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Technological configuration capability, strategic flexibility and organizational performance in Chinese high-tech organizations

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Abstract: The purpose of this study is to investigate the moderating effect of technology configuration capability on the relationship between strategic flexibility and organizational performance through different stages of technological life cycle. Through the empirical research on the 439 Chinese high-tech organizations, it shows that a technological configuration capability has enhanced the effect of strategic flexibility to the organizational performance in the complex dynamic environment. However, the impact on the different stages of technological life cycle is different. In addition, this paper explored strategic flexibility on different stages of technological life cycle on the basis of empirical study.

Key words: Strategic Flexibility; Technology Configuration Capabilities; Organizational Performance; Complex-dynamic Environment, Chinese high-tech organizations

1. Introduction

Numerous studies have indicated that strategic flexibility reflects one type of dynamic capability that enables firms to achieve a competitive advantage in turbulent markets (Eisenhardt and Martin, 2000; Teece et al., 1997). To meet the requirements of fast knowledge diffusion in market demand，firms with strong

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technological capabilities must develop dynamic capabilities that enable them to reconfigure their resources and adapt to changing environments (Eisenhardt and Martin, 2000; Teece, Pisano, and Shuen, 1997). In this sense, strategic flexibility is one type of complementary organizational capability that can help the firm achieve the full potential of its key resources when used in combination (Barney, 1997; Zhou et al., 2010). Because strategic flexibility emphasizes the flexible use of resources and reconfiguration of processes, it helps firms to break down the institutional routines and enhance the abilities to deploy and utilize various resources and know-how (Anderson and Tushman, 1990; Song et al., 2005).

Previous empirical researches on strategic flexibility are mainly divided into two parts. The first is to explore the effect of strategic flexibility (Feifei Yu，2012), especially the relation with organizational performance (Nadkarni & Narayanan 2007; Nadkarni & Herrmann, 2010；Ranjan Karri, 2001; Yaqing Lin, 2013; Huaichao Chen, 2016) and firm competitively（Yang et al., 2015）. The other part is to explore driving factors of strategic flexibility such as dynamic capabilities (e.g. human resource capabilities)(Doordarshi Singh, 2013), TMT (Top Management Team) (Tang Wang, 2015), firm resources (Ian Combe et al., 2012) and business model innovation (Schneider et al., 2014). But these studies on strategic study lack a specific focus in the field, provide an excessive definitional focus or lack a clear empirical overview of research in the field (Brozovic, 2016).

Furthermore, most researches concentrate on the mediating test of strategic flexibility, investigating some individual variables like CEO social network (Virginia Fernandez-Perez et al., 2012) and personality (Sucheta Nadkarni & Pol Herrman, 2010), entrepreneurial orientation (Mohammad et al., 2013), and other organizational factors like organizational learning (María, 2012), organizational learning ambidexterity (Zelong Wei et al., 2013), innovative capability (Ignacio Tamayo-Torres, 2010), strategic orientation (Sabai Khin et al., 2012) affected the enterprises performance and product innovation through improve strategic flexibility. However, there are limited research explore how strategic flexibility impact on organizational performance in a contextual study paradigm, neglecting in-depth discussion about mediating effect of potential influencing factors or moderating and mediating effect.

For different types of enterprises, the impact of strategic flexibility processes and

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mechanisms are different. Based on the perspectives of resource-based view and the capabilities perspective of the firm, this paper tries to analyze the relationship between strategic flexibility and organizational performance in a more dynamic analysis framework. Overall, this paper has three objectives. Firstly, what is the role of organizational technological configuration capabilities play in the process of effect of strategic flexibility on organizational performance? Secondly, do this influencing process and vigor change in a complex-dynamic environment? Thirdly, what are the characteristics of strategic flexibility on different stages in technological life cycle in a longitudinal study? Accordingly, this paper utilizes new high-tech enterprises in China as the samples to examine empirically the hypothesis proposed through literature review and theoretical deduction, with an aim to obtain a more scientific and explicit examination and explanation of the relationship among complex-dynamic environment, strategic flexibility and organizational performance.

2. Theoretical Analysis and Research Hypothesis

2.1. Strategic flexibility and organizational performance

"Success in the 21st century organization will depend first on building strategic flexibility (Hitt et al., 1998)." In highly dynamic competitive environments, a firm can achieve competitive advantage with quick response to the environment and renewed strategic orientation (kevin Zheng Zhou et al., 2010). Thus strategic flexibility is closely linked to environmental uncertainty (Abbott and Banerji, 2003).

From the perspective of competition resource-based view, strategic flexibility is an ability to achieve competitive advantages by makes decisions against the market environment and future resources of dynamic and high-uncertainty, which is divided into tow dimensions of resource flexibility and coordination flexibility (Sanchez, 1997). The resource flexibility is decided by the nature of the resource itself, while coordination flexibility reflects the capability of corporation in utilizing resources (Grewal and Tansuhaj, 2001). Likewise, Harrigan (1980) regards strategic flexibility as a firm's ability to redeploy its assets without friction. In changing environment, strategic flexibility needs both flexible resources and the ability to effectively utilize

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resources (Grewal and Tansuhaj, 2001). As a strategic asset, strategic flexibility is an organizational ability to identify external environmental changes, and to put in resources rapidly and apply the input resources smoothly in responding to the changing actions. Similarly, Shimizu and Hitt (2004) refer to SF as a kind of organizational capability, which includes identifying changes and uncertainties, quickly committing resources to new projects in response to changes, and acting timely to halt or reverse existing resource commitments. For new high-tech enterprises, strategic flexibility is the ability to manage effectively the changing environment faced by technology-intensive enterprise, influenced by environmental uncertainty, mainly comprised by flexible resources and ability and extensive strategic plans (Aaker, 1984).

According to these definitions, strategic flexibility can definitely improve effectiveness of plans, decisions and strategies. Therefore, Das (1995) regarded strategic flexibility as the key to high performance (Das, 1995), and Porter et al (1998) pointed that strategic flexibility was the key and the most important one in those core factors, which integrated with core competence and influenced on organizational competitiveness together. In addition to offering products and services adapted to changing environments, SF also enhances firm performance (Miles and Snow, 1978). Empirically, Madhavan (1996) proved that organizational resources flexibility had positive effect on organizational performance in the global industry of steel. From the two aspects of response flexibility and prevention flexibility, Ranjan (2001) provided evidence that strategic flexibility affected organizational performance in a positive way. Similarly, Lee (2002) supported the positive effect of strategic flexibility on organizational performance. Abbott and Banerji (2003) demonstrate that strategic flexibility had strong positive effect on organizational. Therefore, Based on the above theoretical analysis, we proposed as follows:

H1: *Strategic flexibility has positive effect on organizational performance.*

2.2. The Mediating Effect of Organizational Technological Configuration Capabilities

As mentioned earlier, the influence of strategic flexibility on organizational

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performance is contextual (Schwenk and Shrader, 1993; Meilich and Marcus, 2006). Rudd, Greenley, Beatson, and Lings (2008) note that although the notion of flexibility has received much attention in the strategic management literature given its key role in coping with evolving market conditions, empirical research on this concept in the strategic planning context is very scarce (Jianjun Yang et al., 2015). Thus, work prior to the present study has not investigated that how strategic flexibility help firms cope with complex dynamic environment to improve organizational performance (Su et al, 2008).

The changes and innovation in technology provide strong leverage for creating competitive values, and corporations need technological innovation to improve competitiveness for survival and development, which is especially so in those hi-tech companies with scientific technology as the core. At the same time, acceleration of technological change will release more opportunities and dangers. In such a context, organizational strategic flexibility exerts bigger role in organizational performance than in a low technological changing context (Grewal & Tanshhaj, 2001). When technological change and innovation strengthen, corporations based on strategic flexibility design can identify chances and threats in the market more quickly and accurately, and further enhance the competitiveness through identifying and effectively apply resources (Gotteland &Boule, 2006; Baker & Sinkula, 2007). Zander et al (1995) proved that strategic flexibility enhanced the organizational performance by reducing the degree of reliance of corporations on acquired properties; Galbraith (1990) even defined “strategic flexibility” as the capability of corporations in rapidly and effectively converting core-manufacturing technologies across boundaries and devices. So, the technological capability of corporations is mainly reflected in inner creation of new knowledge, reconfiguration of existing knowledge and external new knowledge and development of inter-organizational knowledge, reflecting the ability of corporations to apply “flows” to promote commercialization of technological assets (Eisenhardt, 2000; Henderson et al, 1994).

In a rapid changing and high uncertain environment, traditional core technology and resource become stumbling block in organizational development due to relative viscosity (Tecee， Pisano & shuen, 1997), and especially the path dependence of core competency makes it difficult for corporations to develop the ability to adapt themselves to the new environment, and to fall into core rigidities (Leonard-Barton,

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1990), and organizational resources will lose their value since they cannot adapt to the changing environment (Barney, 1997). In such a context, scholars in the field of strategy gradually transfer the attention to the dynamic process, from only on the "storage" of organizational technological ability to on the "flow" of organizational technological ability, which are technological configuration capabilities. Technological configuration capabilities mean the abilities to grab new market chance to deploy or combine organizational technological asset structures through integrating internal and external technological resources (Wu et al., 2017), especially the obtaining, developing and maintaining the combination of organizational resources and capabilities (Dierickx & Cool, 1989; Kogut & Zande, 1992; Henderson & Coekburn, 1994; Zander & Kogut, 1995; Szulanski, 1996; Teecet, Pisano & Shue, 1997). Teece et al (1997) proposed the concept of "dynamic capabilities", that is "the ability to integrate, establish and rebuild internal and external competences to adapt to rapid changing environment". This concept reminds us that corporations need not only underlying assets, but also effective ability to configure technologies, which is "the process of integrating, deploying, obtaining and releasing resources to match or even create changes in market" (Eisenhardt & Martin, 2000). Some corporations can flexibly cope technological changes just because they successfully find available new technological opportunities to form up their technological abilities ahead of time.

Based on the above theoretical analysis, we proposes that:

H2: *Technological configuration capabilities play the role of mediator in between strategic flexibility and organizational competing performance.*

2.3. The moderating effect of "Complex-Dynamic Environment" Matrix

The prior studies demonstrated that organizational performance depends on the external environmental conditions (Barney et al., 1991). Responding to the recent call for flexibility research to enhance the predictive powers of theories by considering the influence of environmental contexts (Zahra and Wright 2011). And in practical background of increasing fierce global competition, rapid progress in technology and updating customer demand expectations are devising a knowledge intensive, complex and uncertain environment (Huber, 1984). The environment corporations life is usually vague and inexplicit, and "the only thing constant is

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constant change" (Jaikumar, 1986). Among all the environmental types, turbulence environment best reflects the current market, especially the hi-tech market, which refers to the rate and unpredictability of changes in a firm's external environment (Danneels and Sethi 2010). In the turbulent environment, organizations especially in the hi-tech market, need to keep adjusting existing operating activities or strategic orientation according to dynamic changes in environment in order to better cope with the challenges from fluctuated demand and technological innovation (Morgan et al., 2005).

Turbulent environment includes two dimensions: one is dynamism of environment, which means that uncertainty and unpredictable behaviors of competitors and customers cause the changes and updates in organizational environment (Jaworski and Kohli 1993); the other dimension is the complexity of environment, which means the diversification of the factors in organizational environment and the complexity of the relationship in between these factors (Jaworski and Kohli 1993; Tsai et al., 2002). Accordingly, the environment can be categorized as simple environment and complex environment. Therefore, the complex-dynamic environment matrix is composed by four quadrants, which are simple-dynamic, simple-static, complex-dynamic, complex-static (see in Fig. 1). This paper inspired by product life cycle (PLC) theory by (Paymond Vernon, 1966), the process of innovation and spreading of any new product and technology is divided into: initial stage, growth stage, mature stage and decline stage, all of which will present an "S" curve (See Fig.1). As for knowledge intensive organizations, the balance between technology and market is an issue of developing core competence of organizations. Whether an organization can grasp the characteristics of external market on different stages in the technological life cycle, and whether an organization can get involved in the initial stage of new technology and withdraw in the decline stage of new technology test the technological configuration abilities and therefore is become crucial decision making for the success of organizations.

2.3.1 Technological Initial Stage: Dynamic-Simple environment

In the technological initial stage, organizations are facing a dynamic-simple external environment. First of all, in the early stage, the usage of any new technology is not

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easily identified, not even by those inventors, not to say transition. High-uncertainty is the feature faced by organizations during innovating period. Specifically, the future market demand is difficult to predict, the feasibility and economic benefits of the technological scheme are highly uncertain, and various technological schemes coexist due to the lack of uniform standards. It is necessary for innovators to compare the advantages and disadvantages of various schemes to reduce the risks of failure as much as possible (Yang & Feng, 2003). Secondly, since new technology is not yet formed, industrial standards and technological scheme are only in the hands of few corporations. The major parts stay in the R&D and lab phases. Therefore, there are few competitive factors in the external environment; some of the elements of competition are similar. Since the market demand is not fully defined, more of what determines organizational performance comes from "whether it is superior to competitors in technology commercialization and successful access to the consumer market", which puts forward higher requirements for the combination of internal and external technologies. Hence, we proposes:

H4: *In "Dynamic-Simple" external environment, the effect of technological configuration capability on organizational performance will be enhanced.*

2.3.2 Technology growth stage: Dynamic-Complex environment

At the stage of technological growth, corporations are faced with a Dynamic-Complex external environment. The growth and development of new technologies will greatly affect the products and production process of mature industries. New technological standards gradually penetrate into the market, while outmoded technological standards have not withdrawn from the market competition stage. Both sides are locked in a seesaw struggling stage of seizing market share and inducing market demand, activating again the uncertainty faced by those who have already entered the mature industry. At this point, the market demand uncertainty cannot be predicted, and corporations with long term market insight will pour into emerging market. The competing factors increase, while factors with new technical standards and old ones are not similar to each other. However, the basic elements of competition remain the same. The market enters high-uncertain and high-competitive environment (Yu et al., 2017). Therefore, "Dynamic-Complex"

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external environment requires corporations to adapt to the complexity and dynamics of the market correctly and quickly in addition to rapid communication of information and technology.

Only by converting the latest technology in the lab into the products applying to the market demand or by creating products required by the market can a corporation win in the fierce competition in the market. Therefore, the technological configuration capability becomes particularly important, which may cause evolution of industrial organizations, break the original industrial pattern of competition and lead the rapid growth of the industry bringing high business and financial values for corporation. Hence, we proposes:

H5: *In the "Dynamic-Complex" external environment, the impact of technological configuration capability on organizational performance will be enhanced.*

2.3.3 Technological mature stage: "Static-Complex" environment

In the stage of technological mature, corporation is faced with a "Static-Complex" external market environment. First of all, with the development and maturity of emerging industries, key technologies and products have unified standards, technological support has a systematic integration program, and technology and product development trend has become more clear. Since in mature industries, many standardized products are manufactured through market mechanism. With the industrial development and gradual standardization of products, the uncertainty of market demand is relatively decreased. Secondly, the advanced technology and end product design grasped by few corporations may pass patent protection period, or be imitated and diffused by more corporations, and technological barrier has almost disappeared. A flood of companies rush in, leading to a sharp rise in competition in the external environment and even excessive competition and finally the rapid aging of products and services (Encarnación et al., 2018). Therefore, on this stage, corporations need to explore new opportunities and capabilities to use existing technology to realize high-leveled technological innovation in order to resist the market risk caused by high competition avoiding the price war quagmire. Therefore, we proposes:

H6: *In the "Static-Complex" external environment, technology configuration*

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capability has no significant effect on organizational performance.

2.3.4 Technology decline stage: Static-Simple Environment

On the stage of technology declining, corporations are faced with a "Static-Simple" external market environment. First of all, emerging technologies are already very mature, leaving little space for innovation. Since the emergence of new technologies is still not ready, market uncertainty has declined and entered a relatively stable phase. Secondly, a few corporations may disappear or merge other corporations forming monopoly effect after a good market operation. In addition, as technology is still in use and not too many companies are entering, corporations have arrived a period where they can maintain a steady profit. In the market, competitive factors are not so many, and are similar to each other, and continuous changes maintain all the time. From the perspective of organizational resources, the Static-Simple external environment causes to a sharp decrease in the market development of enterprises, and new technologies have not arrived yet. As a result, corporations put more demands on integration of resources, technology configuration and matching with environmental changes. Only by successfully integrating the existing internal and external technologies and entering the new consumer market applying existing technology, can a corporation always maintains a competitive edge and acquire rather high business and financial value to lay the capital foundation for the creation of a womb for brewing new technology. Therefore, on this stage, corporations need to promote their own technology configuration capability to realize the perfect combination of commodities and consumer market demand, by which can the risk of market shrinking brought along with technology decline be avoided. Hence, we proposes:

H7: *In the "Static-Simple" external environment, the effect of technology configuration capability on organizational performance will be enhanced.*

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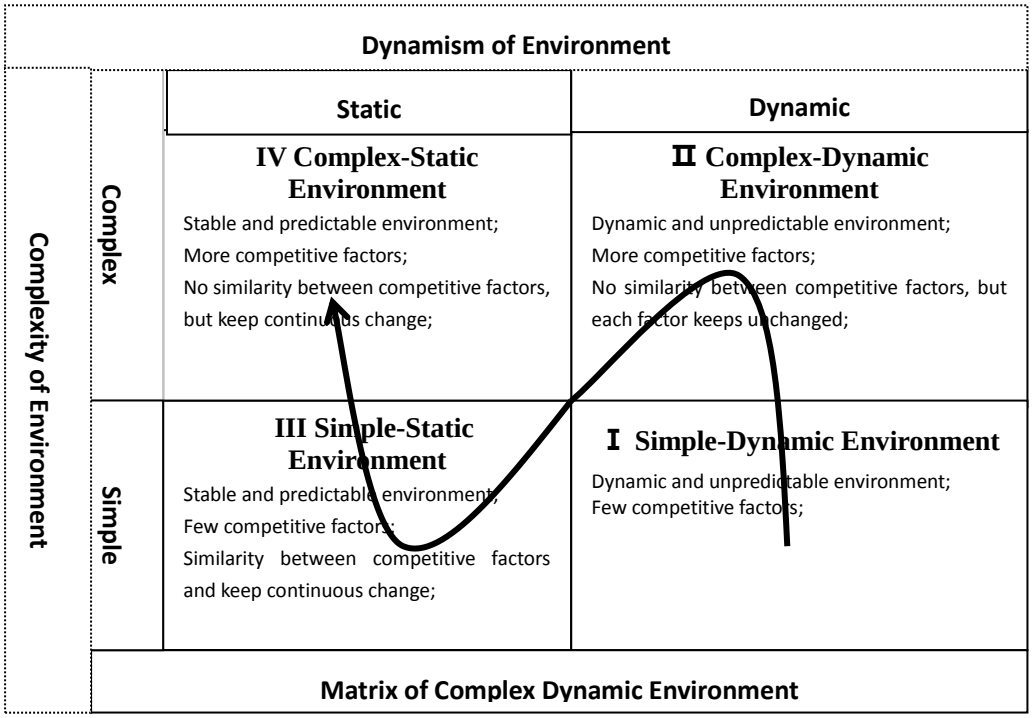

Figure 1 Matrix of Complex Dynamic Environment

3. Research Methodology

3.1. Research Sample

In order to testify the above hypotheses, this research conducted a large scale of survey on top manager of new enterprises of Hi-tech Development Zones in Guangdong province, Jiangsu province, Beijing, Tianjin, Shanghai, and Anhui province, sponsored by key project of National Natural Science Foundation of China, in which 300 in Guangdong province, 150 in Jiangsu province, 50 in Beijing, 80 in Tianjin, 50 in Shanghai and 50 in province Anhui province. Totally 680 questionnaires were distributed. Two methods were taken to distribute the questionnaires, one of which was through government high technology zone administration committee, contacting the middle or senior leaders of high-tech organizations. Training and detailed instructions were given the relevant officers before questionnaire distribution, and the other method was contacting respondent directly by researchers. Respondents evaluated each index based on Likert 6 score scale according to their own real perception. In order to avoid common method variance, we collected data from

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multiple sources, and divided questionnaires into H part and A part. At the same time, in order to obtain valid data, we asked two individuals to separately fill in each questionnaire, that is, H part can be filled in by CEO and HR Director about "vicious competition", "uncertainty of demand", "strategic flexibility", "technology configuration capability" while A part can be filled by 2 deputy general manager about "organizational performance". A total of 581 valid questionnaires were collected in this nationwide survey and the rate of valid collection is 85%. After crossing out those samples of corporations in those non-hi-tech industries and those that do not meet the requirements (the questionnaires that do not meet the requirements mainly refer to those in which continuous 10 same options were chosen or which left too many blanks). The total valid questionnaire from high-tech industries is 439. Table 1 describes some basic information about the respondents and the enterprises the respondents work for.

Table 1: Basic Information about Respondents and the Enterprises Surveyed

Corporate Type	**No. of Samples**		Respondents (H Questionnaire)	Respondents (A Questionnaire)
State-Owned	42		GM/HR Director	Deputy GM
Sino-Foreign Joint Venture	49	**Age**		
Wholly Foreign-owned	92	⩽30	134	134
Private	174	31-40	282	374
Collective	13	41-50	265	225
Others	36	⩾51	82	52
Missing Value	33	**Sex**		
No. of Employees		Male	557	568
<100	85	Female	204	215
100-500	168	**Education Level**		
500-1000	57	Graduated from high school and below	86	111
1000-2000	47	College Degree	200	210

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>2000	48	Undergraduate	406	413
Missing Number	34	Bachelor degree or above	64	47
Total	439	**Post Tenure (Month)**	53.93	55.17

3.2. Variables and Measurement

All subjects were evaluated using the Likert6 point questionnaire, from 1 (totally disagree) to 6 (totally agree). The single dimensional variable by Bierly & Chakrabarti (1996) and Grewal and Tansuhaj (2001) for "Strategic Flexibility, and this scale includes 7 items, such as "We keep adjusting strategy according the changes in the environment", "We keep adjusting resource allocation according to the changes in the environment", "Flexibility is the main feature of our organizational competition strategy" etc., which were responded by CEOs and HR Directors. The Cronbach α of strategic flexibility in this study is 0.888, the mean value is 4.46 and variance is 0.81; about "Technology Configuration Capability", the measuring scale by Jiang (2008) were applied, including 3 items, such as "We are much between than competitors in integrating internal and external technologies", "We are much better than competitors in commercialization of technology and successfully reaching the consumer market", "We are much better than competitors in applying existing technology into new market". Cronbach α of this scale in this study is 0.885, the mean value is 4.30 and variance is 0.95; about "Organizational Performance", the measuring scale developed by Wang et al (2003) was applied, including 7 items, such as "profit level", "general sales", et al. Cronbach α of this scale in this study is 0.946, the mean value is 4.30 and variance is 0.93; about "Dynamism of Environment", the scale developed by Li (2004) was applied with 4 items, such as "Customer demand and product preferences change quickly", "Customers are always in need of new products" et al. Cronbach α of this scale in this study is 0.713, the mean value is 4.22 and variance is 0.96; about "Complexity of Environment", the scale of "vicious competition" developed by Li and Atuahene-Gima (2001), with 4 items, such as "There are a lot of illegal competition in the industry", "The market competition rules

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for protecting intellectual property rights of enterprises are not very effective", "There is a lot of unfair competition on the market, such as local protectionism" et al. Cronbach α of this scale in this study is 0.754, the mean value is 3.54 and variance is 1.10.

Controlling variables: according to the former researches about performance, the nature of corporations, organizational scale (the number of employees as the proxy variable) on the organizational level were chosen.

4. Data Analysis and Results

4.1. Confirmatory factor analysis of discriminant validity in variables

Liserl 8.5 software was used to conduct confirmatory factor analysis. Table 1 displays the results of confirmatory factor analysis under 5 conditions, in which the five factor model fitted the best (χ2 =707.99；df=262； NNFI=0.97；CFI=0.97；GFI=0.89；RMSEA=0.062). In addition to the five factor model, we examined the other four models: four factor model by merging uncertainty of environment and complexity of environment into one factor; three factor model by merging uncertainty of environment, complexity of environment and organizational performance as one factor; two factor model by emerging technology configuration capability, organizational performance, uncertainty of environment and complexity of environment as one factor; the single factor model just merged strategic flexibility, technology configuration capability, organizational performance, uncertainty of environment, and complexity of environment as one factor. As shown in table 2, fitting index supported five factor model, which means strategic flexibility, technology configuration capability, organizational performance, organizational performance, uncertainty of environment and complexity of environment have good differentiated validity.

Table 2: Confirmatory Factor Analysis of Discriminant Validity of Concepts

Model	χ^2	df	NNFI	CFI	GFI	RMSEA
5 factor model: SF;TDA;CP;EU;EC	707.99	262	0.97	0.97	0.89	0.062

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4 factor model: SF;TDA;CP; EU+EC	979.15	266	0.95	0.96	0.85	0.078
3 factor model: SF;TDA;CP+EU+EC	2419.97	269	0.85	0.86	0.69	0.14
2 factor model: SF;TDA+CP+EU+EC	4195.67	271	0.79	0.81	0.57	0.18
1 factor model: CB+CI+CSE+RP+EM	6537.95	272	0.68	0.71	0.46	0.23

Note: SF=strategic flexibility; TDA=technology distribution capability; CP=organizational performance; EU=uncertainty of environment; EC=complexity of environment; + means merging

4.2. Correlation Analysis between Variables

Table 3 shows the basic descriptive statistic results of each variable. The correlation analysis results indicate that strategic flexibility has positive correlation with technology configuration capability (r=0.676, p<0.01), organizational performance (r=0.152, p<0.01). Technology configuration capability is positively related with organizational performance (r=0.177, p<0.01). Environmental uncertaintyis positively related with organizational performance (r=0.099, p<0.05), while the correlation between organizational performance and complexity of environment is not so significant. Table 2 indicates the mean values, standard deviation and correlation coefficient of various factors, such as strategic flexibility, technology configuration capability, organizational performance, environmental uncertaintyand complexity of environment. The reliability coefficients of each construct are shown on the diagonal.

Table 3: Descriptive Statistics and Correlation Analysis of Variables（N=493）

	Mean Value	**standard deviation**	1	2	3	4	5
1. Strategic flexibility	4.46	.807	(0.885)				
2. Technology Configuration Capability	4.30	.953	0.676**	(0.885)			
3. Organizational Performance	4.30	.927	0.152**	0.177**	(0.946)		
4. Dynamism of Environment	4.18	.878	0.528**	0.478**	0.099*	(0.713)	
5. Complexity of Environment	3.54	1.104	0.234**	0.265**	0.027	0.341**	(0.754)

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Note: * p<0.05, ** p<0.01 The coefficient of internal consistency of related variables is shown on the diagonal (α cooefficent)

4.3. Mediating Effects of Technology Deployment Capability

H2 is to test the mediating effect of technology configuration capability in between the relationship of strategic flexibility and organizational performance. Based on the test by Baron & Kenny, mediating effect needs 4 conditions: (1) strategic flexibility must be positively correlated with technology configuration capability; (2) strategic flexibility is significantly and positively related with organizational performance; (3) technology configuration capability is significantly correlated with organizational performance; (4) when technology configuration capability is put into the relationship analysis between strategic flexibility and organizational performance, technology configuration capability is the fully mediator if strategic flexibility is not significantly related with organizational performance; technology configuration capability is a partial mediator if the relationship between strategic flexibility and organizational performance is weakened significantly when technology configuration capability is put into this relationship.

According to the advice by Hu and Bentler (1998), this paper chose to report on 5 representative model fitting parameters, which are χ2 (root), NNFI, CFI, GFI and RMSEA separately. These 5 fitting parameters provide fitting degree parameters between data models and hypothetic model according to different logics, and 5 parameters can evaluate the fitting relationship between data and hypotheses in a comprehensive way. Based on the idea by Hu and Bentler, NNFI、CFI and GFI are above 0.9, which means the model is well fitting; RMSEA is below 0.1, indicating the model is well fitting; besides, χ2/df is less than 5, meaning a good model fitting.

Table 4 provides a structure model with 6 nested models, while M3, M4, M5, M6 are significantly different from M1 and M2. M3 and M4 illustrate that technology configuration capability is no the mediator between strategic flexibility and organizational performance; M5 and M6 respectively show that technology configuration capability is full mediator and partial mediator between strategic flexibility and organizational performance. M1 and M2 respectively describe the path relationship between strategic flexibility and organizational performance and the

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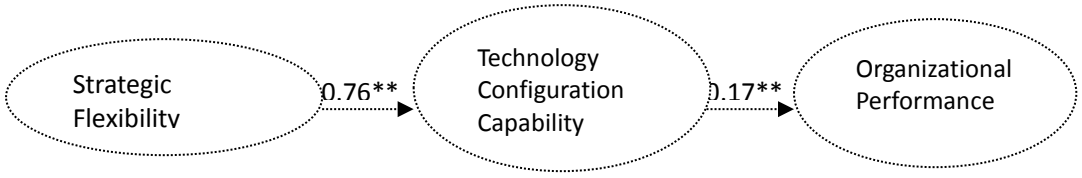
relationship between strategic flexibility and technology configuration capability. The each fitting index in M1 shows the good fitting of the model, whose path coefficient is 0.63 (t=10.83, p<0.01). Hence, Hi is supported. From χ2/df and fitting index, at the same degree of freedom the chi-square value of model 5 is the lowest. Therefore, M5 is obviously superior to M3, M4, while the △χ2 of M6 and M5 is 0.35 with no significant difference. As for models with no significant difference, we prefer simple model. Therefore, full mediating model has better fitting in M5, and the hypothesis about the mediator of technology configuration capability in between strategic flexibility and organizational performance in H2 is supported by data.

Table 4: Comparison among Structural Models

Model	χ^2	df	χ^2/df	NNFI	CFI	GFI	RMSEA
M1：SF→TDA	122.33	33	3.70	0.97	0.98	0.95	0.079
M2：SF→ CP	258.94	75	3.45	0.97	0.98	0.92	0.075
M3：SF →CP； TDA→CP	521.66	116	4.49	0.95	0.96	0.88	0.089
M4：SF→ TDA；SF →CP	327.36	116	2.82	0.98	0.98	0.92	0.064
M5：SF→ TDA；TDA→CP	325.92	116	2.80	0.98	0.98	0.92	0.064
M6：SF →CP、TDA；TDA→CP	325.57	115	2.83	0.98	0.98	0.92	0.065

Note: Δ χ^2 is The difference between the chi squares of this model and the theoretical model. *means P < 0.05 ($\chi^2(1) = 3.84$) ,**means P < 0.01 ($\chi^2(1) = 6.63$) ,***means P < 0.001($\chi^2(1) = 10.83$)。 NS means insignificant

Figure 2 shows the standardized coefficients among each variable, strategic flexibility has significant effect on technology configuration capability (β=0.76, p<0.01); at the same time technology configuration capability has significant effect on organizational performance (β=0.17, p<0.01).



Note: *means P < 0.05, **means P < 0.01。

Figure 2: Full mediation model of Strategic Flexibility and Organizational Performance

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4.4. Effect of Complexity-Dynamism of Environment

This study also applied the combined method of cluster analysis and regression analysis, and took consideration of the effects of complexity and environmental uncertaintyon the relationship between technology configuration and organizational performance. First of all, this paper conducted K-means cluster analysis based on the mean values of complexity and dynamism of environment, which is completed through three steps: first, hierarchical cluster analysis of samples; second, analyze and calculate the next primary center needed by K-means cluster through mean values comparison; third, confirm the various combinations of "High-high", "High-low", "Low-high" and "Low and low" complexity and dynamism of environment. See figure 3.

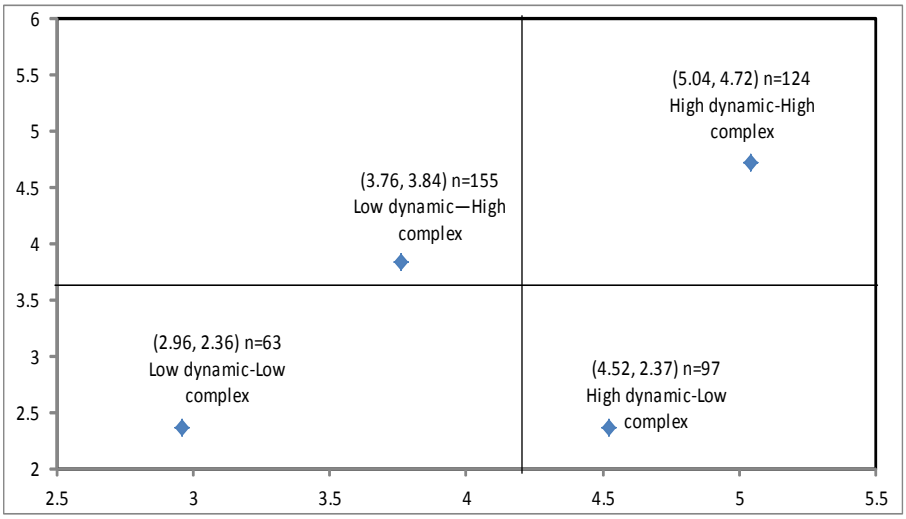

Figure 3: Four-quadrant Model of Complexity-Dynamism of Environment

From figure 3, the mean values dividing four quadrants are 4.17 figu, and accordingly categorize the levels of dynamism and complexity faced by 439 responding corporations. Based on the four conditions, the regression model of relationship between technology configuration capability and organizational performance is analyzed. See table 5.

Table 5: The Relationship between Technology Configuration Capability and Organizational Performance in Different Environments

	High Dynamic-	Low Dynamic-	Low Dynamic-	High Dynamic-

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	Low Complex	High Complex	Low Complex	High Complex
Technology Configuration Capability and Organizational Performance	M1	M2	M3	M4
Standardized regression coefficient	0.197*	1.412(NS)	0.322**	0.195*
sig	0.05	0.16	0.01	0.034
R^2	0.039	0.006	0.088	0.038
F value	3.74	1.994	6.692	4.614

Note: * in the table means P < 0.05 , ** means P < 0.01. NS means insignificant

From table 5, in the "Low dynamic-Low complex" environment, the relationship between technology configuration capability and organizational performance is very significant (r=0.322, p<0.01), while in the " Low dynamic- High complex" environment, insignificant (r=1.412, ns), and in the "High-dynamic- Low complex" and "High dynamic- High complex" environments, the relationship between technology configuration capability and organizational performance is significant on the level of r=0.05.

5. Conclusion and discussion

Building on Resource-based theory and organizational competent theory, we examine the effects of strategic flexibility on organization performance. We find that the moderating effect of organizational technology configuration capability on organizational performance. We further find that technological configuration capability enhances the positive relationship between strategic flexibility and organization performance, but the mediator effect is different under different external environments based on the dynamic analytic framework of technological life cycle. Our findings thereby contribute to existing literature in three major ways.

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First, our findings provide a more nuanced understanding of the curvilinear effects of strategic flexibility on organization performance. Previous literature highlights the role of strategic flexibility for performance improvement in that strategic flexibility emphasizes the flexible use of resources and reconfiguration of processes, it reflects one type of dynamic capability that enables firms to achieve a competitive advantage in turbulent markets (Eisenhardt and Martin, 2000; Teece et al., 1997). Consistent with this logic, we find that technological capability enhances a firm's dynamically use of its existing knowledge and expertise in product innovation. Therefore, firms with great technological capability are more likely to search beyond the domain of neighborhood knowledge and embark on a broader level of exploration that transcends existing technological and organizational boundaries (Kavin Zheng Zhou & Fang Wu, 2010). Therefore, technological capability makes the positive linkage between strategic flexibility and performance stronger.

Even more novel is our finding that strategic flexibility has an inverted S-shaped relationship with performance in different external turbulent environment (See Fig.1). During the three periods of initial stage, growth stage and declining stage in high-tech enterprises, the technology allocation capability will enhance the positive relationship between strategic flexibility and corporate performance whereas in the mature stage of technology, this mediating effect is not obvious (See Table 6).

Table 6

Features of Strategic Flexibility Levels in the Matrix Complex-Dynamic Environment

TLC	EEF	SF Level	TCC	Cor. Type	OF
Initial	Dynamic unpredictable; Few competitive factors;	Free Action	Yes	Laboratory	Small market share; Strong technological innovation power; Obscure brand advantage;
Growth	Dynamic Unpredictable; More competitive factors;	Challenge any time	Yes	Bellwether	Grab market share Strong technological innovation power Obvious brand advantage

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Mature	Static predictable; Competitive factors;	Relatively stable	No	Monopoly	Large market share; Weak technological innovation power; Obvious brand advantage;
Declining	Static Predictable; Few competitive factors;	Re-orientation	Yes	Imitative	Small market share; Weak technological innovation power; Obscure brand advantage;

* TLC means technological life cycle; EEF means external environment feature; SF level mans strategic flexibility level; TCC mans technological configuration capability; Cor. Type means corporation type; OF means organizational feature

These findings enrich extant literature by demonstrating the path on how the strategic flexibility affected performances due to the technological configuration capability changed in different external environment. These findings not only reconcile the conflicting views about the relationship between flexibility and innovation (e.g., Shrader et al., 1997； Schwenk & Shrader，1993) but also add significantly to existing anecdotal evidence and case studies that indicate the failure of technology-leading firms in the face of rapid environmental change (Christensen, 1997, 2006).

Second, we advance extant literature by proposing and confirming empirically that strategic flexibility helps firms with superior technology improve their configuration capability. Recent work calls for the identification of ‘dynamic capabilities’ that firms can use to adapt, integrate, and reconfigure their resources and competencies in response to changing environments (Eisenhardt and Martin, 2000), a field that suffers from a lack of empirical evidence (Lavie, 2006). We propose that strategic flexibility, as an organizing principle may not directly affect performance; rather, it must work together with dynamical organizational capabilities to affect performance. Consistent with our propositions, we find that strategic flexibility has no direct effect on performance but instead enhances the positive effect of technological capability on performance.

Our findings also provide some important managerial implications. From the longitudinal study of time dimension, on different technological life stages,

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knowledge intensive organizations are faced with various external environmental features, which put forward different requirements of organizational technology configuration capability. The effect process and intensity vary too. Through anatomizing external environmental features on technological life cycle, more scientific and distinct explanation and argumentation of the relationship among environments, strategic flexibility level and organizational performance are acquired

Firstly, knowledge intensive organizations should make a right decision on which life cycle development is the new technology, in order to grasp the external environmental features more accurately. The competitive external environment is usually fluctuating, especially for knowledge intensive organizations, not only requiring them face with the attacks from competition strategy and behavior adjustment of competitors, uncertain directions of customer preference, pressure from both sides of supply and demand, and other single managerial competitive factors and compound technological competitive factors. The complexity and environmental uncertaintylead to the nonlinear relationship between competitive factors and between cause and effect. Therefore for knowledge intensive organizations, it is rather difficult to directly identify the key factors influencing organizational success and failure from complex competitive environmental system. Organizations need to have real time monitor and analyze each stage in technological life cycle to catch some subtle change information in competitive environment, so that they can judge the possible shocking effect on corporations and develop buffer strategies in a timely manner.

Secondly, knowledge intensive organizations should move their focus from “owning technology” to “using technology”. With the coming of new economic era, global competition becomes increasingly fierce. The complex and dynamic external environment has put massive pressure on the survival and competition of organizations. For a long time, China's new technology-based enterprises have always focused introduction and trifled with absorption, causing no synchronous lifting in innovation ability and slow scale expansion. Thus, technological innovation cannot reach the consumer market quickly and transform into the competitive advantage and core organizational competence. Inspired by Resource-based theory, knowledge intensive organizations should attach pay attention to their own “technological assets” (technological resources owned by organizations) and at the

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same time more emphasis should be laid on technology configuration capabilities (how do organizations use technological resources), which is crucial to promote organizational strategic flexibility, improve the organizational performance and competitive advantages.

Lastly, knowledge intensive organizations should move from “static orientation” to “dynamic orientation”, promoting organizational strategic flexibility on different technological life cycle stages. Strategic flexibility has the characteristics of flexibility and adaptability to reduce environmental threats, respond quickly and actively utilize external resources. Nowadays organizations’ internal environment, external environment and the interaction between the internal and external environment are more dynamic and complex, it is critical for organizations to cultivate and update all kinds of strategic flexible elements needed for the current and future competition based on reality, and enhance the adaptability of complex dynamic environment with the help of promoting strategic flexibility. In complex and dynamic competitive environment, it is very challenging for organizations to surpass core competence for long term, because the competitive advantages cultivated relying on resources and strength are often easily replaced by fast technology and product innovation. While organizations cultivate the core competence based on dynamic flexibility to respond to changes in environment and adjust organizational resources allocation in time to adapt to requirements of complex and dynamic environment, should consider the difference at the organizational life cycle with initial, growth, mature and decline stage. Organizations should “change to change” according to the changes in their own situations and external environment.

6. Limitation and directions for further research

It must be pointed out that there are some limitations in this study. First of all, samples were not acquired by probability sampling, but by choosing the high-tech enterprises in the Hi-tech Development Zones Guangdong province, Jiangsu province, Beijing, Tianjin, Shanghai, and Anhui province. It may limit research conclusion from being generalized over all hi-tech enterprises in China. Future study can sample hi-tech enterprises from wider coverage of cities, provinces and non Hi-tech

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Development Zones. Secondly, it is too simple to matrix the external environments from two variables of demand uncertainty and vicious competition, although this study tried to start from technological life cycle and dynamic analysis of external environment, and discovered that organizational technology configuration capability is a dynamic process instead of static resource. Future research should focus on the external environmental features reflecting the level of strategic flexibility, research how to make full use of resource flexibility and coordination flexibility and obtain strategic advantages from global market with fierce competition.

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