

# The mediating effect of personal KM among customer involvement and service innovation-based the case study of firm MB

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**Abstract—** How to implement service innovation for Chinese manufacturing firms by customer involvement is the key problem to transformation. Through the interview and questionnaire research in MB, the relationship among customer involvement, personal KM and service innovation is investigated. The types and measurement indicators are proofed. The result indicates that personal KM can be classified into customer knowledge and customer relationship. Furthermore, the mediating effect of personal KM is investigated.

**Index Terms—** customer involvement; service innovation; personal KM; mediating mechanism

## I. INTRODUCTION

Developed countries pay much attention on the innovation of manufacture, while the researches on service innovation in China have more realistic significance. Firstly, Manufacturing is still the cornerstone of promoting the economic development of China. The ratio of manufacturing output in western developed countries is only 20% of GDP; however, it is 50 percent in China. Secondly, Chinese manufacture is in transitional period. On the one hand, manufacture has not had cost advantages for cost has increased. On the other hand, low level of technology leads that manufacture is concentrated in production link with low profit. According to smiling curve, to realize value promotion, service innovation extending to upstream and downstream could be the most effective way for transforming Chinese manufacturers[1]. The simultaneity of intangibility, production and consumption forces enterprise to obtain customer involvement to realize service innovation.

In the current study about customer involvement and service innovation, researchers analyze it from two aspects. Firstly, consumer's knowledge transfer is considered as the intervening mechanism of customer involvement and service innovation. For example, Zhang et.al (2007) thinks that customer involvement leads to their change of roles, which enhances customer's wishes of knowledge sharing. However, customer contact and service customization increase the uncertainty in service process. The pressure from customer and market makes enterprise have to understand customer, which enhances enterprise's wishes of knowledge acquisition [2]. From the human capital of customer perspective, Lu and Wang's empirical study (2009) indicated that customer

involvement influences service innovation by knowledge transferring and its contents, and in the service innovation process, the relationship between customer involvement influences service innovation is influenced by causal ambiguity and creative conflict. [3]. Secondly, the interrelation between customer involvement and employee's creation is analyzed. The empirical study of Zhang and Lu (2013) considers that customer involvement promotes the knowledge sharing between customer and employee, and then advances employee's service innovation [4].

Current study enriches our understanding of the relationship between customer involvement and service innovation, however there are some insufficient as follows. Firstly, from the point of the research content, realizing service innovation through the transferring of customer knowledge is mainly investigated, while knowledge management's effect on the relationship between customer involvement and service innovation is neglected. Secondly, from the point of the research's object, previous studies focused on service innovation in service industry, but the analysis of knowledge management about service innovation in manufacture is insufficient. Therefore, based on the perspective of service innovation in manufacture, this paper mainly analyses knowledge integration's effect on personal KM and service innovation via questionnaire about employee of manufacture. It's conducive to analyze service innovation in manufacture from the perspective of combining customer involvement and personal KM more comprehensively, and it supplies manufacture which is carrying out service innovation in the tense competitive environment with some enlightenments.

## II. THEORETICAL BACKGROUND

Researchers analyzed the role and the effect of customer in service innovation process from the perspective of co-production and co-creation successively.

### 2.1 Co-production

From the perspective of G-D Logic, product is the main unit of value creation while service is in a subordinative position. Co-production is a cooperative relationship built by enterprises and customers. Customers participate in a part of product R&D, production, control and so on. Customers share personal knowledge via communicating and interacting with employees. Meanwhile, they create new knowledge together with employees. Therefore, customers mainly play roles of providing knowledge and cooperation development in co-production [5-6]. KM includes knowledge about customers' demand, dynamics and the relationship between enterprises and customers. Customers developing production together with enterprises reduces development cycle of new

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production. Furthermore, customer involvement makes researching to be a co-creative process by enterprises and customers. Thus, enterprises intercoordinate with customers and solve problems together in co-creation, which contributes to product innovation obviously. When customers' degree of involvement is gradually improved, to avoid opportunistic behavior, enterprises set corresponding motivation mechanism to encourage customers to share their information and knowledge. It promotes product innovation. As the value contribution that service offers to enterprises continues to increase, market theory considers that customers not only participate in manufacturing processes but in service processes [7]. Enterprises encourage customers to involve in the processes of production and service actively [8]. Etgar (2008) thinks that co-production of service is that customers involve in the process of service production, thereby the productive efficiency of service is improved and service+ product becomes the unit of value delivery gradually [9]. Above all, The process of service production in manufacture exist two characteristics. 1) enterprise is still the main part of value creation. 2) the importance of customer reciprocity is neglected; enterprise income is emphasized but customer income is neglected.

**2.2 Co-creation**

Under the background of service dominant logic, the role and effect of customer has changed observably, which are transferred co-production into co-creation. Lusch and Vargo(2006) consider that co-creation contains two parts. The first one is "value creation". The value of service replaces the value of product. Product is just a carrier to realize value, i.e., it deliveries service to extract value [10]. The second one is "co-creation" [11]. In co-creation, customers don't accept product and service passively anymore. Oppositely, they become the dominant player of service. Co-creation of service is an interactive process of customers and enterprises, which includes involving in the design and manufacture of product and delivering service. Co-creation is a kind of high level creating behavior that customers involve in service and product. Creation Process is changed enterprise being main part into interaction between customer and enterprise. It means that customer is not a passive acceptor but an active participator. That is to say, customer is not only an information supplier but also a co-creator who can obtain and use information. The main distinction between co-production and co-creation is shown in the table below.

Table1 The difference between co-production and co-creation

	Co-production	Co-creation
value-creation	Extracting economic value Quality of product or service	Personalized experience creation
role of customers	Passive, a kind of resource	Information provider, value creator
customer involvement	bottom of value chain	repeated interactions
customer expectations	useble	Co-creating product or service
Main behavioral agent	Manager, employee	Customer, manager, employee
concern	Manufacture,	Customer and

creation	enterprise leading	enterprise leading	experience, KM Enterprise and customer
communication	listening to customers	Less formal communication	Interactive communication Formal and informal communication

**2.3 Personal KM**

From co-production to co-creation, the degree of customer involvement and KM's effect on service innovation increase gradually. Customer and enterprise establish an active mechanism for knowledge communication and share, by which customer can share knowledge timely. Consequently, enterprise can obtain the knowledge of market and customer in time. Creating, integrating and applying the knowledge from interacting with customer make manufacturing enterprise realize service creation, then value creation and establish continuous advantage of competing. Customer knowledge could be divided into three types. 1) Knowledge about customer. Knowledge, such as transaction record of customer, used product, personal preference, can be located online by Investigating. It is useful for enterprise to improve the quality of product and service designing. 2) Knowledge from customer. Knowledge comes from customer feedback. Customers' preference, originality, consumption experience contribute to design product and service for enterprises. 3) Knowledge for customer [12]. Enterprise provides customer with knowledge or knowledge share among customers, which is conducive to purchase or use service better for customers. For example, offer integrated information of disease and patients to patients. Personal KM is that individual constructs knowledge structure via tools and perfects it constantly. It's a process of gathering, absorbing and creating knowledge [13]. Existing researches only pay attention to how to obtain KM in the process of customer involvement. But the analysis of how to employ corresponding mechanism to integrate KM is deficient. Therefore, personal KM is a mediating mechanism to realize service innovation via customer involvement.

III. THE CASE STUDY

**3.1 The introduction to case company**

Enterprise MB, established in August 1999, integrates RF products development, production, sales and services into a whole. Its business area involves antenna, RF, and solution of wireless coverage, which belongs to national high-new technology industry. Enterprise MB offers relevant product and service to more than 30 countries and regions. Its customers mainly include two kinds. One is manufacturer of equipment and systems, and another one is network operator. Customers contain China Mobile, China Telecom, China Unicom, ZTE and foreign customers, such as Nortel Networks, Mexican Telecom. In recent years, profit of communication manufacturing is decreased and the market competition is increasingly fierce. Customers expect personalized products, value-added services, and complete solution. For enterprise MB, foreign □□ and Nortel Networks need it to supply comprehensive quality traceability system and domestic customers, such as China Mobile, China Telecom and China Unicom, urgently demand fast quotation and unique order- capture model. That is to say, manufacture

is transferred into personalized service industry increasingly obviously. In order to increase the efficiency of service transformation, MB pays attention to capturing customer knowledge and applying KM tools. So applying customer knowledge by managing employee knowledge is an important mechanism of offering a service-oriented solution.

**3.2 analysis results**

By interviewing a project manager in charge of China Mobile and Nortel Networks, this paper proposes that there are two behaviors when customers participate in co-creation. 1) Customer involvement behavior. It includes knowledge search, knowledge share, co-creation and service innovation. 2) Customer citizenship behavior. It includes timely customer feedback, customer reviews, service among customers and customers' patience (waiting for service patiently). Customer citizenship behavior increases customers' dependence on enterprises. Accordingly, customers share knowledge with enterprises actively, and then different departments of firms could share and integrate customer knowledge together, by which firms understand customer needs timely and adequately. Therefore, it's needed to manage personal knowledge to integrate knowledge of customer involvement for promoting service innovation.

Meanwhile, the results of interview indicate that customer involvement needs personal KM to realize service innovation. It's mainly shown in the following three aspects. 1) Via personal KM, enterprises integrate and apply customer knowledge about technology, service environment, service quality and so on. And then, service processes is improved and the cost of service is reduced. 2) Via personal KM, enterprises can improve and create service in time to promote customer perception quality. 3) Via personal KM, enterprises can promote ability of service innovation to shorten the period of service innovation. Compared with competitors, enterprise can quickly develop new service and timely make up program of integrating product and service. Therefore, customer involvement influences service innovation by personal KM.

**IV. THE QUESTIONNAIRES AND ANALYSIS RESULTS**

This paper design the questionnaire about personal KM based on interview and the study of Wilde (2011) [14]. It's shown in table 2.

**Table 2 The research question and illustration**

Question	Illustration
1 Customer knowledge that is needed to complete work is all offered by enterprise.	knowledge adoption, knowledge transfer
2 Customer knowledge of work tasks can be obtained from colleagues.	Receiving knowledge, changing theory into practice
3 Sharing customer knowledge in work initiatives	knowledge externalization
4 Partly depending on customer knowledge of colleagues in work.	socialization process
5 Independently making decision under his own responsibility	knowledge intemalization
6 Customer-knowledge base (data, technical paper, report, product catalogue) is important to work	knowledge integration
7 Existing management tool for	applicability of

customer relationship can offer sufficient information to daily work.

8	Existing management tool for customer relationship can offer relevant information outside of daily work.	applicability of additional customer knowledge
9	Having established nice customer relationship in daily work	Application of customer relationship
10	customer relationship influence the priority of job arrangement	Personal relationship among employees and customers
11	daily work depends on customer data provided by enterprise	Necessity of customer data
12	Depending on existing customer management tool for work	Dependent of CRM

This paper sets four scales instead of five scales in Likert scale for every question. The four scales are shown in table 3. Table 3 The implication of scales

serial number	1	2	3	4
implication	Never applying	Less applying	Mostly applying	Sufficiently applying

Respondents: 27 managers and 27 front-line people. Managers contain executive group and administrative support group; front-line people contain employees of product, market and customer service. There are 2 invalid questionnaires from managers and front-line people respectively. Thus, valid questionnaires are 10 and 25 from managers and front-line people respectively. Results of questionnaire are shown in table 4.

**Table 4 Results of questionnaire**

question classification	Subclass of problem	serial number	Average Score	
			managers	front-line people
Customer knowledge	utilizability	1	3.7	3.64
		2	3.5	3.64
		3	3.7	3.68
	dependability	4	3.0	3.04
		5	3.4	3.36
		6	3.3	3.28
Customer relationship	utilizability	7	3.0	3.32
		8	3.2	3.64
		9	3.2	3.4
	dependability	10	3.2	3.68
		11	3.1	3.6
		12	2.9	3.48

Results of questionnaire indicate that in the respect of customer knowledge, there is no significant difference between front line and TMT. It presents that both of them are similar in the dependence of customer knowledge in work. However, in the respect customer relationship, front line people get a higher score than manager. It indicates that the maintenance of customer relationship is established on the daily work of front-line people and customer relationship is important to front-line people.

Questionnaires indicate that personal KM is an extension of model SECI. Based on personal knowledge externalization, knowledge share and knowledge intemalization, enterprise can use customer knowledge and manage customer relationship well.

Enterprises need to establish the mechanism of personal KM from the following 4 aspects. 1) Recognizing customer knowledge needed by employees. In the process of customer involvement, enterprises can obtain knowledge by communicating with customers regularly, set up virtual community and mine customer knowledge. 2) Establishing and promoting the mechanism of knowledge share and holding formal and informal seminars regularly. 3) Keeping knowledge dependence among employees, task modularization and interdependence among modules. 4) Improving the using quality of knowledge management tools.

#### V. THE CONCLUSION

With the background of the service transformation in Chinese manufacturing industry, this paper is aimed at analyzing the mediating effect of personal KM among customer involvement and service innovation via case study method. Conclusions of the study are as follows. Firstly, the mediating effect of personal KM among customer involvement and service innovation is demonstrated by case study. Meanwhile, It summarizes the two dimensions of personal KM, i.e., customer knowledge and customer relationship. The former emphasizes the creation, share and application of knowledge. It is an extension of model SECI in customer involving in service innovation; the latter emphasizes the effect of customer relationship on knowledge application. Secondly, results of questionnaire indicate that compared with TMT, the effect of front-line people on the maintenance of customer relationship is more obvious, which reveals the importance of customer relationship for front-line people. Meanwhile, it reveals that enterprise should establish corresponding motivation mechanism to encourage front-line people to keep stable relationship with customers to promote service innovation.

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