides, the three dimensions of customer knowledge: product or technical customer knowledge, system-level customer knowledge, and strategic level customer knowledge are measured by Li Kite's (Scale Liket) 5-level scale. Product or technical level of customer knowledge can be measured from "Our company is very clear about customer's evaluation of our products or services ", "Our company is very clear about the requirements to improve our existing products or services ", "Our company is very clear about the development requirements to our new product or service ". System-level customer knowledge can be measured from four aspects: "Our company is very clear about the customer's procurement decision-making process", "Our company is very clear about the relationship between customer's procurement decision-making and departments," "Our company is very clear about which departments affect customer's procurement decision-making", "Our company is very clear about the selection criteria of customer's purchasing new products or services". Strategic level customer knowledge can be measured from five aspects: "Our company fully understands the customer's development goals and strategy", "Our company fully understands customers in the target market ", "Our company fully understands the industry's competitive position of customers ", "Our company fully understands the relationship between customers and the other suppliers", "Our company fully understands customer's evaluation of brand competition of our product or service ".

This paper is to measure the scale of marketing dynamic capability (2015) from Li Wei's (2015)

constitutive perspective and it constructs market perception, interface interoperability, customer responsiveness three sub-capacities on the basis of clearing the concept of marketing dynamic capability. According to actual needs, the measured items have been cut to 9 finally, followed by "Enterprise makes periodical evaluation of customer and competitor ", "Key market information in different departments of the enterprise can be effectively spread and shared", "Important market information can be quickly transmitted to the top managers", "Managers at all levels have a certain market decision-making power", "Important enterprises in the implementation of marketing decisions can be adjusted according to the environmental transformation", "Marketing department can effectively cooperate with other key departments ", "Enterprise can accurately transfer the information of product and market to target customers", "Enterprise can utilize a variety of media to carry out marketing communications", " In this industry, the time of developing and marketing product is relatively short ".

Product innovation performance of the scale integrates Chen, Lin (2006) [25], Gima, Slater, and Olson's (2005) measurement indicators, and is measured from "product innovation increases market share", "product innovation leads to increased profits ", " product innovation can meet market demand", "compared with its competitors, the company's product innovation has been successful".

### 3.3 Reliability and Validity of Samples

This paper uses the Cronbach's  $\alpha$  coefficient method to detect the reliability of the data, and to test the consistency of subjects' response to the entries in the table. The reliability value of the customer knowledge management scale is 0.873 > 0.70, and  $\alpha$  coefficient of each dimension are respectively 0.796, 0.799 and 0.705 and they are greater than 0.70, so the internal consistency of customer knowledge management ability's measuring data is higher. The overall  $\alpha$  value of measuring scale of marketing dynamic capability is 0.809, and the whole  $\alpha$  value of measuring scale of product innovation performance is 0.744, and the two values are both more than 0.70. This shows that the internal consistency of measuring data of the dynamic capability and product innovation performance is good.

The questionnaires of this research are previous scholars empirically measuring tools. The validity test can be obtained by factor analysis whether the structure of the scale is reasonable. The KMO value of the customer knowledge management capability is 0.915 (>0.70), and the Bartlett test results: the chi-square value is 692.109, and the value is large, which proves that the P value is less than 0.01, which is suitable for the factor analysis. The principal component analysis method is used to measure the scale of customer knowledge management capability, and the factor axis is carried out by using Varimax. There are three common factors' characteristic value is greater than 1. The total variance of the three factors is 63.082%, which is higher than 60%, so that the validity of the customer knowledge management capability is good. The KMO value of marketing dynamic capability measurement scale is 0.842 > 0.70. And the Bartlett ball test results: Chi-square value is 393.872, and the value is large. It is proved that the corresponding P value < 0.01, and Bartlett ball test of zero hypothesis is ruled out, so it is suitable for factor analysis and the validity of the structure is better. The KMO value of product innovation performance measurement scale is 0.728 > 0.70, and Bartlett ball test results: Chi-square value is 156.751, which proves that the corresponding P value < 0.01. Then it is suitable for factor analysis, and the validity of the structure is better.

### 4. Correlation Analysis

In order to understand the impact relationship among customer knowledge management, marketing dynamic capability and product innovation performance, this research uses correlation

analysis to study whether there are close relationships between the direction and size of customer knowledge management and marketing dynamic capabilities, between customer knowledge management and product innovation performance, between marketing dynamic capabilities and product innovation performance. As shown in Table 1.

Table 1: Correlation Analysis (Correlations)

		Product innovation performance	Marketing dynamic capability	Product or technical customer knowledge	System-level customer knowledge	Strategic customer knowledge
Product innovation performance	Pearson Correlation	1	.786**	.541**	.581**	.667**
	Sig. (2-tailed)		.000	.000	.000	.000
	N	182	182	182	182	182
Marketing dynamic capability	Pearson Correlation	.786**	1	.705**	.678**	.756**
	Sig. (2-tailed)	.000		.000	.000	.000
	N	182	182	182	182	182
Product or technical customer knowledge	Pearson Correlation	.541**	.705**	1	.720**	.681**
	Sig. (2-tailed)	.000	.000		.000	.000
	N	182	182	182	182	182
System-level customer knowledg	Pearson Correlation	.581**	.678**	.720**	1	.703**
	Sig. (2-tailed)	.000	.000	.000		.000
	N	182	182	182	182	182
Strategic customer knowledge	Pearson Correlation	.667**	.756**	.681**	.703**	1
	Sig. (2-tailed)	.000	.000	.000	.000	
	N	182	182	182	182	182

\*shows P value < 0.05, \*\* shows P value < 0.01.

#### 4.1 Correlation Analysis between Customer Knowledge Management and Marketing Dynamic Capabilities

The correlation coefficients among product or technical level customer knowledge, system level customer knowledge, strategic level customer knowledge and marketing dynamic capabilities are 0.705, 0.678, and 0.756. And the corresponding P value are all less than 0.05, so statistical significance is obvious, which proves that the product technical level customer knowledge, system level customer knowledge, strategic level customer knowledge and marketing dynamic capabilities have significant positive correlation. That is, the higher level of product or technical level customer knowledge, system level customer knowledge, and strategic level customer knowledge, and then marketing dynamic capability also becomes higher.



## 4.2 Correlation Analysis of Customer Knowledge Management Capability and Product Innovation Performance

The correlation coefficients among product or technical level customer knowledge, system level customer knowledge, strategic level customer knowledge and product innovation performance are 0.541, 0.581, and 0.667. And the corresponding P value are all less than 0.05, so statistical significance is obvious, which proves that the product or technical level customer knowledge, system level customer knowledge, strategic level customer knowledge and product innovation performance have significant positive correlation. Namely, the higher level of product technical level customer knowledge, system level customer knowledge, strategic level customer knowledge, and then product innovation performance is also higher.

## 4.3 Correlation Analysis of Marketing Dynamic Capability and Product Innovation Performance

The correlation coefficient between marketing dynamic capability and product innovation performance is 0.786, and the corresponding P value is less than 0.05, and the statistical significance is obvious. It is proved that marketing dynamic capability and product innovation performance have a significant positive correlation. That is, the higher level of marketing dynamic capabilities, and product innovation performance is correspondingly higher.

## 5. Regression Analysis

In order to further explore the relationship between customer knowledge management capability, marketing dynamic capability and product innovation performance, this study uses regression analysis to analyze the influence of product technical level customer knowledge, system level customer knowledge, and strategic level customer knowledge on marketing dynamic capability and product innovation performance.

### 5.1 The Analysis of Each Dimension's Impact of Customer Knowledge Management on Product Innovation Performance

This paper regards product or technical level customer knowledge, system level customer knowledge, strategic level customer knowledge as the independent variable, and product innovation performance as the dependent variable. The results of regression analysis are shown in Table 2.

Table 2: Overview of regression (Model Summary)

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.687 <sup>a</sup>	.472	.464	.40211

a. Predictors: (Constant), strategic level customer knowledge, product or technical level customer knowledge, system level customer knowledge.

The results of Table 2 show that the R value of the model is 0.687, and R square is 0.472, and the adjusted coefficient (adjusted R Square) is 0.464. The interpretation of the independent variable is 46.4% > 30%, so the interpretation of the model's independent variable is high.

Table 3 is the result of the independent variable dragged into the regression equation: when the regression equation contains different independent variables, F-value = 53.130, Sig. value is 0, which is significantly < 0.01, with a significant statistical significance. It states that regression model has significant practical significance.

Table 3: Model goodness of fit test (ANOVA)

Model	Sum of Squares	df	Mean Square	F	Sig.
1 Regression	25.772	3	8.591	53.130	.000 <sup>a</sup>
Residual	28.781	178	.162		
Total	54.553	181			

a. Predictors: (Constant), strategic level customer knowledge, product or technical level customer knowledge, system level customer knowledge.

b. Dependent Variable: product innovation performance.

Table 4: Results of regression analysis (Coefficients)

Model	Unstandardized Coefficients		Standardized Coefficients	t	Sig.	Collinearity Statistics	
	B	Std. Error	Beta			Tolerance	VIF
(Constant)	.660	.262		2.520	.013		
Product or technical customer knowledge	.178	.083	.178	2.029	.044	.421	2.373
1 System-level customer knowledge	.196	.091	.186	2.154	.033	.398	2.514
Strategic customer knowledge	.567	.096	.483	5.904	.000	.443	2.259

a. Dependent Variable: Product innovation performance.

The regression results in Table 4 show that: the regression coefficients of products or technical level customer knowledge, system level customer knowledge, strategic level customer knowledge are 0.178, 0.196, and 2.154, and T values are respectively 2.029, 0.567, 5.904, and the corresponding P values are:  $P < 0.05$ , which proves that products or technical level customer knowledge, system level customer knowledge, and strategic level customer knowledge have a positive impact on product innovation performance and have a significant impact. Namely, the higher level of product or technical level customer knowledge, system level customer knowledge, strategic level customer knowledge, and then product innovation performance is correspondingly higher. Thus, assuming H1a to H1c are all supported. At the same time, this research can establish the regression analysis equation: Product Innovation Performance =  $0.178 \times \text{products or technical level customer knowledge} + 0.196 \times \text{system level customer knowledge} + 0.567 \times \text{strategic level of customer knowledge} + 0.660$ .

## 5.2 The Impact Analysis of Various Dimensions of Customer Knowledge Management Capabilities on Marketing Dynamic Capabilities

Table 5: Overview of regression (Model Summary)

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
2	.805a	.649	.643	.26966

a. Predictors: (Constant), strategic level customer knowledge, product or technical level customer knowledge, system level customer knowledge.

This survey regards product or technical level customer knowledge, system level customer

knowledge, strategic level customer knowledge as the independent variable, and marketing dynamic capabilities as the dependent variable. The results of regression analysis show in Table 5:

The results in Table 5 show that the R value of the model is 0.805, and R square is 0.649, and the adjusted coefficient (adjusted R Square) is 0.643. It states that the interpretation of the independent variable is 64.3% > 30%, so the interpretation of the model's independent variable is high.

Table 6: Model goodness of fit test (ANOVA)

Model	Sum of Squares	df	Mean Square	F	Sig.
2 Regression	23.893	3	7.964	109.526	.000a
Residual	12.943	178	.073		
Total	36.836	181			

a. Predictors: (Constant), strategic level customer knowledge, product or technical level customer knowledge, system level customer knowledge.

b. Dependent Variable: marketing dynamic capabilities.

Table 6 is the result of the independent variable dragging into the regression equation: when the regression equation contains different independent variables, F-value = 109.526, Sig. value is 0.000, which is significantly less than 0.01, with a significant statistical significance. It states that regression model has significant practical significance.

Table 7: Results of regression analysis (Coefficients)

Model	Unstandardized Coefficients		Standardized Coefficients	t	Sig.	Collinearity Statistics	
	B	Std. Error	Beta			Tolerance	VIF
(Constant)	.761	.176		4.333	.000		
2 Product or technical customer knowledge	.233	.056	.284	4.155	.000	.421	2.373
System-level customer knowledge	.134	.061	.154	2.193	.030	.398	2.514
Strategic customer knowledge	.438	.064	.454	6.800	.000	.443	2.259

a. Dependent Variable: marketing dynamic capabilities.

The regression results in Table 7 show that: the regression coefficients of products or technical level customer knowledge, system level customer knowledge, strategic level customer knowledge are 0.233, 0.134, and 0.438, and T values are respectively 4.155, 2.193, and 6.800, and the corresponding P values are all: P < 0.05, which proves that products or technical level customer knowledge, system level customer knowledge, and strategic level customer knowledge have a positive impact on marketing dynamic capabilities and have a significant impact. Namely, the higher level of product technical level customer knowledge, system level customer knowledge, strategic level customer knowledge, and then the higher marketing dynamic capability they have. Thus, assuming H1a to H1c are all supported. At the same time, this research can establish the regression analysis equation: marketing dynamic capabilities = 0.233 \* product or technical level

customer knowledge + 0.134 \* system level customer knowledge + 0.438 \* strategic level of customer knowledge + 0.761.

### 5.3 The Impact of Marketing Dynamic Capability on Product Innovation Performance

This research regards marketing dynamic capabilities as the independent variable, and product innovation performance as the dependent variable. The results of regression analysis show in Table 8.

Table 8: Overview of regression (Model Summary)

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
3	.786 <sup>a</sup>	.618	.616	.34015

a. Predictors: (Constant), Marketing dynamic capability.

The results in Table 8 show that the R value of the model is 0.786, and R square is 0.618, and the adjusted coefficient (adjusted R Square) is 0.616. It states that the interpretation of the independent variable is 61.6% > 30%, so the interpretation of the model's independent variable is high.

Table 9: Model goodness of fitting test (ANOVA)

Model		Sum of Squares	df	Mean Square	F	Sig.
3	Regression	33.727	1	33.727	291.502	.000 <sup>a</sup>
	Residual	20.826	180	.116		
	Total	54.553	181			

a. Predictors: (Constant), Marketing dynamic capability.

b. Dependent Variable: Product innovation performance.

Table 9 is the result of the independent variable dragged into the regression equation: when the regression equation contains different independent variables, F-value = 291.502, Sig. value is 0.000, which is significantly less than 0.01, with a significant statistical significance. It states that regression model has significant practical significance.

Table 10: Results of regression analysis (Coefficients)

Model	Unstandardized Coefficients		Standardized Coefficients	t	Sig.	Collinearity Statistics	
	B	Std. Error	Beta			Tolerance	VIF
(Constant)	.207	.220		.942	.347		
3 Marketing dynamic capability	.957	.056	.786	17.073	.000	1.000	1.000

a. Dependent Variable: Product innovation performance.

The regression results in Table 10 show that: the regression coefficient of marketing dynamic capability is 0.957, and T value is 17.073, and the corresponding P values are all: P < 0.05, which

proves that marketing dynamic capability have a positive impact on product innovation performance and have a significant impact. That is, the higher level of marketing dynamic capability, and then product innovation performance is correspondingly higher. Thus, assuming H3 is supported. At the same time, this research can establish the regression analysis equation: product innovation performance = 0.957\*marketing dynamic capability+0.207.

#### 5.4 The Analysis of Marketing Dynamic Capabilities' Mediating Role Between Customer Knowledge Management Capability and Product Innovation Performance

To prove whether mediating variables--marketing dynamic capability for emotional commitment must meet four premises: Customer knowledge management will have a significant impact on product innovation performance, Customer knowledge management capability will have a significant impact on the marketing dynamic capability, Marketing dynamic capabilities will have a significant impact on product innovation performance, When it makes marketing analysis of the customer knowledge management capabilities and marketing dynamic capabilities, customer knowledge management capability will interfered by marketing dynamic capabilities, and the impact on product innovation performance becomes weak or disappear. Table 4, table 7 and table 10 have verified the first three premises, and table 11 analyzes the fourth premise.

Table 11: Results of regression analysis (Coefficients)

Model	Unstandardized Coefficients		Standardized Coefficients	t	Sig.	Collinearity Statistics	
	B	Std. Error	Beta			Tolerance	VIF
(Constant)	.028	.229		.121	.904		
Product or technical customer knowledge	-.116	.073	-.116	-1.589	.114	.384	2.603
System-level customer knowledge	.085	.077	.080	1.105	.271	.387	2.582
Strategic customer knowledge	.203	.090	.173	2.064	.055	.351	2.846
Marketing dynamic capability	.831	.093	.683	8.926	.000	.351	2.846

a. Dependent Variable: Product innovation performance.

When marketing dynamic capability is regard as a medium variable, the regression coefficient of customer knowledge management capability's each dimension has declined, and the P value is more than 0.05. Therefore, the effect of customer knowledge management capability on product innovation performance is not significant under the influence of marketing dynamic capability's mediating effect.

In summary, when customer knowledge management capabilities make regression analysis of the product innovation performance, the regression effect is significant. It shows that the customer knowledge management ability and the variable product innovation performance have obvious correlation. When adding the Mediator of marketing dynamic capabilities, the corresponding P values of each dimension of customer knowledge management capacities were greater than 0.05, and the regression effect was no longer significant. The marketing dynamic ability still have a significant positive impact on product innovation performance (P<0.001). This shows that the marketing dynamic capability plays an intermediary role in the dimensions of Customer Knowledge Management and Product Innovation Performance.

## 6. Conclusion

In this paper, the relationship between customer knowledge management and product innovation performance is analysed from the point of view of organization market, and the mediating effect of marketing dynamic capability on the above two is explored. To regard the high-tech industry enterprises as the main questionnaire survey object, this research verifies the above research framework. It is found that the three dimensions of customer knowledge in the enterprise have different effects on product innovation performance.

First, the impact of strategic level customer knowledge on product innovation performance is the most significant, which indicates that the customer knowledge in the top managers' mind, such as market positioning long-term vision, customer marketing strategy, relationships between customer and other suppliers, competitors and customer's own differentiation strategy, is very important for enterprises. Actually many companies believe that as long as they listen carefully to the needs of customers by the way to listen carefully about the needs of customers. In fact, companies usually just ask what the customers want. Unfortunately, customers often do not know what exactly they really want, even though they continue to put forward suggestions for improvement of the company's products. Therefore, the strategic level customer knowledge requires companies to have keen market perception, full consideration of the practical needs of customers to make strategic design, and effective response to market changes.

The second one system level customer knowledge requires the enterprise personnel impose a unique strategy for the customer purchase process of the participants, buyers, decision makers. The acquisition of this kind of customer knowledge requires long-term communication and understanding between marketing staff and organizational customers.

Finally, the product or technical level customer knowledge is easy for the enterprise to grasp the customer knowledge of current technology, product, service, product innovation, service optimization, competitive products and so on. Thus it can be found that the impact of three dimensions of customer knowledge on product innovation performance and the corresponding customer knowledge acquisition is inversely proportional.

The marketing dynamic capability of enterprise plays an intermediary role on the organizational customer knowledge and product innovation performance, which indicates that the enterprise's deep digging and utilization of product or technical customer knowledge, systematic knowledge, and strategic knowledge can enhance the dynamic capability of enterprise marketing, so as to improve the level of product innovation performance. The purpose of building marketing dynamic capability is to link more efficiently and to allocate resources, especially the management of customer knowledge resources, to enhance the ability of enterprises to respond to market changes. The core value concept is to create and deliver more customer value and improve product performance.

In addition, the study still has some limitations, due to the limited sample selection and quantity, so it needs further in-depth research hypothesis and testing theoretical arguments. Considering the influence of environmental characteristics and different background conditions between variables, and then there are differences among the researches on customer knowledge, so to explore the impact of different customer knowledge under different environmental characteristics mechanism on product innovation performance can be used as a future research direction. It needs further study of whether there are other intermediary variables or manipulated variables affecting the relations between organizational customer knowledge and product innovation performance, except marketing dynamic capabilities.

## References

[1] HE J. (2004), "Knowledge Impacts of User Participation: A Cognitive Perspective", *Computer Personnel Research*:

Careers, Culture, and Ethics in a Networked Environment, 1-7.

- [2] Qin Zhihua, Wang Dongdong, Zhao Jing (2014), "Effect Mechanism of External Knowledge Acquisition on Enterprise's Innovation Performance", *Technology Economics*, 33, (12): 1-6.
- [3] Mowery DC, Oxley JE, Silverman BS. (1996), "Strategic alliances and interfirm knowledge transfer", *Strategic Management Journal*, Winter Special Issue, 17: 77-91.
- [4] Zhang Hongqi, Lu Ruoyu (2012), "The Empirical Research of the Effect of Customer Knowledge Management on Service Innovation Capability", *Science of Science and Management of S. & T.*, 33, (8): 66-73.
- [5] Wang Hualin (2006), "The Research of the Performance Impact of New Products on Customer Knowledge Management", *Science & Technology Progress and Policy*, (8): 143-145.
- [6] Li T, Calantone R. J (1998), "The Impact of Market Knowledge Competence on New Product Advantage: Conceptualization and Empirical Examination", *Journal of Marketing*, 62, (4): 13-29.
- [7] Michael Gibbert, Marius Leibold, Gilbert Probst (2002), "Five styles of customer knowledge management, and how smart companies put them into action", *European Management Journal*, 20, (5): 459-469.
- [8] Rowley J E. (2002), "Reflections on customer knowledge management in e-business", *Qualitative Market Research*, 5, (4): 268-280.
- [9] Smith H A, McKeen J D. (2005), "Developments in practice xviii: Customer knowledge management: Adding value for our customers", *Communications of the Association for Information Systems*, 16:744-755.
- [10] Shang Xiaoyan, Wang Yonggui (2013), "Customer Knowledge and Enterprise Performance----Marketing Ability of the Intermediary Function Research", *Nanjing Business Review*, (6): 144-161.
- [11] Hong J. F. L. , Nguyen T. V. (2009), "Knowledge embeddedness and the Transfer Mechanisms in Multinational Corporations", *Journal of World Business*, 44, (4): 347-356.
- [12] FANG E. & ZOU S. (2009), "Antecedents and consequences of marketing dynamic capabilities in international joint ventures", *Journal of International Business Studies*, 40, (5): 742-761.
- [13] Xu Hui, Li Wei, Wang Liang (2011), "Market Knowledge Management and Formation of Marketing Dynamic Capabilities: A Case Study on Tianjin OTIS", *Chinese Journal of Management*, 8, (3): 323-331.
- [14] Li Wei (2015), "The concept and scale development of Marketing dynamic capabilities", *Business economics and management*, 28, (2): 68-77.
- [15] Han Yi (2007), "Model of Development and Empirical Study on Employee Job Performance Construct", *Journal of Management Sciences in China*, 10, (5): 62-75.
- [16] Shang Xiaoyan, Wang Yonggui (2015), "The Form and Measurement of Customer Knowledge System on the Organize Market ----Based on The Research of Chinese Companies", *Management Review*, 27, (2): 67-75.
- [17] Mou Chaolan (2015), "The Impact of Customer Knowledge on Technology Innovation Performance", *Science & Technology Progress and Policy*, 32, (7): 92-96.
- [18] Weiss L M, Capozzi M M, Prusak L (2004), "Learning from the internet giants", *MIT Sloan Management Review*, 45 (4): 79-85.
- [19] Murschetz P. (2013), "Customer Integration and Web Interactivity. A Literature Review and Analysis of the Role of Transaction Costs in Building Value Webs", *Handbook of Social Media Management*. Springer Berlin Heidelberg: 775-794.
- [20] Joshi, A W, Sharma, S. (2004), "Customer Knowledge Development: Antecedents and Impact on New Product Performance", *Journal of Marketing*, 68, (10): 47-59.
- [21] Gordon G. L, Calantone R. J, di Benedetto C. A, Kaminski P. F (1993), "Customer Knowledge Acquisition in the Business Product Market", *The Journal of Product and Brand Management*, 2(3): 23-35.
- [22] Zhang Rui, Wang Keyi, Xia Likun, Liu Youming (2008), "The Study on the Relationship Among The enterprise market knowledge ability, marketing ability and organization performance", *Journal of Dalian University of Technology (Social Science Edition)*, (29): 19-23.
- [23] Mowery DC, Oxley JE, Silverman BS. (1996), "Strategic alliances and interfirm knowledge transfer", *Strategic Management Journal*, Winter Special Issue, 17: 77-91.
- [24] Li Huaizu (2004), "Research Methodology for Management", *Xi'an Jiaotong University Press*, 1-346.
- [25] Lin BW, Chen C.J. (2006), "Fostering product innovation in industry networks: the mediating role of knowledge integration", *The International Journal of Human Resource*, 17(1): 155-173.