

# **The relationship of innovation climate, knowledge ambidexterity and service innovation performance—based on exploratory cases study**

Rui Zhang

School of Computer and Information Engineering, Zhejiang Gongshang University  
ruizhang0110@gmail.com

Chunhua Ju

School of Computer and Information Engineering, Zhejiang Gongshang University  
juchunhua@gmail.com

## **Abstract**

The innovation climate and innovation ability are closely related. This paper focuses on how innovation climate affect service innovation performance. Based on literature review, theoretical hypothesis is presented and tested by case analysis. By interviewing and questionnaire survey, the study reveals the nature of research topic and proposes theoretical framework.

**Keywords:** Innovation Climate; Service Innovation; Knowledge Ambidexterity; Service Innovation Performance

## **INTRODUCTION**

Under influence of economic globalization, technological change and knowledge diffusion, R&D cycle has been shortened and R&D cost has been reduced continually in the enterprise, with great changes taken place to corporate innovation environment. Service innovation is an important innovation activity, increasingly becoming an effective way to jump out of the trap of productization, and to enhance their competitive advantage(Chesbrough,2011). In an open innovation environment, the competitive advantage of an enterprise not only comes from its internal subjects, but suffers from the impact of external subjects(Wei and Lu,2012).

On how the innovation climate formed by these subjects affects firm innovation performance there are always different opinions, and a consistent conclusion has not been drawn yet. Based on that, this paper carries out a research around such a basic problem as “how innovation climate affects service innovation performance”. Through exploratory cases study of four enterprises, it deeply explores the relationship between innovation climate and service innovation performance as well as the mechanism of action therein.

# **LITERATURE REVIEW**

## **Innovation Climate and Service Innovation Performance**

Innovation is a process, and the result of the interaction between various factors. The change in environment means a new threat or opportunity, so enterprises must keep adjusting their strategy and internal environment to achieve a good balance between environment and organization (Doloreux,2014). An organizational climate that supports innovation is closely related to organizational innovative capability, and systematic innovation is needed by long-term organizational development(Drucker,1998).

Innovation climate is used to represent team's emphasis on the value and specification of innovation(Anderson and West,1998); the advantages and disadvantages of organizational innovation climate have a close relationship with the level of organizational innovation ability(Wang and Zhu,2005). Innovation climate is a core foundation for innovation fostering, but there are still very few researches carried out from this viewpoint(Hogan and Coote,2013).

As an important factor that may influence and enhance corporate innovation performance, innovation climate has attracted increasing attention. In terms of the influencing factors of innovation climate, some researches are focused on the driving effect of external environment on innovation(Zeng et al. 2013), while some emphasize the impact of internal climate on innovation(Amabile et al.1996; Wang,2010;Somech and Drach-Zahavy,2013). With the proposal of open innovation, enterprise boundary has got increasingly fuzzier, and enterprise innovation has been increasingly influenced by internal and external innovation climates. For enterprise innovation, external and internal cultivation needs to be carried out, internal and external innovation elements need to be integrated together, for the reason that closed innovation will prevail without external innovation elements, while enterprise competitiveness will be lost if external elements are blindly applied(Jiang,2011). The previous single research perspective has severely restricted the scope and depth of the research on the influence of innovation climate on service innovation. Therefore, this paper takes enterprise as a research unit, and combines the external and internal climates together to create a trans-enterprise innovation climate to identify the impact of a multi-subject innovation climate on service innovation performance.

## **Innovation Climate and Knowledge Ambidexterity**

Innovation process is just a process in which knowledge is converted and utilized(Grant,1996). Innovation activity will create an environment for knowledge exchange and improve the innovation between intra-organizational staff. In turn, it will promote knowledge demand and improve the diversity of knowledge activities. Thus, there is a close relation between knowledge management and innovation activities(Lai et al. 2014).

Exploratory learning is focused on new knowledge acquisition, which helps enterprises acquire sources and bases for innovation by searching external new knowledge. Exploitive learning stresses the utilization and integration of the existing knowledge, which helps adjust the existing knowledge and process to adapt to the change of market and technology(Xu and Li,2013). The essence of these two kinds of learning is to match corporate inner resources with external resources by exploring new knowledge (knowledge exploration) and utilizing the existing knowledge (knowledge exploitation), to boost enterprise innovation capacity. Here, knowledge exploration and knowledge exploitation are comprehensively defined as knowledge ambidexterity. Therefore, this research holds that there is an important correlation between innovation climate and knowledge ambidexterity.

## Knowledge Ambidexterity and Service Innovation Performance

Enterprise's innovation activity is mainly manifested as the reintegration and creation of knowledge resources. The use of external knowledge has reduced the restrictions from enterprise inner resource shortage(Gupta et al. 2006). Exploratory knowledge can help enterprises use the changing environment conditions to meet the newly-presented market demands. Therefore, this study hypothesizes that knowledge ambidexterity has a positive impact on service innovation performance.

To sum up, this study introduces “knowledge ambidexterity”, an intervening variable, into the impact mechanism of innovation climate on service innovation performance, to explore whether innovation climate will act on knowledge ambidexterity to affect service innovation performance, as is shown in Figure 1:



Figure 1- Hypothetical Mechanism about the Relationship

## THE CASE ANALYSIS

According to the advice given by Yin(2012), multi-case study is carried out in this research, and data was collected through interview, questionnaire and second-hand data compilation in multiple forms from many channels in this study.

The basic profile of the four exploratory cases in this study is shown in Table 1. In order that the business information of the enterprises should be protected and their routines should be followed, their names are concealed and just denoted with an alphabetic code.

Table 1- Fundamental State of Enterprise

	<b>A</b>	<b>B</b>	<b>C</b>	<b>D</b>
<b>Founded in</b>	1993	1989	2006	2005
<b>Total staff</b>	6000	100	400	1000
<b>Nature of property right</b>	Private	Private	Joint venture	Foreign-funded
<b>R&amp;D department</b>	Yes	No	Yes	No
<b>Research personnel</b>	20	10	35	40
<b>Main business</b>	Express Storage distribution	Manufacture logistics Commerce logistics Consulting	Warehouse service Distribution service Express service	Transportation Distribution Warehouse Packaging Solutions

A preliminary analysis will be made of the data collected from each below. Afterwards, a qualitative analysis will be carried out on the innovation climate, knowledge ambidexterity and service innovation performance in each case, to obtain structured and encoded data information to further deeply analyze the relations between the variables.

## Innovation Climate

Innovation climate refers to enterprise's perception of the internal and external innovation environments, which then instructs or promotes the enterprise to generate an innovative behavior, to produce an environmental cognition of the innovation performance (Anderson and West,1998; Amabile et al.,1996; Somech and Drach-Zahavy,2013).

## External Innovation Climate

This paper defines innovation climate according to the internal and external perspective of enterprise boundary, treats external innovation climate as outside of enterprise boundary by reference to the studies made by Utterback(1971) and Su et al.(2010), and gathers the external environmental elements that have influences on enterprise innovation activities. Three dimensions, including policy climate(PC), competition climate(CC1) and cooperation climate(CC2), are used in the study to represent external innovation climate (Table 2).

*Table 2-External Innovation Climate of Enterprise*

	<b>Policy Climate(PC)</b>	<b>Competition Climate(CC1)</b>	<b>Cooperation Climate(CC2)</b>
<b>A</b>	The national and local supportive policy have a great influence, and can apply for tax preferences	often adjusts its strategic direction due to the impact of competitors and often launches new service products by market demand	Often cooperates with its customers, keeps a close relation with the suppliers, universities and research institutions.
<b>B</b>	can benefit from the standard policy management, but the policy and fund support is less	The horizontal competition is intense, and product similarity is high, but the competitors may support each other occasionally	share their information system with competitors; keeps a good private relation with supplier, has a university-industry cooperative relationship
<b>C</b>	doesn't feel much about policy support, hard to apply for tax preferences	Product similarity is high with the major competitors; rarely communicates and cooperates with the competitors	Always keeps in touch with associations, universities and research institutes, and has a close relation with customers
<b>D</b>	Can't feel policy impact, and never applies for tax preferences	Compete with the competitors, don't have obvious impacts on competitors	Has a good cooperative relationship with the suppliers and customers

## Internal Innovation Climate

Internal innovation climate is defined as existing within enterprise based on the studies made by Isaksen and Ekvall(2010) and Liu and Shi(2009). It is a common subjective cognition of the intra-organizational work environment or climate that affects innovative behavior, represented with organization support, task support and staff support (Table 3).

*Table 3-Internal Innovation Climate of Enterprise*

	<b>Organization Support(OS)</b>	<b>Task Support(TS)</b>	<b>Staff Support(SS)</b>
<b>A</b>	extensive training for staff; creative staff can get both mental and material rewards; it holds supporting activities for innovation regularly	specific and challenging task, task scheduling can help staff make the most of their strong points, and staff can manage time freely	respects the staff's creativity, encourages make innovations and express different views, share with each other
<b>B</b>	encourages to do advanced studies and take qualification tests, sets up an innovation fund	specific task, not challenging, arrange time freely, but they don't have strong creativity	each staff can make comments without restraint,brainstorming conference regularly
<b>C</b>	express opinions and ideas by the internal publication;	specific task, not challenging, can choose work and decide	encourages the subordinates to make innovations; the staff can

	rewards the staff that do some creative practice, not encourage the staff to go out study	work schedule in accordance with staff's interest	communicate with each other freely in the discussion area
<b>D</b>	Not encourage the staff to engage in advanced studies, not reward creative ideas of the staff	task sometimes non-specific, can finish work according to the leaderships' directives	rarely supports creative ideas; the staff just do their own work well, not communicate or share with each other

## Knowledge Ambidexterity

Knowledge ambidexterity refers to explore and exploit knowledge required for its innovation. Knowledge exploration refers to the explore new knowledge for diversity creation and enterprise boundary expansion; knowledge exploitation refers to utilize existing knowledge for new product and service. This is verified by the interview on each case, so enterprises' knowledge ambidexterity is measured with knowledge exploration(KR) and knowledge exploitation(KI) in this study. The data result is shown in Table 4.

*Table 4-Knowledge Ambidexterity of Enterprise*

	<b>Knowledge Exploration(KR)</b>	<b>Knowledge Exploitation(KI)</b>
<b>A</b>	often pays attention to external change, understands outside information quickly, often obtains advanced technologies from many external channels	can apply new technologies to the development of services and products rapidly, and the internal staff often discuss how to better use new external knowledge
<b>B</b>	gets related information from industry associations and exhibitions; gets a deep understanding of each customer in detail	pays attention to outside new products and considers how to utilize new knowledge, but can't transform new knowledge into new products
<b>C</b>	The circle of peers, QQ group and forum are the sources of main technical and market information, and pays attention to the changes of external environment.	can adjust enterprise strategy rapidly according to the emergence of the products outside of the industry, but not have enough ability to transform new knowledge into new products
<b>D</b>	gets information from the cooperation with suppliers, but sometimes the competitors can also get the similar information	insensitive to external change, but rarely transforms new knowledge into new products due to limited technological capabilities

## Service Innovation Performance

Service innovation refers to the development of a new service perceived as novel or helpful to key customers(Flint,et al. 2005). Here, service innovation is defined as that a service enterprise improves and changes the existing service process and service products by applying new ideas and technologies, to improve the existing service quality and efficiency, to create new values for customers, to finally form a competitive advantage.

Service innovation performance is manifested as financial and non-financial aspects; financial performance includes profit, sales volume; non-financial performance includes new customers, loyalty and competitive position(Avlontis et al. 2001; Thakur and Hale,2013). The service innovation performance of the four exploratory cases in this research is shown below (Table 5).

*Table 5-Service Innovation Performance of Enterprise*

	<b>Service Innovation Performance(SIP)</b>
<b>A</b>	always in the front ranks of the country and even world in terms of service innovation; develops new services rapidly; the marketing success rate is high;sales volume of new

	services occupies a very high proportion
<b>B</b>	customer satisfaction is high;has strong service innovation ability;new service development level is high; new service sales volume occupies a high proportion
<b>C</b>	has a weak development ability for new services;the sales volume of its new services doesn't occupy a high proportion of the total turnover
<b>D</b>	new products aren't so popular in the market;the sales volume of its new services doesn't occupy a high proportion of the total turnover

## Case Data Information Coding

On the basis of describing and analyzing the case data, this paper judged and graded innovation climate of each case, knowledge ambidexterity and service innovation performance in accordance with its actual situation, and invited the interviewees and experts to make a further review and amendment. Four grades——very good, good, so-so and poor——are used to denote the level of the cases' various indicators (Table 6).

*Table 6-Case Data Information Coding*

	<b>Innovation Climate</b>						<b>Knowledge Ambidexterity</b>		<b>SIP</b>
	PC	CC1	CC2	OS	TS	SS	KR	KI	SIP
<b>A</b>	Very Good	Very Good	Very Good	Very Good	Very Good	Very Good	Very Good	Very Good	Very Good
<b>B</b>	Good	Good	Good	Good	So-so	Very Good	Very Good	So-so	Very Good
<b>C</b>	So-so	Poor	So-so	So-so	So-so	Very Good	So-so	So-so	So-so
<b>D</b>	Poor	Poor	Poor	So-so	Poor	So-so	So-so	Poor	Poor

## RESEARCH HYPOTHESIS PROPOSE

All groups of variables of the four cases are compared, then the correlation and causality between the various variables, such as innovation climate, knowledge ambidexterity and service innovation performance, are generalized, and finally an initial research hypothesis is proposed.

## Innovation Climate and Knowledge Ambidexterity

### External Innovation Climate and Knowledge Ambidexterity

#### Policy Climate and Knowledge Ambidexterity

The policy climate is positively correlated to the knowledge exploration and knowledge exploitation from Table 6. For instance, A can master the dynamic industry information faster since it benefits from the supportive policy from the local government, and meanwhile it can apply the information to new service development rapidly. Since it is very hard for C to apply for tax preferences, C cannot get very useful new information and knowledge, so it doesn't has obvious superiority. Thus it can be seen that the external policy climate has a significant impact on enterprise's innovative behavior. Based on the above analysis, this study puts forward the following initial hypothesis:

H1: external policy climate has a positive influence on the knowledge exploration.

H2: external policy climate has a positive influence on the knowledge exploitation.

### **Competition Climate and Knowledge Ambidexterity**

It can be seen from Table 6 that the external competition climate is positively correlated to the knowledge exploration and knowledge exploitation. A often adjusts its strategic direction according to the impact from its competitors, launches corresponding service products in accordance with market demand, and also cooperates with the competitors, so it can apply the information to new service development rapidly. C rarely communicates or cooperates with its competitors, so it just has a so-so level of knowledge exploration and knowledge exploitation. Through the above analysis, this study puts forward the following initial hypothesis:

H3: external competition climate has a positive influence on the knowledge exploration.

H4: external competition climate has a positive influence on the knowledge exploitation.

### **Cooperation Climate and Knowledge Ambidexterity**

The external cooperation climate of enterprise is positively correlated to the knowledge exploration from Table 6. Through cooperation with external partners, enterprise can get specific new knowledge from the partners, and finally to enhance its service innovation performance. A cooperated with “CHIU SHUI”, a clothing brand, and developed special services, including warehouse management, inventory forecast and distribution, welling meeting the demand of its logistics services, and finally developed A’s marketing success rate. D merely cooperates with suppliers and customers, and doesn’t cooperate with any scientific research institution, university or competitor, so the level of its knowledge ambidexterity is just so-so. Through the above analysis, this study puts forward the following initial hypothesis:

H5: external cooperation climate has a positive influence on the knowledge exploitation.

## **Internal Innovation Climate and Knowledge Ambidexterity**

### **Organization Support and Knowledge Ambidexterity**

It can be seen from Table 6 that the internal organizational support is positively correlated to its knowledge exploration. For instance, A provides its staff with enough opportunities for further studies and amply rewards the creative staff, so it has a good level of knowledge exploration and knowledge exploitation. If an enterprise can provide its staff with a good training and advanced study plan and encourage its staff to make innovations, its ability to explore and exploit knowledge will be enhanced greatly. Through the above analysis, this study puts forwards the following initial hypothesis:

H6: internal organizational support has a positive influence on the knowledge exploration.

H7: internal organizational support has a positive influence on the knowledge exploitation.

### **Task Support and Knowledge Ambidexterity**

It can be seen from Table 6 that task support is positively correlated to the knowledge exploration and knowledge exploitation. For example, A sets a clear development goal each year and can assign work to staff according to their strong point; most work can be done with creativity. B assigns work by project and the staff dominate their work freely, but they can’t do work with much creativity. C always sets a clear, but not challenging business goal. D sometimes doesn’t allocate work task clearly, and the staff just work according to the superior order. This shows that only the task and work with a clear goal can make staff more eager to explore knowledge, and that the work with a space for creativity can also promote an enterprise to explore and exploit knowledge. Through the above analysis, this study puts forwards the following initial hypothetical propositions:

Proposition 8: internal task support has a positive influence on the knowledge exploration.

Proposition 9: internal task support has a positive influence on the knowledge exploitation.

### **Staff Support and Knowledge Ambidexterity**

It can be seen from Table 6 that staff support is positively correlated to the knowledge exploration and knowledge exploitation. For example, the management of A encourages the staff to express different views, put forward suggestions and make innovations, so the level of its knowledge exploration and exploitation is very high. B conducts flat management, holds

brainstorming conference regularly, and gives material incentives to the staff that put forward rational suggestions, so the level of its knowledge exploration and exploitation is high. Since the management of D doesn't support creative ideas, the staff doesn't have high enthusiasm, so the level of its knowledge exploration and exploitation is low. Through the above analysis, this study puts forwards the following initial hypothesis:

H10: internal staff support has a positive influence on the knowledge exploration.

H11: internal staff support has a positive influence on the knowledge exploitation.

## **Knowledge Ambidexterity and Service Innovation Performance**

### **Knowledge Exploration and Service Innovation Performance**

It can be seen from exploratory case analysis that knowledge exploration of enterprise is positively correlated to service innovation performance. A was designed after the general manager of Hangzhou Branch visited small-sized e-commerce enterprises and understood the practical difficulties faced by customers and their actual demands. This service was accepted by customers and promoted nationwide rapidly as soon as it was launched. But D, which is poor in knowledge exploration, obviously doesn't have ideal service innovation performance. This shows that only when an enterprise explores more knowledge can it be better able to solve problems and find more business opportunities to have its service innovation performance get better. Through the above analysis, this study puts forwards the following initial hypothetical proposition:

H12: the knowledge exploration of enterprise has a positive influence on its service innovation performance.

### **Knowledge Exploitation and Service Innovation Performance**

It can be seen from Table 6 that knowledge exploitation of enterprise is positively correlated to service innovation performance. For example, in terms of knowledge exploitation, A and B behave well, both of which have good service innovation performance; but C rarely can apply the knowledge acquired to new service development, its service innovation performance is not good. B has good system development ability. To realize fast and effective terminal matching and input of delivery address information, B bought a piece of address parsing software from a provider and dismantled the software. On the basis of the original software, it made secondary development, finally realizing the effective input of terminal data, thus pre-posing client terminal behavior, eventually enhancing service innovation performance. Through the above analysis, this study puts forwards the following initial hypothetical proposition:

H13: knowledge exploitation of enterprise has a positive influence on its service innovation performance.

## **Innovation Climate and Service Innovation Performance**

### **External Innovation Climate and Service Innovation Performance**

It can be seen from the data in Table 6 and the above analysis that external innovation climate is positively correlated to service innovation performance, and that the external policy climate, competition climate and cooperation climate of an enterprise all can help enhance its service innovation performance. For instance, both A and B, which have a good external innovation climate, have good service innovation performance; but D doesn't has good service innovation performance due to its poor perception of external innovation climate. Therefore, this study puts forward the following initial hypothesis:

H14: external innovation climate (policy climate, competition climate and cooperation climate) has a positive influence on service innovation performance.

### **Internal Innovation Climate and Service Innovation Performance**

It can be seen from the data in Table 6 and the above analysis that internal innovation climate is positively correlated to service innovation performance, and that internal organization support, task support and staff support all can help enhance service innovation performance. Therefore,



this study puts forward the following initial hypothesis:

H15: internal innovation climate (organization support, task support and staff support) has a positive influence on service innovation performance.

## CONCLUSIONS

By researching the four exploratory cases, this paper analyzed the mechanism of internal and external innovation climates on service innovation performance in the enterprise, holding that knowledge ambidexterity has a mediating effect on the mechanism of the impact. In other words, internal innovation climate and external innovation climate help enhance an enterprise's service innovation performance by promoting it to explore and exploit knowledge. This research verified some scholars' research on the positive relationship between innovation climate, knowledge ambidexterity and innovation performance(Figure 2).

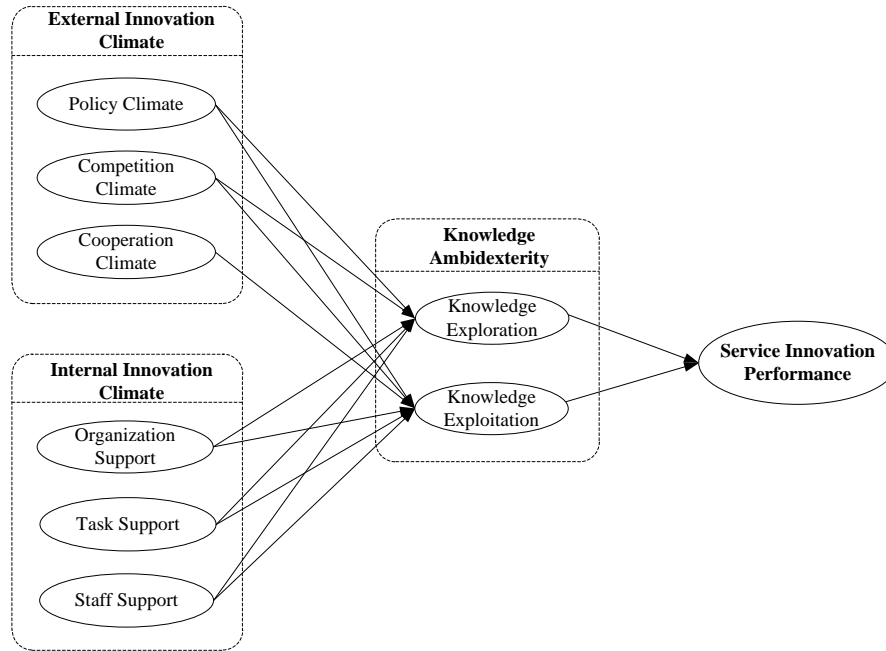


Figure 2- The Relationship of Innovation Climate, Knowledge Ambidexterity and Service Innovation Performance

In the follow-up research, we will further discuss and verify how innovation climate affects service innovation performance through the intervening mechanism of knowledge ambidexterity. Meanwhile, we can further research the interactivity and complementarity between enterprise internal and external innovation climates, and verify whether the effect between the two on innovation performance is greater than their respective one-way performance in the follow-up study. Despite the choice of logistics enterprises as research objects in this paper, due to the uneven development levels of Chinese logistics enterprises, a particularly clear research conclusion couldn't be drawn from the final research result. So the follow-up research hopes to make an in-depth research on specific objects.

## Acknowledgments

It is a project supported by Natural Science Foundation of Zhejiang (No:LY15G020008), and Modern Business Circulation System Construction Collaborative Innovation Center & Contemporary Business and Trade Research Center of Zhejiang Gongshang University (No:14SMXY01ZD), and also supported

by Zhejiang Public Projects(No:2014C33099), National Science Foundation of China(No:61305148).

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